SCIENCE

8 December 1972

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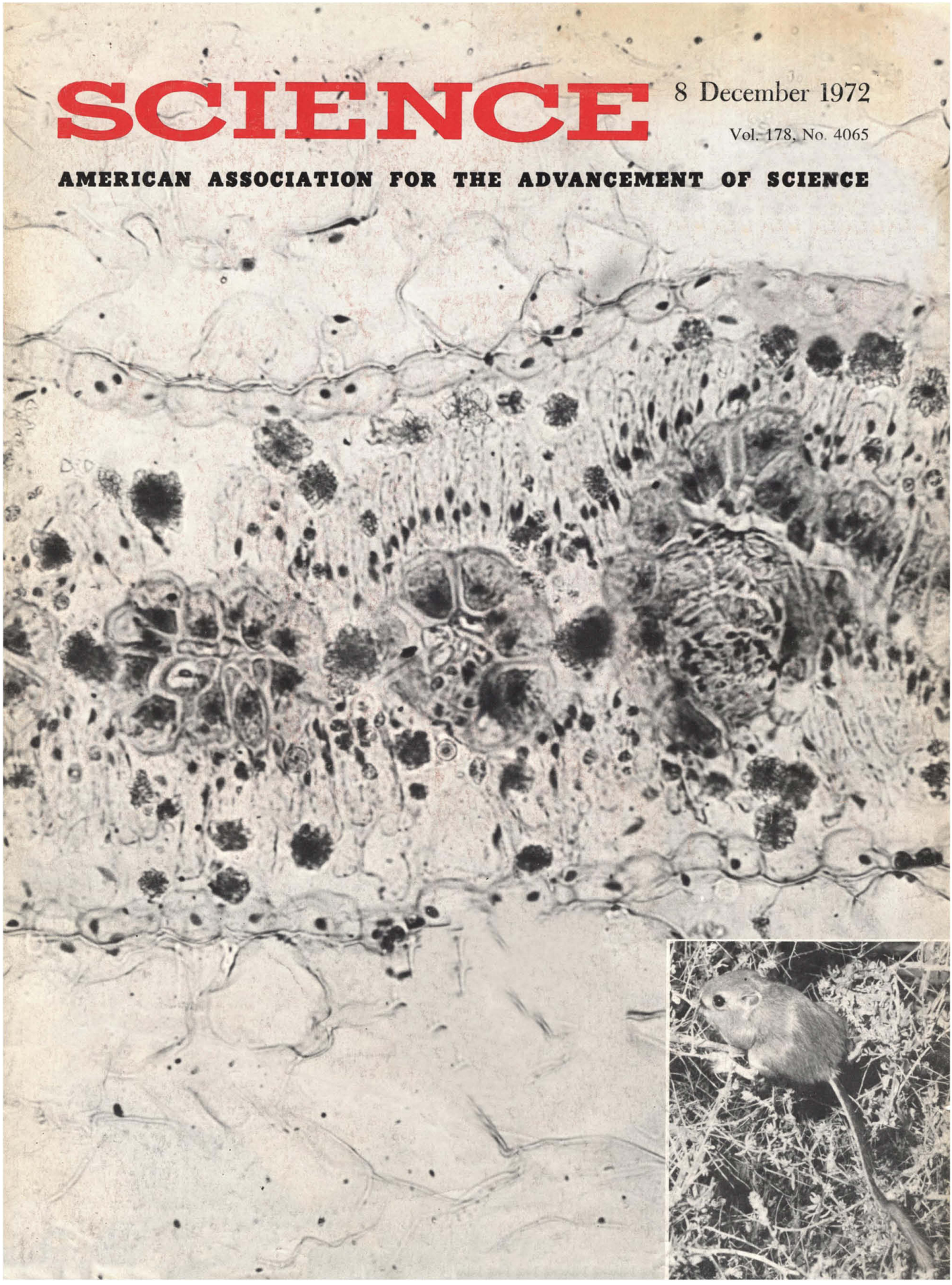
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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By **Amos Turk,** City College of CUNY; **Jonathan Turk;** and **Janet T. Wittes,** of the George Washington Univer. 217 pp. illustrated. Soft Cover. March 1972. $3.95. Order no. 8925.

Fischer: SCIENCE, MAN AND SOCIETY

This unusual supplementary text should be read by all students enrolled in introductory science courses. It can heighten the student's interest in science curriculum by demonstrating its relevance to his daily life. Shows how science and technology have shaped today's society, and knowledge gained in the laboratory can be applied to the solution of many current social and moral problems ranging from air and water pollution to the ethical considerations involved in the development of nuclear energy.

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By **Elmer E. Anderson,** Clarkson College of Technology. 430 pp. 106 ill. May 1971. $14.50. Order no. 1220.

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Discussing subjects ranging from the rudiments of ac and dc theory to the principles of circuit design, the author provides an easy-to-understand introduction to electronic instrumentation for students enrolled in a one semester course. No prior knowledge of electronics is assumed. The principles behind the operation of semiconductors and transducers are fully developed. Practical results and applications are emphasized throughout. A laboratory manual is also available.

By **A. James Diefenderfer,** Lehigh Univ. Text: 675 pp. 745 ill. April 1972. $14.95. Manual: 375 pp. 257 ill. April 1972. $7.50. Order no. Text: 3075. Manual: 3072.

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By **Jerry B. Marion** and **Ronald C. Davidson,** Univ. of Maryland. 230 pp. ill. February 1972. $4.75. Order no. 6070.

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Vol. 178, No. 4064

SCIENCE

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COVER

Cross section (25 μm) of leaf of salt bush (about $\times$ 300). (Insert) Great Basin or chisel-toothed rat on the top of a spiny saltbush. Most kangaroo rats forage for seeds in the soil, but this species is an aboreal leaf forager. See page 1094. [G. J. Kenagy, University of California, Los Angeles]

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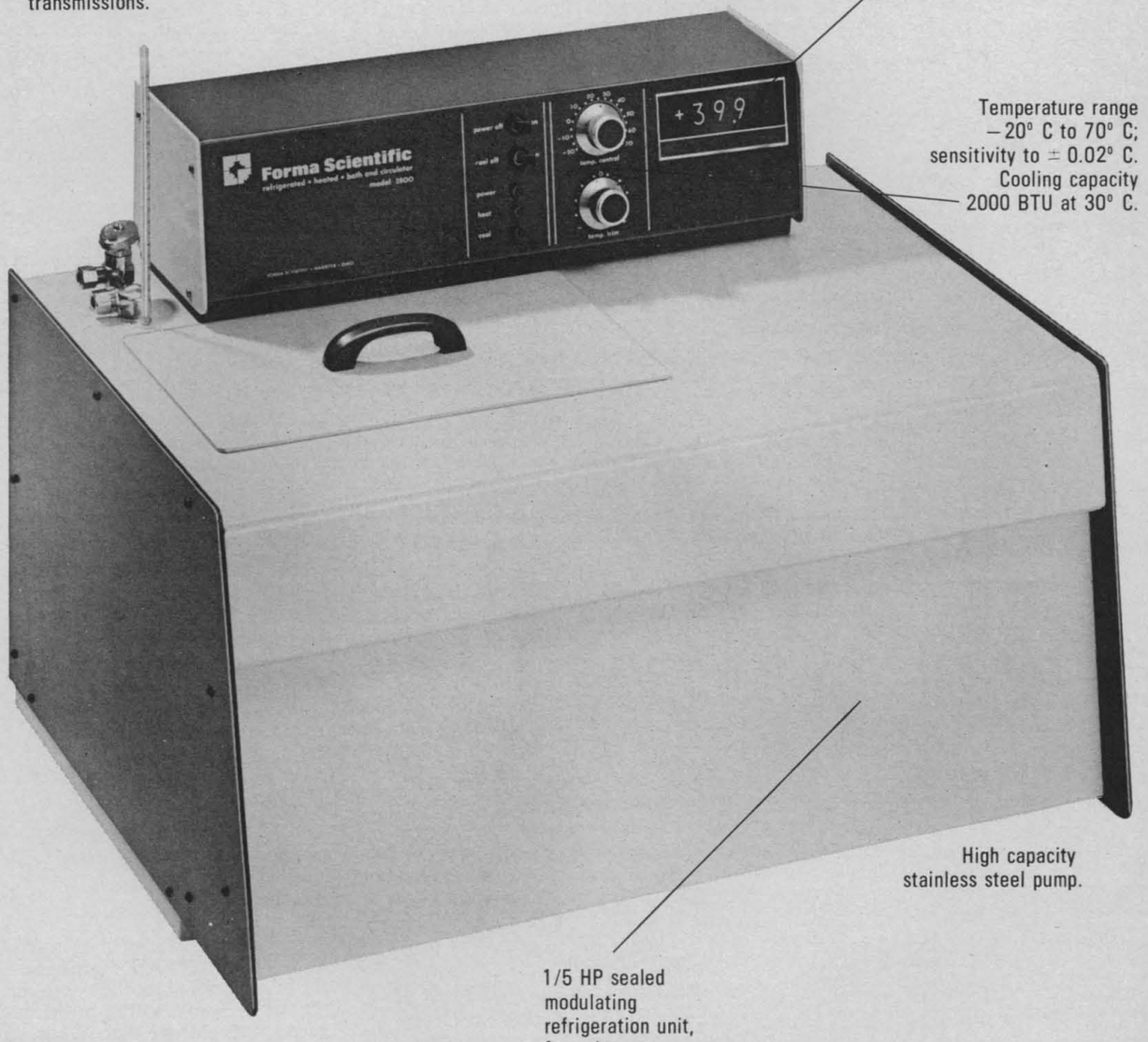

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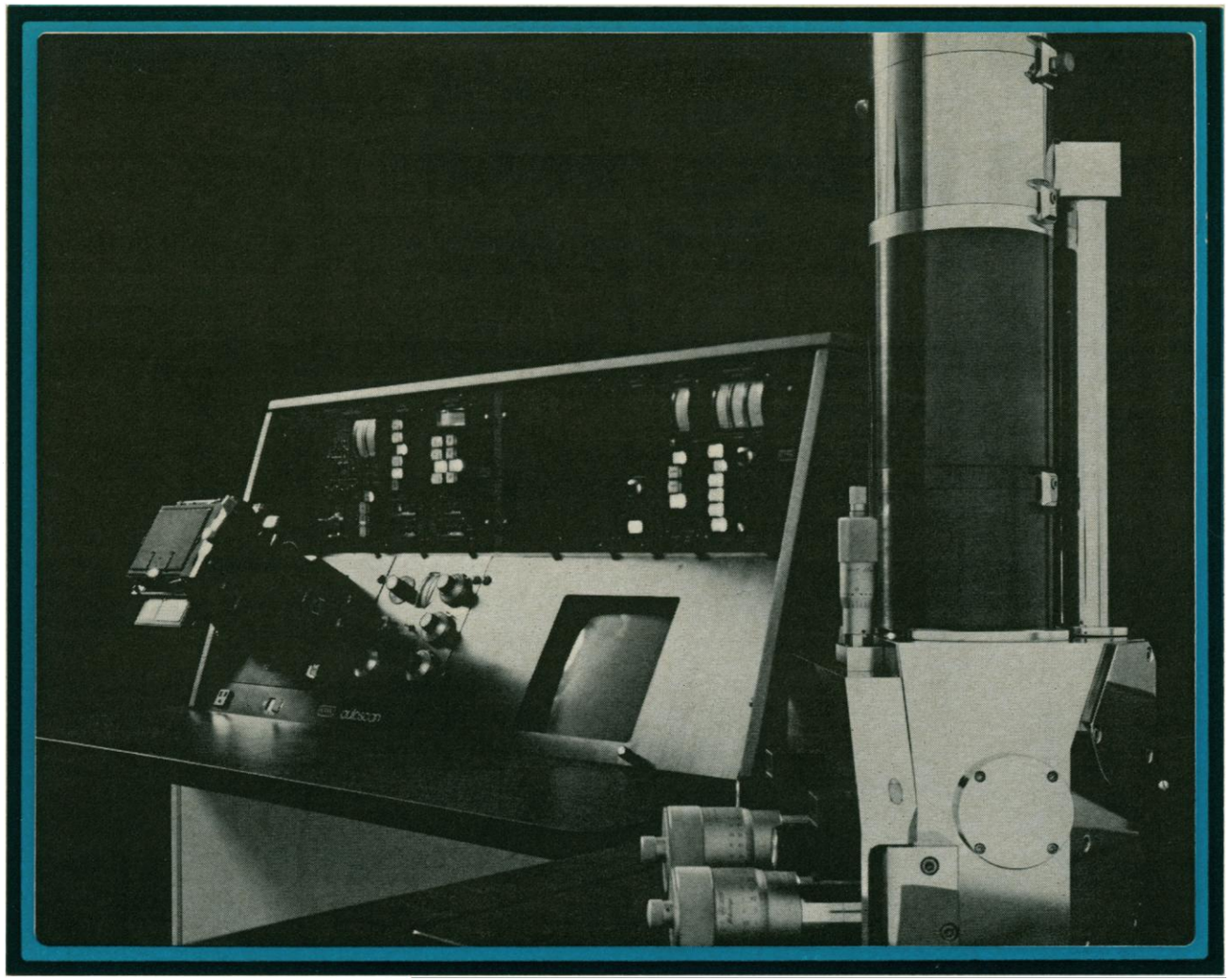

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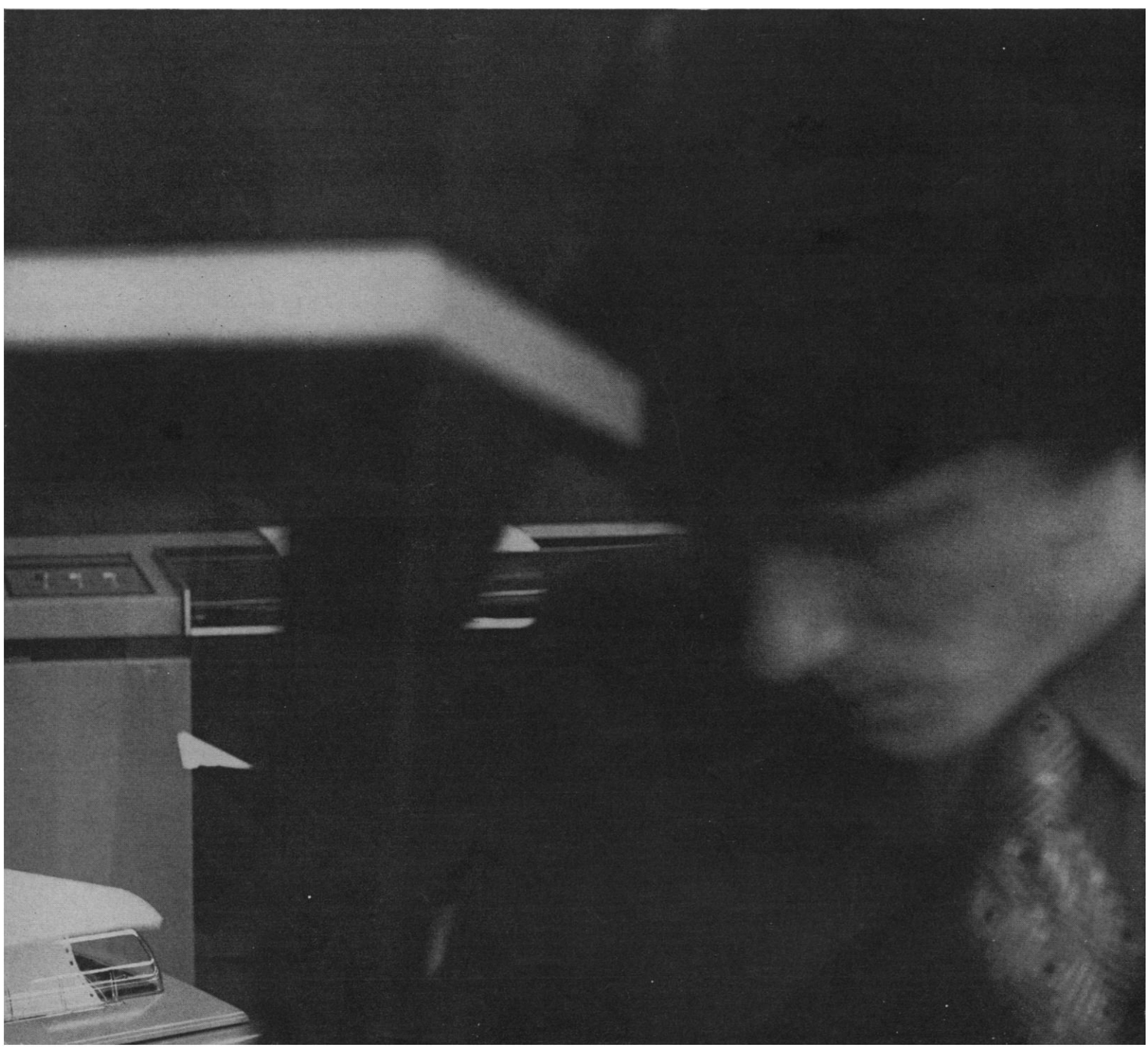

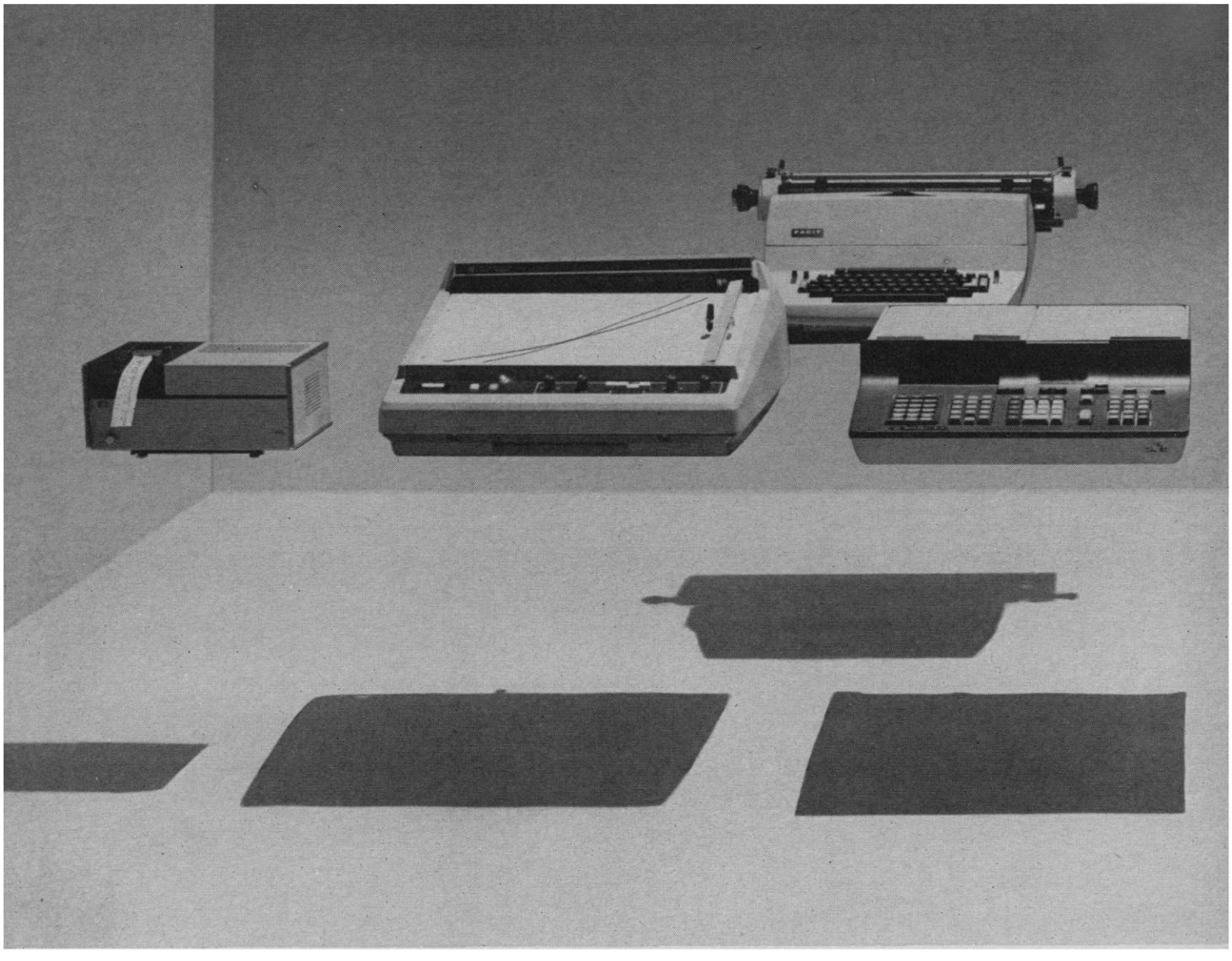

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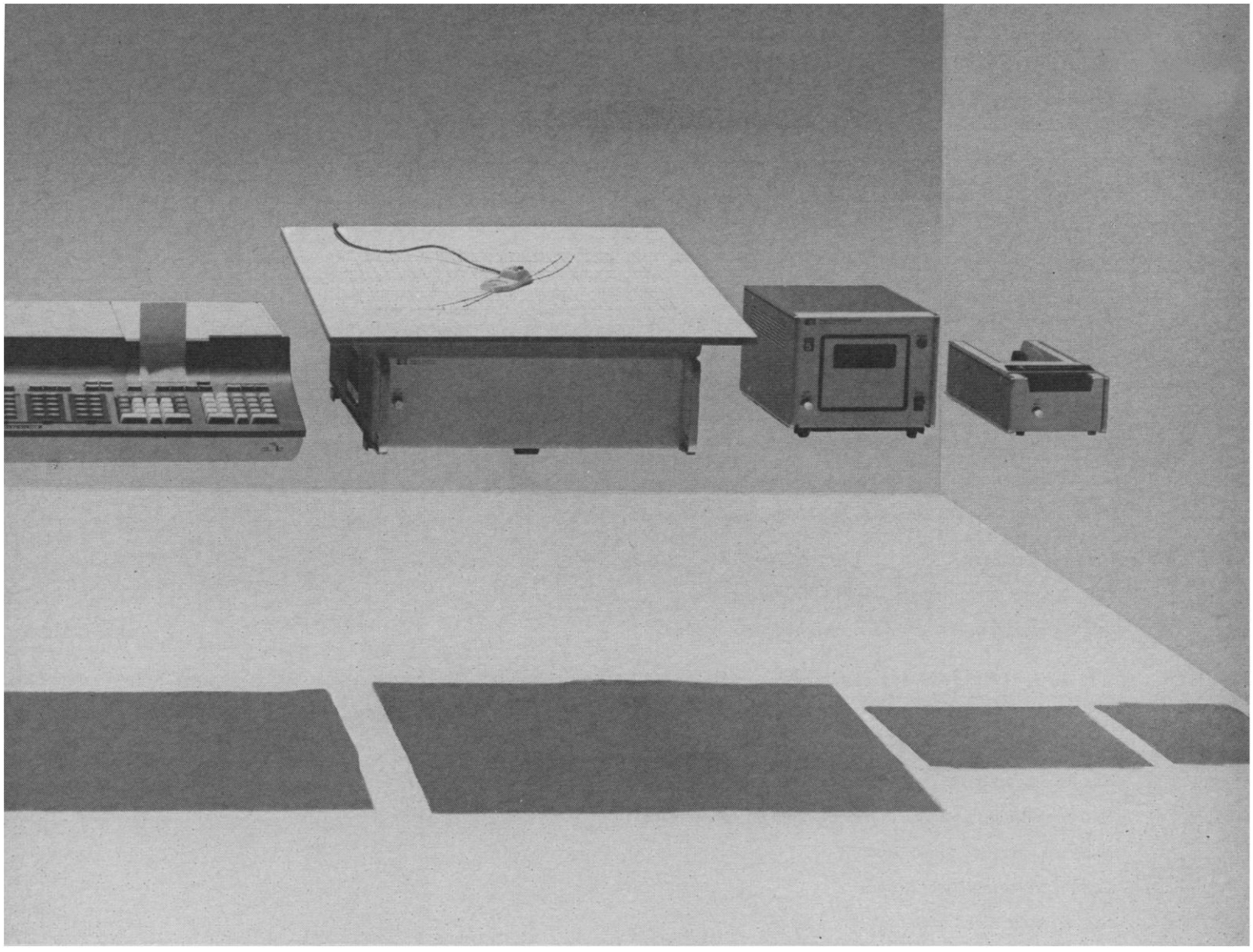

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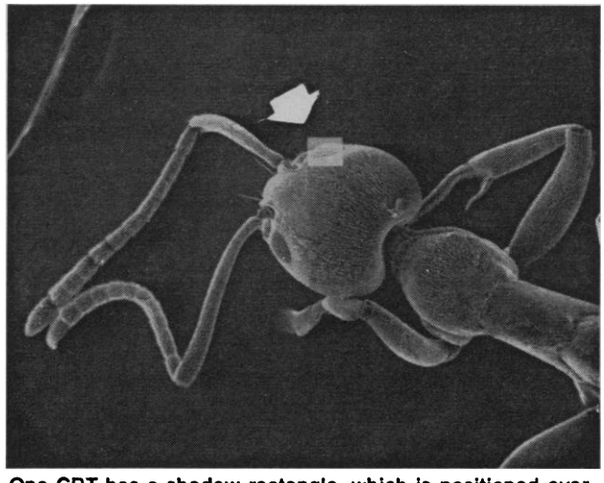
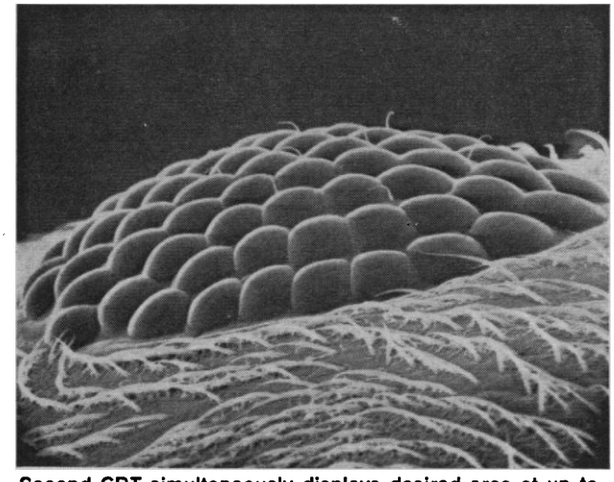


One CRT has a shadow rectangle, which is positioned over area desired for greater magnification. Ant above is shown at 60X.



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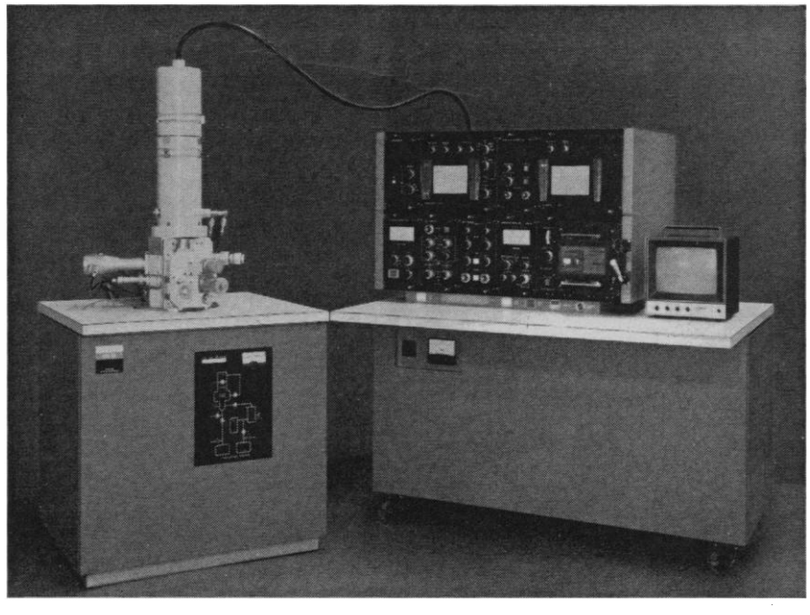

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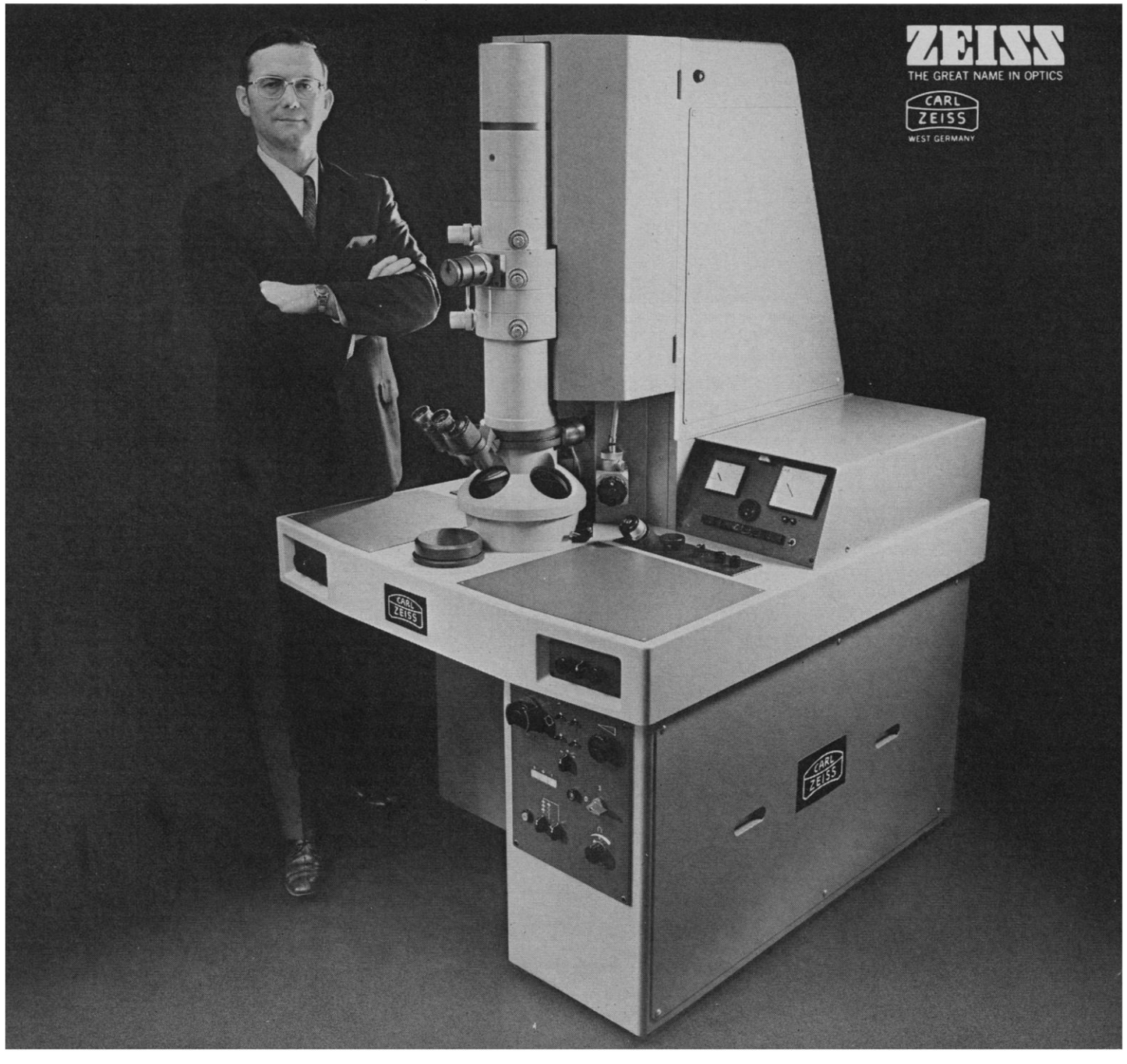

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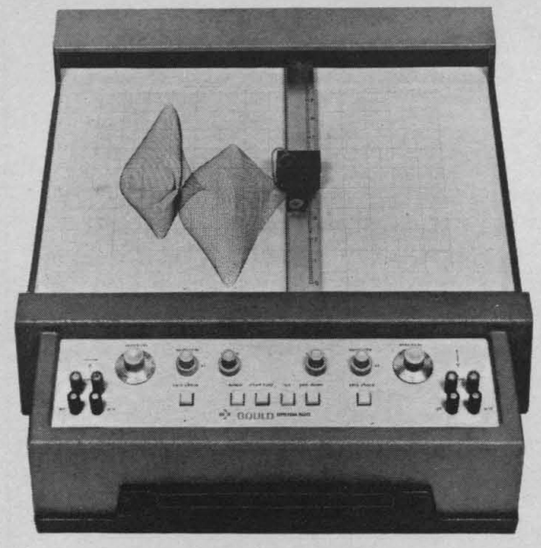

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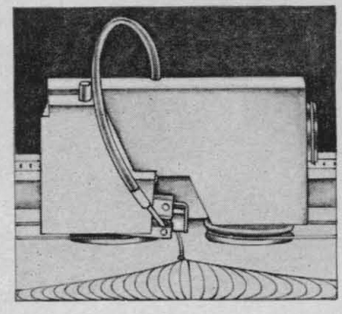

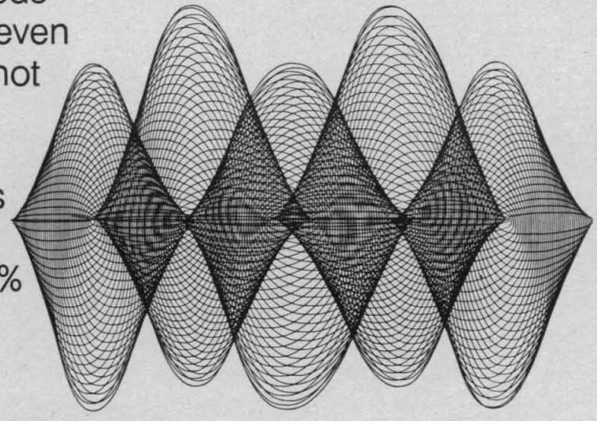

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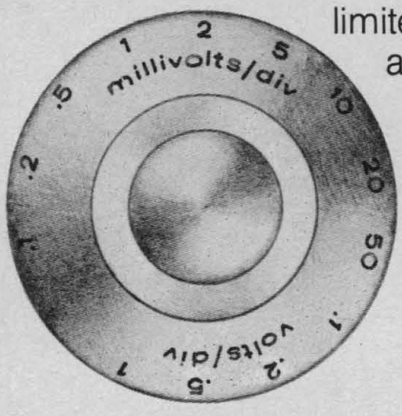

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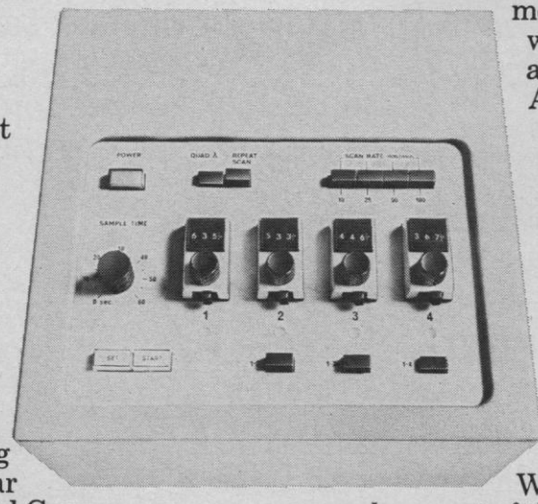

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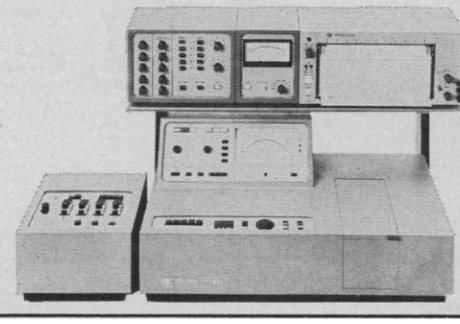

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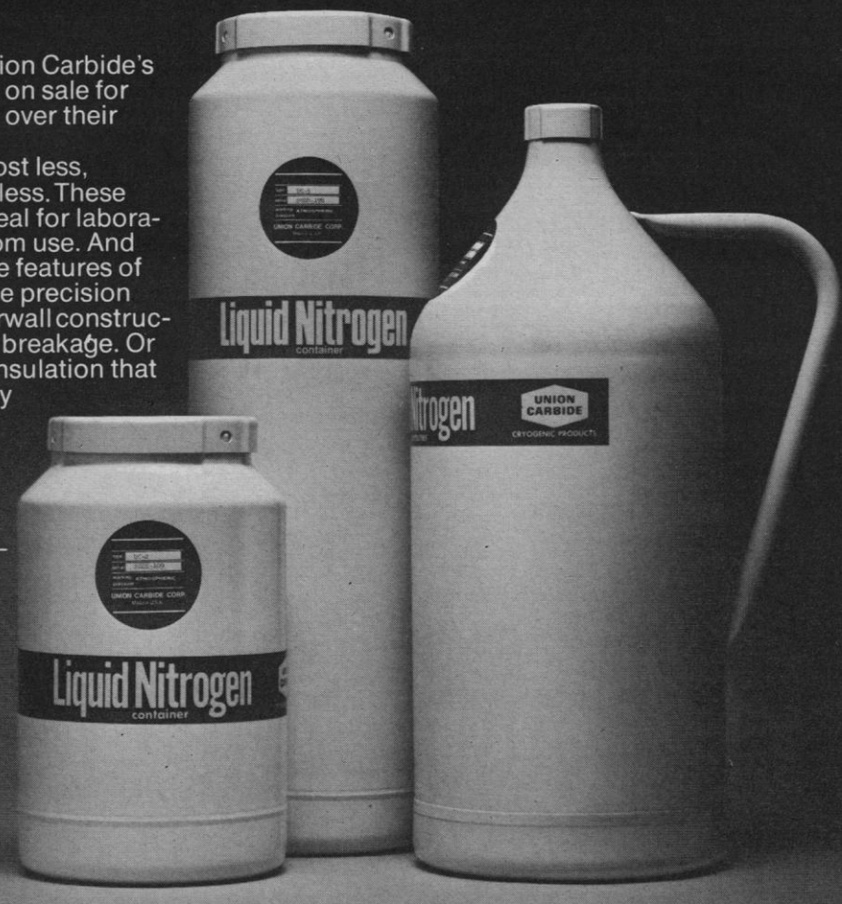

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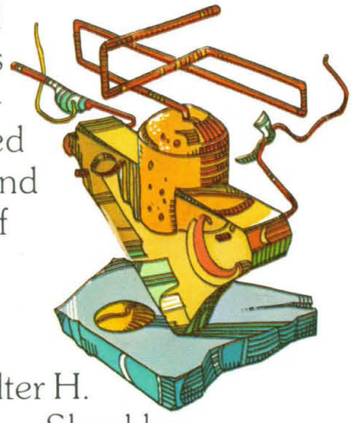
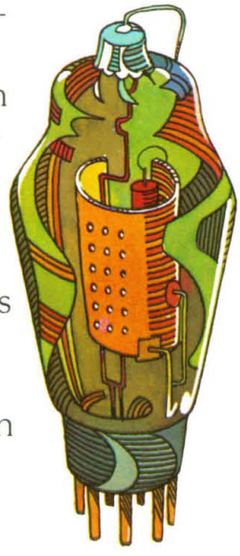
Since Bell Labs invented the transiston

On December 23, 1947, a team of Bell Laboratories scientists demonstrated that they could manipulate the behavior of electrons in a crystal of germanium and thereby amplify an electric current and the sound of a voice being carried by the current. This invention, the transistor, revolutionized communications and affected the lives of just about everybody in the world. For their work, John Bardeen, Walter H. Brattain, and William Shockley received a Nobel Prize.

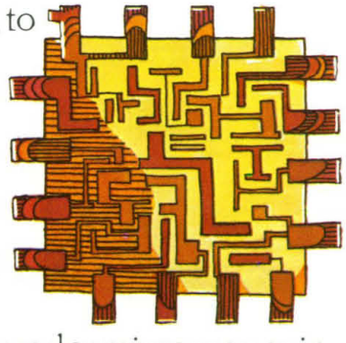


The story of the transistor began in the late 1930s. Telephone equipment used vast numbers of vacuum tubes and relays, but seemed to have inherent limitations for handling the ever-growing, ever more complex communications needs of the future. Devices without the shortcomings of tubes and relays were needed. Bell Labs scientists sought to find the answer through research in semiconductor materials. World War II interrupted their efforts until 1945 when the quest was resumed. Out of this research came the discovery of the transistor effect—the amplification and control of the flow of electrons in a solid material.



Bell Labs immediately mounted a major effort to understand fully the new phenomenon, devise new transistor structures, and develop methods for preparing and purifying germanium, and later silicon. The early "point-contact" transistor was soon followed by the "grown-junction," the "diffused-base," and the "field-effect" designs, and more recently by the combining of large numbers of transistors, diodes, and resistors on a single chip of silicon to form the "integrated circuit."

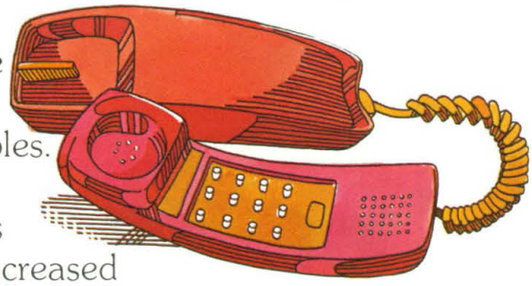
Western Electric in turn set out to apply its broad manufacturing expertise to producing economically the large numbers of transistors needed for telephone uses. Methods were required to refine semiconductor materials to extreme levels of purity, to grow perfect single crystals out of them, to diffuse appropriate "impurity" atoms into the semiconductor for altering its properties, to form individual devices, and to encapsulate them. Western Electric had to design and build factories where this work is done under microscopes in hospital-clean, dust-free environments.



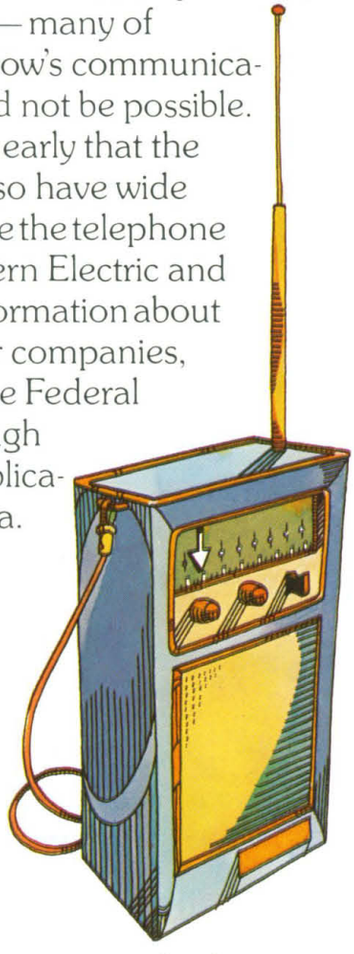
In the Bell System, transistors and other semiconductor devices have made possible Touch-Tone® dialing,

your world has never been the same.

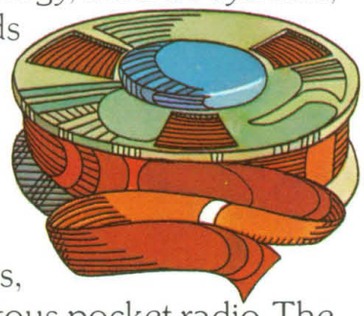
high-speed data transmission, and highly reliable undersea cables. These devices have increased enormously the capacities and dependability of buried coaxial cables for carrying communications across the country. They have also made possible new switching machines for rapidly connecting telephone callers and providing such new services as automatic call transfer. Without the transistor—and its minute size, heat-free operation, and high reliability—many of today's and tomorrow's communications services would not be possible.



It was evident early that the transistor would also have wide applications outside the telephone business. So, Western Electric and Bell Labs made information about it available to other companies, universities, and the Federal Government through technical talks, publications, and symposia. As a result, a large effort in research, development, and manufacture of transistors soon got going outside the Bell System.



Today, transistors are widely used in space exploration, satellite communications, medical technology, defense systems, and in hundreds of such diverse products as television sets, hearing aids, automobile ignition systems, and the ubiquitous pocket radio. The transistor revolutionized the computer industry by making possible millions of accurate calculations in less than a second.



The transistor spawned a whole new industry of "solid-state electronics." Worldwide sales of semiconductor devices are estimated to add up to $2.7 billion this year. In the USA, nearly 8 million people are employed in the manufacture of equipment using these devices.

All this started 25 years ago. The same philosophy of technical innovation that created and made practical the transistor continues to operate today in Bell Labs and Western Electric. They are working together to bring you better communications services at lower cost through your local Bell operating company. At the same time, spin-offs from their creativity are benefiting all mankind.

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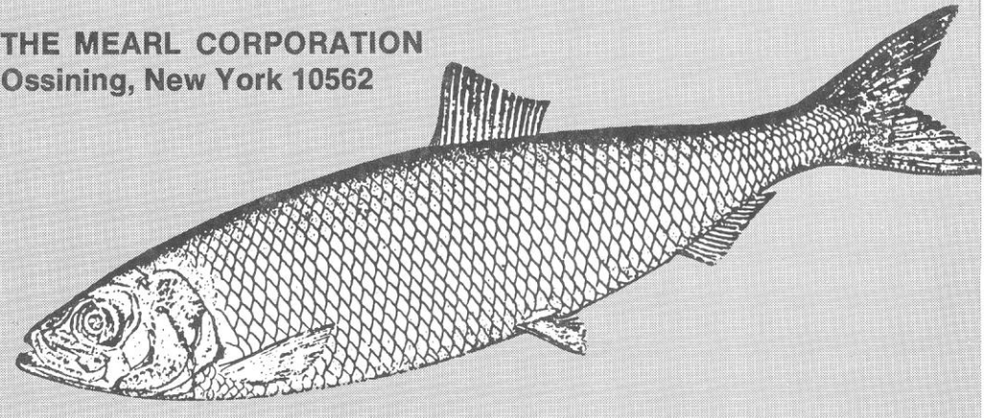

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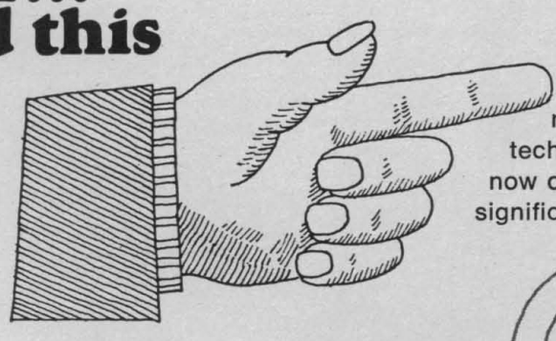

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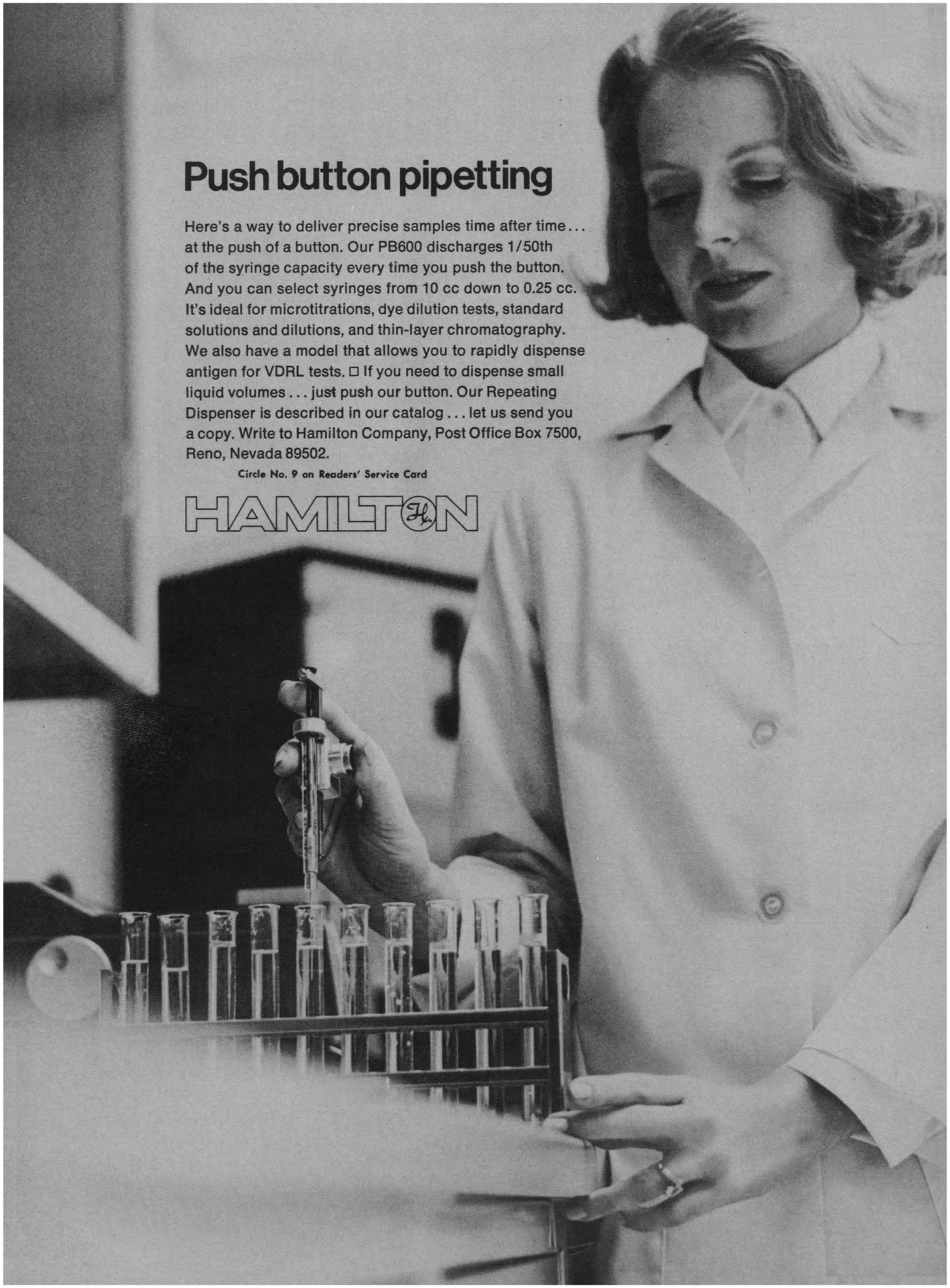
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HAMILTON

teed up to 13 million volts and a tube voltage warranty to 15 million volts. This is the first such kit ever produced and sold by HVEC. The model MP (Emperor) tandem accelerator is rated at 10 million volts, and no MP has ever operated substantially above this value except HEVC's own machine in brief tests prior to their shipping the kit to us early in January 1972. We are therefore in unknown territory and, not unexpectedly, are encountering difficulties. In solving our problems we have had, and I am certain will continue to have, complete, friendly, and helpful cooperation from HVEC.

The Chalk River Nuclear Laboratories have always maintained a close relationship with HVEC, which began when Chalk River funded HVEC for a design study, and subsequently the construction, of the first tandem. The success of this venture (the EN tandem) led to the purchase by Chalk River of one of the first MP tandems, and recently to our decision to be the first to upgrade an MP to 15 million volts. In this nearly half-million-dollar upgrading program, by far the largest and most important item was the purchase of new stainless steel accelerating tubes from HVEC. The kit was accepted from HVEC on 1 September 1972 and has been operating very satisfactorily for 2 months at voltages over 13 million. We expect to be able to operate these tubes eventually at 15 million volts. Our recent acquisition of the new high gradient tubes can only be interpreted as a substantial vote of confidence in the capabilities of the High Voltage Engineering Corporation.

J. C. D. MILTON
Nuclear Physics Branch,
Chalk River Nuclear Laboratories,
Chalk River, Ontario, Canada

I read with interest the report on the High Voltage Engineering Corporation. My quoted statement that we "have had more than our fair share of little annoyances with detailed designs" is correct, but incomplete. An EN accelerator manufactured for us by HVEC in 1959, guaranteed to 5 million volts, ran reliably for 10 years at up to 6 million volts and was only shut down so that it could be replaced by a larger model (the Super FN), guaranteed to 9 million volts on terminal.

This accelerator was installed 2 years ago and is basically a sound machine; it has been tested at 10 million volts and is run regularly to 9.5 million volts for research. We have had trouble with many detailed design problems, but the Super FN is, to some extent, one of a new generation of accelerators, and some problems were to be expected. These problems have been solved as they have occurred, and HVEC has noted the changes we have made for consideration in their future installations. The accelerator has become increasingly reliable and, before a recent tank opening to replace a belt, which had run for almost 10,000 hours, had run for several months without any need to open the pressure tank.

With a new generation of machines that run at considerably increased voltage gradients, the possibilities for testing in the plant are limited. HVEC has given us all the help we could reasonably expect in correcting faults, and the Super FN accelerator is now settling down to the reliability we had learned to expect from the previous machine.

K. R. CHAPMAN
Department of Physics, Florida State University, Tallahassee 32306

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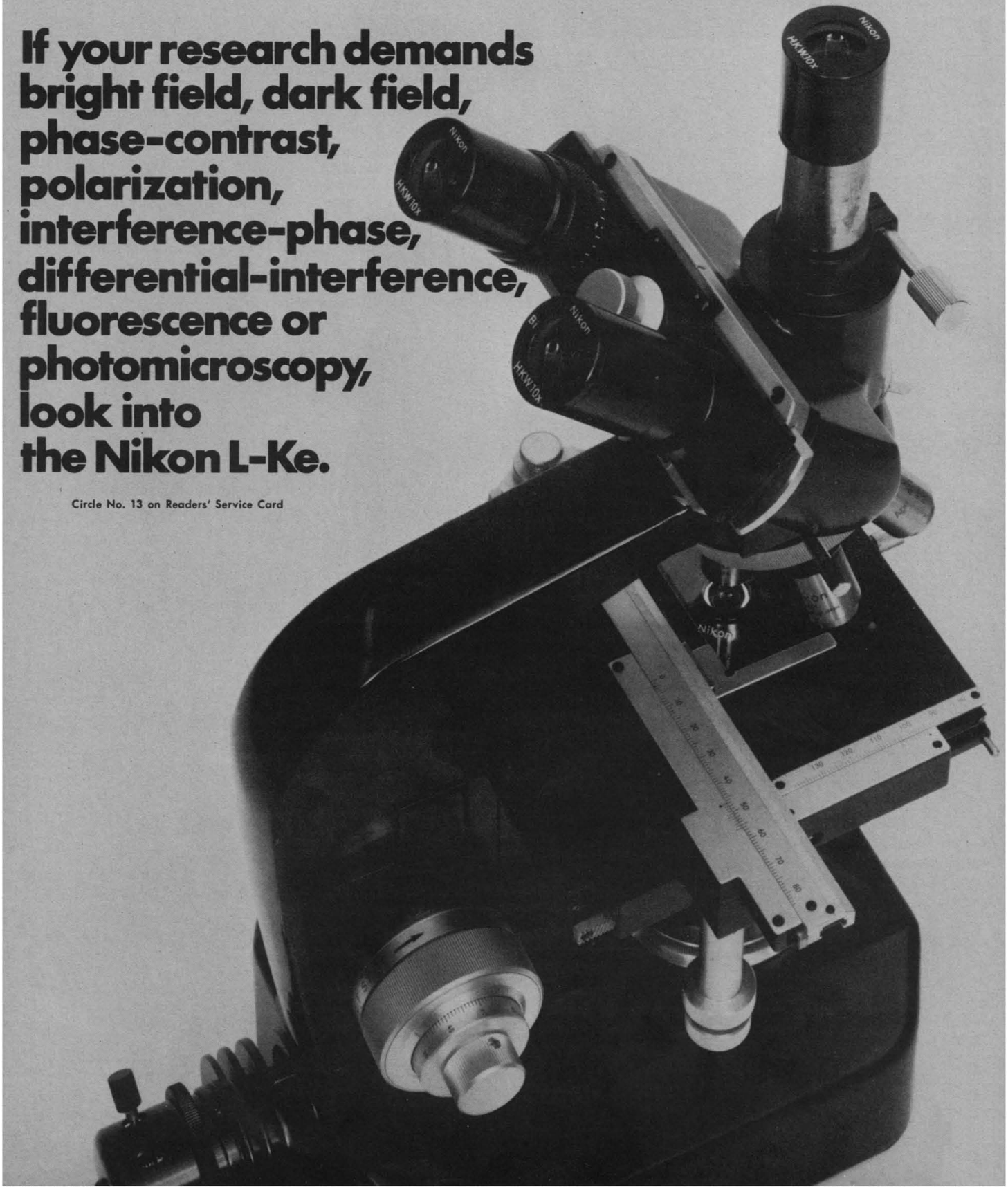

Circle No. 13 on Readers' Service Card

8 December 1972, Volume 178, Number 4065 **SCIENCE**

Adjusting to Normal Times

It is now clear that the 20 years from 1946 to 1966, during which federal funds for research and development doubled nearly four times, were really quite abnormal in the way that the golden ages of Greece or Florence were abnormal in their cultures. The scientific world must now carry on, in ways more appropriate to sterner times, what was best about the age just past.

It is characteristic of golden ages to be presided over by small elites of unusual vision and vigor, and ours was no exception. The budget for science was developed each year by a small number of presidential advisers in the White House and in what is now called the Office of Management and Budget. The budget was defended by representatives of a few universities, the National Academy of Sciences, and certain other private groups, and the funds were appropriated through the good offices of an equally small number of informed and devoted congressional leaders. Much has changed in the last 5 or 6 years. In terms of constant dollars, funds for all levels of research have actually declined. The emphasis is swinging away from aerospace and toward more earthy considerations, away from building up the infrastructure of science and toward the solution of immediate problems.

To a considerable but not accurately known extent, the people, the Congress, and the executive have lost confidence in the scientific establishment and its governing elite. The long series of reports from the National Academy of Sciences on the present state and foreseeable needs of science, painstaking and thorough though they were, may actually have been counterproductive, with their undeniable odor of special pleading for more of the same. In any case, time alone is enough to change the faces of White House advisers and even of congressional committees.

It's a new ball game, and the scientific world might well give more thought to how to play it. If that world no longer enjoys the prestige that a Bush or a Conant brought with him out of the war, it has what they did not have, a large army of scientists deployed through every state in the Union in an educational and research network such as the world has never seen. For various reasons, most of which are not their fault, these members of the rank and file, and even many of the institutions which they serve, have never learned how to make themselves felt in the positive determination of science policy. For example, nothing is clearer than that congressmen listen to their constituents; but how many working scientists ever speak to them? There is at least one exception to the prevailing reticence. High school teachers of science do talk to congressmen, and year after year the appropriations committee restores to the National Science Foundation the funds for the summer institutes for high school teachers which the executive would like to take away.

The fading away of the *ancien régime* provides an opportunity for the silent majority to make themselves heard, and the AAAS could more effectively advance science if it found how to "raise the consciousness" of that majority and give it a firmer voice.—ROBERT S. MORISON, *Program on Science, Technology and Society, Cornell University, Ithaca, New York 14850*

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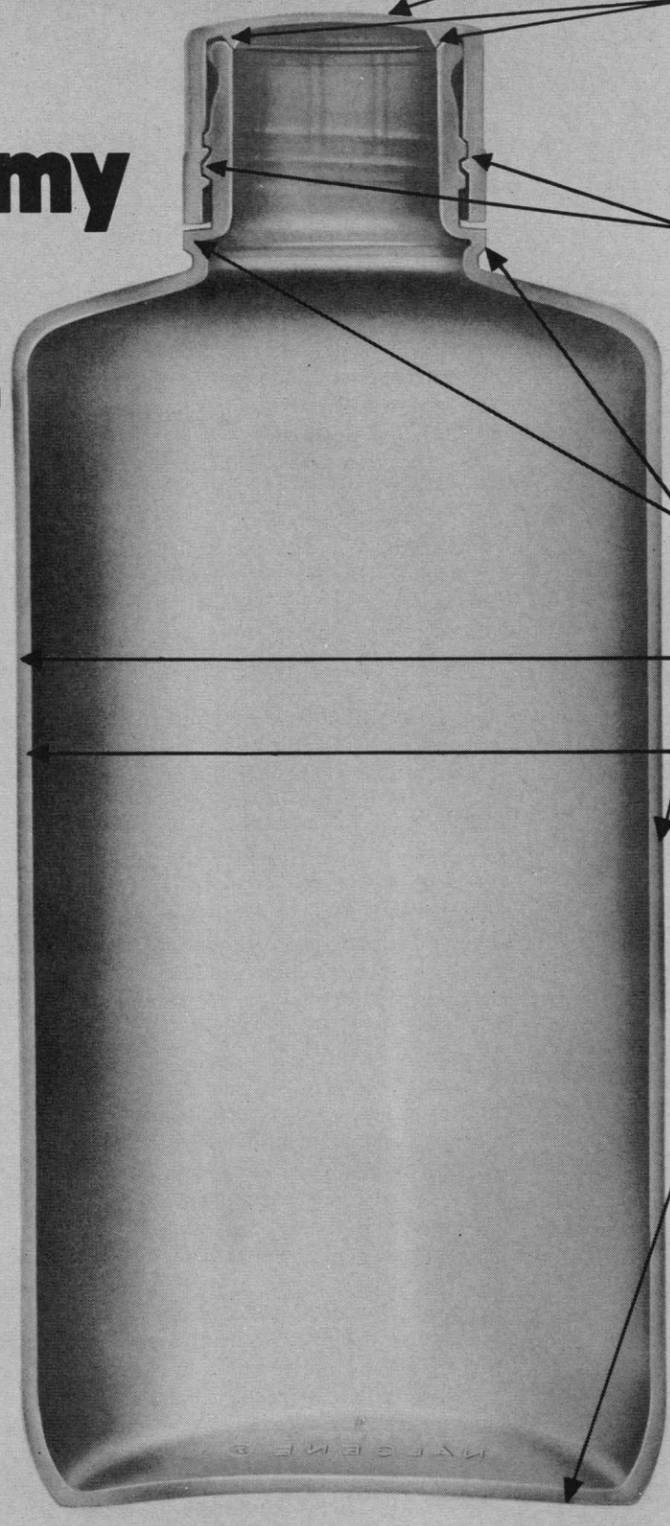

Closure is tough, one-piece, autoclavable polypropylene.

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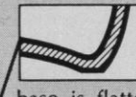

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Seattle meeting confirmed an opinion that is held by certain astronomers that their data are a useful adjunct to routine air pollution monitoring activities. While there are limitations in astronomical data, these are usually smaller and better known than the errors in other types of data. Astronomers can provide (i) nighttime extinction data, (ii) a new set of remote locations as well as some new urban ones, (iii) a lengthy data record (beginning in 1902 in the case of Abbot's data), and (iv) a variety of new measuring techniques.

Some conclusions reached through astronomical research that are of special interest to atmospheric scientists are as follows:

1) No global trends in extinction that can be ascribed to human causes have been detected at remote locations so far.

2) Both volcanic activity and some apparently natural cycling of the biosphere affect astronomical extinction; the latter effect produces an annual pattern.

3) The transparency of the atmosphere near cities continues to deteriorate in most cases.

4) The anomalous wavelength dependence of extinction suggests a unique aerosol size distribution in background locations.

Also from the meteorological viewpoint, a number of gaps became apparent in available knowledge. Perhaps the most obvious one is the need for coordinating extinction measurements with local and synoptic meteorological data. Certain biases exist because of the lack of extinction data for cloudy periods. Also, effects have been discovered that are due to dust derived from upslope winds on mountaintops. Since regional effects of human activity will certainly be apparent before global effects, studies of the transport of air masses to and from observing sites may be possible.

Finally, another kind of pollution is of less concern to meteorologists but of vital concern to astronomers. Light pollution, caused by the rapid expansion of outdoor lighting in cities and even in open western countryside, has been of great concern in many observatories recently. Greater public awareness of the problem, research on more efficient lamps (from the point of view of increased ground illumination and reduced light loss to the sky), and political action through the introduction of city ordinances are among the goals of astronomers in various research centers of the Southwest.

At the Seattle meeting astronomers emphasized their concern about the deterioration of the atmosphere, through which most of the information about the universe must pass. Progress in the application of certain kinds of astronomical data to research on atmospheric deterioration has begun. Much more must be done to understand fully the implications of the data and even more, of course, to turn the tide. Charles Abbot may not have expected that his data and methods would be used for these purposes, but his are the best optical data available over such a long time base and they have come to us only because of his painstaking care in gathering and recording all available information in his experiments.

P. W. HODGE
NELS LAULAINEN
R. J. CHARLSON
Department of Astronomy, University of Washington, Seattle 98195

References

1. N. Laulainen and P. W. Hodge, Eds., *Project ASTRA Publication 15* (Univ. of Washington, Seattle, 1972).
2. C. G. Abbot, *The Sun and the Welfare of Man* (Smithsonian Institution, New York, 1929), p. 68.

Forthcoming Events

January

9–12. American **Astronomical** Soc., Las Cruces, N.M. (H. M. Gurin, AAS, 211 FitzRandolph Rd., Princeton, N.J. 08540)

9–13. National Soc. of **Professional Engineers**, Salt Lake City, Utah. (P. H. Robbins, NSPE, 2029 K St., NW, Washington, D.C. 20006)

14–19. **Protein Phosphorylation in Control Mechanisms**, Miami, Fla. (W. J. Whelan, Dept. of Biochemistry, School of Medicine, Univ. of Miami, P.O. Box 875, Biscayne Annex, Miami 33152)

15–16. **Regional Environmental Management** Conf., San Diego, Calif. [L. E. Coate, REMC, County of San Diego, Environmental Development Agency, Integrated Regional Environmental Management (IREM) Project, 1600 Pacific Hwy., San Diego 92101]

15–17. **Lunar Dynamics and Observational Coordinate Systems**, Houston, Tex. (J. D. Mulholland, Lunar Science Inst., 3303 NASA Rd. 1, Houston 77058)

15–18. American **Crystallographic** Assoc., Gainesville, Fla. (Mrs. E. E. Snider, ACA, 335 E. 45 St., New York 10017)

15–19. **Geophysics of the Earth and the Oceans**, 2nd intern. conf., Australian Inst. of Physics and Australian Soc. of Exploration Geophysicists, Sydney. (B. D.

Johnson, School of Earth Sciences, Macquarie Univ., North Ryde, New South Wales 2113, Australia)

15–22. International Symp. on **Taxonomy of Fungi**, Madras, India. (C. V. Subramanian, Centre for Advanced Studies in Botany, Univ. of Madras, Madras-5)

22–26. **Nuclear Power Plant Control and Instrumentation**, Intern. Atomic Energy Agency, Prague, Czechoslovakia. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

24–28. American College of **Psychiatrists**, New Orleans, La. (P. A. Martin, 16300 N. Park Dr., Southfield, Mich. 48075)

25–29. American **Mathematical** Soc., Dallas, Tex. (G. L. Walker, AMS, P.O. Box 6248, Providence, R.I. 02904)

26. **Bibliographical** Soc. of America, New York, N.Y. (Miss C. Hover, Box 397, Grand Central Sta., New York 10017)

27–29. **Mathematical** Assoc. of America, Dallas, Tex. (H. Alder, Dept. of Mathematics, Univ. of California, Davis 95616)

28–1. American Soc. of **Heating, Refrigeration, and Air-Conditioning Engineers**, Chicago, Ill. (A. T. G. Boggs III, ASHRAE, 345 E. 47 St., New York 10017)

28–2. **Power Engineering** Soc., Inst. of Electrical and Electronics Engineers, New York, N.Y. (J. W. Bean, IEEE-PES, 345 E. 47 St., New York 10017)

28–3. American **Library** Assoc., Washington, D.C. (R. Wedgeworth, ALA, 50 E. Huron St., Chicago, Ill. 60611)

28–6. North American Conf. on **Fertility and Sterility**, U.S. Intern. Foundation for Studies in Reproduction, Acapulco, Mexico. (Mrs. F. Royce, 112-44 69th Ave., Forest Hills, N.Y. 11375)

29–1. American Assoc. of **Physics Teachers**, Albany, N.Y. (W. V. Johnson, AAPT, 1785 Massachusetts Ave., NW, Washington, D.C. 20036)

31–2. Western **Spectroscopy** Assoc., Pacific Grove, Calif. (G. R. Haugen, L-404, Univ. of California, Lawrence Livermore Lab., Livermore 94550)

February

7–8. **Organic Matter in Water Supplies: Occurrence, Significance, and Control**, 15th water quality conf., Champaign, Ill. (V. L. Snoeyink, Dept. of Civil Engineering, Univ. of Illinois at Urbana-Champaign, Urbana 61801)

8–9. **Geodesy/Solid Earth and Ocean Physics** Research, 2nd conf., American Geophysical Union, Columbus, Ohio. (A. F. Spilhaus, Jr., AGU, 1707 L St., NW, Washington, D.C. 20036)

8–9. Association for **Hospital Medical Education**, Chicago, Ill. (T. G. Kummer, AHME, 1911 Jefferson Davis Hwy., Arlington, Va. 22202)

9–16. American Soc. of **Clinical Pathologists**, Honolulu, Hawaii. (G. F. Stevenson, ASCP, 2100 W. Harrison St., Chicago, Ill. 60612)

10–11. **Medical Education**, 69th annual congr., American Medical Assoc., Chicago, Ill. (C. H. W. Ruhe, AMA Council on Medical Education, 535 N. Dearborn St., Chicago 60610)

10–14. American Acad. of **Allergy**,

Washington, D.C. (J. O. Kelley, AAA, 225 E. Michigan St., Milwaukee, Wis. 53202)

10–15. Society for **Range Management**, Boise, Idaho. (F. T. Colbert, SRM, 2120 S. Birch St.; Denver, Colo. 80222)

12–13. **Psychopharmacologic Treatment in Psychiatry**, Gainesville, Fla. (Dr. H. C. B. Denber, Dept. of Psychiatry, College of Medicine, J. Hillis Miller Health Center, Gainesville 32601)

12–14. **Energy: Demand, Conservation and Institutional Problems**, National Science Foundation RANN Program and Massachusetts Inst. of Technology, Cambridge, Mass. (M. R. Bateman, Industrial Liaison Office, Massachusetts Inst. of Technology, Cambridge 02139)

14–16. **Solid-State Circuits**, intern. conf., Inst. of Electrical and Electronics Engineers, Inc., Philadelphia, Pa. (L. Winner, 152 W. 42 St., New York 10036)

14–18. American College of **Cardiology**, San Francisco, Calif. (W. D. Nelligan, ACC, 9650 Rockville Pike, Bethesda, Md. 20014)

16–17. Symposium on **Immunopharmacology**, New York Heart Assoc., New York, N.Y. (I. Saulpaugh, NYHA, 2 E. 64 St., New York 10021)

18–24. **Effects of Low-Frequency Magnetic and Electric Fields on Biological Communication Processes**, Natl. Science Foundation, Neuroelectric Soc., and Intern. Inst. for Medical Electronics and Biological Engineering, Snowmass-at-Aspen, Colo. (A. Sances, Jr., NS, 8700 W. Wisconsin Ave., Milwaukee, Wis. 53226)

19–22. International Symp. on **Hydrometallurgy**, Chicago, Ill. (D. J. I. Evans, Research and Development Div., Sherritt Gordon Mines Ltd., Fort Saskatchewan, Alta., Canada)

20. National Assoc. of **Medical Examiners**, Las Vegas, Nev. (P. Hudson, P.O. Box 2488, Chapel Hill, N.C. 27514)

20–23. American Acad. of **Forensic Sciences**, Las Vegas, Nev. (J. T. Weston, 44 Medical Dr., Salt Lake City, Utah, 84113)

21–22. **Educational Technology Symp.**, Washington, D.C. (N. E. Rogers, NSIA, Suite 700, 740 15th St., N.W., Washington, D.C. 20005)

21–24. Society of **Professors of Education**, Chicago, Ill. (R. E. Bayles, School of Education, Atlanta Univ., Atlanta, Ga. 30314)

21–6. American **Medical** Assoc. and **Weizmann Inst. of Science**, Tel Aviv, Israel. (Israel Scientific Conf., Dept. of Intern. Medicine, AMA, 535 N. Dearborn St., Chicago, Ill. 60610)

24–27. American Assoc. of **Pathologists and Bacteriologists**, Washington, D.C. (A. J. French, Univ. of Michigan Medical Center, Ann Arbor 48104)

24–3. International Acad. of **Pathology**, U.S.–Canadian Div., Washington, D.C. (L. D. Stoddard, Dept. of Pathology, Medical College of Georgia, Augusta 30902)

25. Oregon **Acad. of Science**, Salem. (H. D. Reese, Dept. of Chemistry, Oregon State Univ., Corvallis 97331)

25–1. American Inst. of **Mining, Metallurgical and Petroleum Engineers**, Chicago, Ill. (J. B. Alford, AIMMPE, 345 E. 47 St., New York 10017)

WINNERS 1972 AAAS-WESTINGHOUSE SCIENCE WRITING AWARDS

Walter Sullivan, *New York Times*, for science writing in newspapers with over 100,000 daily circulation.

Dennis L. Meredith, Phoenix-Times Newspapers, Rhode Island, for science writing in newspapers with under 100,000 circulation.

Eugene Kinkead, *The New Yorker*, for science writing in magazines.

Additional details are available from:

Grayce A. Finger
AAAS
1515 Massachusetts Avenue, NW
Washington, D.C. 20005

25–3. Continuing Education for **Excellence in Medicine and Surgery**, American Soc. of Contemporary Medicine and Surgery, Miami Beach, Fla. (Miss V. Kendall, Suite 1629, ASCMS, 30 N. Michigan Ave., Chicago, Ill. 60602)

26–1. American **Educational Research** Assoc., New Orleans, La. (R. A. Dershimer, AERA, 1126 16th St., NW, Washington, D.C. 20036)

27–2. **Biophysical** Soc., Columbus, Ohio. (M. O. Dayhoff, Natl. Biomedical Research Foundation, Georgetown Univ. Medical Center, 3900 Reservoir Rd., NW, Washington, D.C. 20007)

28–3. American Assoc. of **Petroleum Geologists**, Rocky Mountain Div., Salt Lake City, Utah. (Miss K. Watson, AAPG, 1444 S. Boulder, Tulsa, Okla. 74101)

28–4. American **Psychological** Assoc., Div. of Psychotherapy, Freeport, Grand Bahama Island. (V. Rosenthal, 815 Indian Rd., Glenview, Ill. 60025)

March

1–2. **Fracture and Flaws**, 13th annual symp., American Soc. of Mechanical Engineers and American Soc. for Metals, Albuquerque, N.M. (D. Buchanan, Organization 9310K, Sandia Labs., Albuquerque 87115)

2–3. International **Geobotany** Conf., Knoxville, Tenn. (C. Amundsen, Graduate Program in Ecology, Univ. of Tennessee, Knoxville 37916)

3–9. American **Concrete** Inst., annual, Atlantic City, N.J. (ACI, Box 4754 Redford Sta., Detroit, Mich. 48219)

5–7. **Particle Accelerator** Conf., 5th, San Francisco, Calif. (E. J. Lofgren, Lawrence Radiation Lab., Univ. of California, Berkeley 94720)

5–7. National Federation of **Science Abstracting and Indexing Services**, Philadelphia, Pa. (S. Kennan, NFSAIS, 2102 Arch St., Philadelphia 19103)

5–9. **Medical Data Processing** Symp., Inst. for Research and Automation, Toulouse, France. (E. E. Van Brunt, Permanente Medical Group, 3779 Piedmont Ave., Oakland, Calif. 94611)

6–10. **Lymphology**, 4th intern. congr., Tucson, Ariz. (C. L. Witte, Dept. of Surgery, Univ. of Arizona College of Medicine, Tucson 85721)

8–11. Southern **Anthropological** Soc. (9th annual) and American **Ethnological** Soc., Wrightsville Beach, N.C. (T. Fitzgerald, Dept. of Sociology and Anthropology, Univ. of North Carolina at Greensboro, Greensboro 27412)

9–10. Pennsylvania **Acad. of Science**, Carlisle. (G. C. Shoffstall, Jr., 214 Whitmore Lab., Pennsylvania State Univ., University Park 16802)

11–16. Symposium on **Membranes**, Squaw Valley, Calif. (W. Stoeckenius, Dept. of Bacteriology, Univ. of California, Los Angeles 90024)

11–16. American Soc. of **Photogrammetry**, Washington, D.C. (L. P. Jacobs, 105 N. Virginia Ave., Falls Church, Va. 22046)

12–13. **Drugs, Hormones and the Kidney**, 4th annual nephrology conf., American Heart Assoc., Inc., Philadelphia, Pa. (Dept. of Councils, AHA, 44 E. 23 St., New York 10010)

12–15. American Soc. for **Neurochemistry**, 4th, Columbus, Ohio. (L. A. Horrocks, Dept. of Physiological Chemistry, Ohio State Univ., 1645 Neil Ave., Columbus 43210)

12–15. Conference on **Prevention and Control of Oil Spills**, American Petroleum Inst., Environmental Protection Agency, U.S. Coast Guard, Washington, D.C. (J. R. Gould, Suite 700, 1629 K St., NW, Washington, D.C. 20006)

12–16. Symposium on **Applications of Nuclear Data in Science and Technology**, Intern. Atomic Energy Agency, Paris, France. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

13–16. **Optical** Soc. of America, Denver, Colo. (M. E. Warga, OSA, 2100 Pennsylvania Ave., NW, Washington, D.C.)

14–16. American Assoc. of **Petroleum Geologists**, Southwest Div., Fort Worth, Tex. (K. Watson, AAPG, 1444 S. Boulder, Box 979, Tulsa, Okla. 74101)

15–16. **Advanced Analytical Concepts for the Clinical Laboratory**, 5th annual, Oak Ridge, Tenn. (C. D. Scott, Oak Ridge Natl. Lab., P.O. Box X, Oak Ridge 37830)

15–16. Symposium on **Drugs and the Unborn Child**, National Foundation–March of Dimes, New York, N.Y. (M. New, Dept. of Pediatrics, Div. of Pediatric Endocrinology, New York Hospital–Cornell Medical Center, 525 E. 68 St., New York 10021)

15–16. **Estuaries of the Pacific Northwest**, 3rd technical conf., Corvallis, Ore. (L. S. Slotta, Ocean Engineering Programs, School of Engineering, Oregon State Univ., Corvallis 97331)

15–17. Association for **Children with Learning Disabilities**, 10th intern. conf., Detroit, Mich. (K. M. Tillotson, ACLD, 2200 Brownsville Rd., Pittsburgh, Pa. 15210)

15–17. Symposium on **Reproductive Biology, Mating Behavior and Captive Breeding of Felids**, World Wildlife Safari and Inst. for the Study and Conservation of Endangered Species, Winston, Ore. (R. L. Eaton, Box AL, Winston 97496)

16. Mississippi **Acad. of Sciences**, Biloxi. (D. L. Dodgen, University Medical Center, Jackson, Miss. 39216)

18–21. **Wildlife Management** Inst., Washington, D.C. (L. R. Jahn, WMI, 709 Wire Bldg., Washington, D.C. 20005)

18–22. Society of **Toxicology**, New York, N.Y. (R. A. Scale, ST, Esso Research and Engineering Co., P.O. Box 45, Linden, N.J. 07036)

18–23. **Deafness**, 4th intern. conf., World Federation of the Deaf and Assoc. of the Deaf and Mute in Israel, Tel Aviv, Israel. (A. Reich, Organizing Committee, P.O. Box 16271, Tel Aviv)

18–23. Symposium on **Molecular Biology** (Virus Research), Intern. Chemical and Nuclear Corp. and Molecular Biology Inst., Univ. of California, Squaw Valley. (C. F. Fox, Dept. of Bacteriology, Univ. of California, Los Angeles 90024)

19–23. **Characterization of Corrosion Products**, Natl. Assoc. of Corrosion Engineers, Anaheim, Calif. (W. D. France, Jr., General Motors Research Labs., General Motors Technical Center, Warren, Mich. 48090)

20–23. American **Astronomical** Union (Planetary Sciences Div.), Tucson, Ariz. (B. Smith, Dept. of Astronomy, New Mexico State Univ., Las Cruces 88001)

22–23. **Information Sciences and Systems**, 7th conf., Princeton, N.J. (T. Pavlidis, Dept. of Electrical Engineering, School of Engineering/Applied Science, Engineering Quadrangle, Princeton 08540)

23–25. **Future Status of Earth Resources in Society**, Natl. Assoc. of Geology Teachers, Central Section, Chicago, Ill. (M. K. Sood, Dept. of Earth Sciences, Northeastern Illinois Univ., Bryn Mawr at St. Louis Ave., Chicago 60625)

26–28. **Engineering Aspects of Magnetohydrodynamics**, Stanford, Calif. (M. Mitchner, Dept. of Mechanical Engineering, Stanford Univ., Stanford 94305)

26–29. Institute of **Electrical and Electronics Engineers**, New York, N.Y. (D. G. Fink, IEEE, 345 E. 47 St., New York 10017)

26–30. Symposium on **New Developments in Radiopharmaceuticals and Labeled Compounds**, Intern. Atomic Energy Agency, Copenhagen, Denmark. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

27–29. **Reduction of Pollutants in Heterogeneous Combustion Processes**, Combustion Inst., Central States Section, Champaign, Ill. (R. A. Strehlow, 105 Transportation Bldg., Univ. of Illinois, Urbana 61801)

27–29. National Assoc. for **Research in Science Teaching**, Detroit, Mich. (R. W. Lefler, Dept. of Physics, Purdue Univ., Lafayette, Ind. 47907)

28–30. Conference on **Nuclear Structure and High Energy Physics** (Nuclear Physics Sub-Committee), Inst. of Physics, Liverpool, England. (Meetings Officer, IP, 47 Belgrave Sq., London SW1X 8QX, England)

29–30. **Rural Health**, American Medical Assoc., Dallas, Tex. (B. L. Bible, AMA, 535 N. Dearborn St., Chicago 60610)

29–31. American **Philosophical** Assoc., Pacific Div., Seattle, Wash. (N. E. Bowie, Hamilton College, Clinton, N.Y. 13323)

29–31. Northwest **Scientific** Assoc., Walla Walla, Wash. (G. H. Deitschman, U.S. Forest Service, P.O. Box 469, Moscow, Idaho 83843)

29–1. Society for **Research in Child Development**, Philadelphia, Pa. (M. K. Harlow, 22 N. Charter St., Madison, Wis. 53706)

30–3. National **Science Teachers** Assoc., Detroit, Mich. (R. H. Carleton, NSTA, 1201 16th St., NW, Washington, D.C. 20036)

31. New Jersey **Acad. of Science**, West Long Branch (M. L. Branin, Box 61, Cranbury, N.J. 08512)

31–6. American **Pharmaceutical** Assoc., Chicago, Ill. (W. S. Apple, APA, 2215 Constitution Ave., NW, Washington, D.C. 20037)

April

2–7. American College of **Radiology**, San Francisco, Calif. (W. C. Stronach, ACR, 20 N. Wacker Dr., Chicago, Ill. 60606)

3–5. **Reliability Physics** Symp., Inst. of Electrical and Electronics Engineers, Las Vegas, Nev. (H. Lauffenburger, IIT Research Inst., 10 W. 35 St., Chicago, Ill. 60616)

3–13. **Education of Teachers for Integrated Science**, Committee on Teaching of Science, International Council of Scientific Unions, College Park, Md. (M. Dietz, Science Teaching Center, Univ. of Maryland, College Park 20742)

4–7. American **Fertility** Soc., San Francisco, Calif. (W. C. Stronach, AFS, 1801 Ninth Ave. S., Birmingham, Ala. 35205)

5–7. Alabama **Acad. of Science**, Huntsville. (T. Denton, Biology Dept., Samford Univ., Birmingham, Ala. 35209)

5–7. Michigan **Acad. of Science, Arts and Letters**, Ann Arbor. (T. G. Overmire, MASAL, 2117 Washtenaw Ave., Ann Arbor 48104)

5–7. West Virginia **Acad. of Science**, Fairmont. (E. A. Bartholomew, West Virginia Univ., Morgantown 26506)

5–7. National Council of **Teachers of Mathematics**, Charleston, S.C. (F. A. Kirby, Union County Public Schools, P.O. Box 629, Union, S.C.)

5–9. **Combustion Engines**, 10th intern. congr., American Soc. of Mechanical Engineers, Washington, D.C. (Meetings Officer, ASME, United Engineering Center, 345 E. 47 St., New York 10017)

6–8. American **Psychosomatic** Soc., 30th annual, Denver, Colo. (M. T. Singer, 265 Nassau Rd., Roosevelt, N.Y. 11575)

7–12. American College of **Allergists**, Atlanta, Ga. (E. Bauers, 2100 Dain Tower, Minneapolis, Minn. 55402)

8–11. American Assoc. of **Dental Schools**, Washington, D.C. (B. F. Miller, III, AADS, 211 E. Chicago Ave., Chicago, Ill. 60611)

8–13. American **Chemical** Soc., 165th natl., Dallas, Tex. (Meetings Manager, ACS, 1155 16th St., NW, Washington, D.C. 20036)

8–14. **Turbulent Diffusion in Environmental Pollution**, 2nd symp., American Geophysical Union, Charlottesville, Va. (A. F. Spilhaus, Jr., American Geophysical Union, 1707 L St., NW, Washington, D.C. 20036)

9–11. **Frontiers in Education**, Education Group of the Inst. of Electrical and Electronics Engineers, West Lafayette, Ind. (Meetings Officer, IEEE, 345 E. 47 St., New York 10017)

9–11. **Interaction of Particle Beams with Surfaces**, Lancaster, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SWIX 8QX, England)

9–11. Amercian **Vacuum** Soc., New Mexico chapter, Albuquerque. (R. L. Gerlach, Sandia Labs., Albuquerque)

9–12. American Assoc. of **Anatomists**, New York, N.Y. (J. E. Pauly, Dept. of Anatomy, Univ. of Arkansas School of Medicine, Little Rock 72201)

9–12. **Cancer Detection and Prevention**, 2nd intern. symp., Intern. Union against Cancer and Intern. Agency for Research on Cancer of the World Health Organization, Bologna, Italy. (2nd Intern. Symp. on CDP, Istituto di Oncologia "F. Addarii," Viale Ercolani 4/2, 40138 Bologna)

9–12. American Acad. of **Pediatrics**, Boston, Mass. (R. G. Frazier, AAP, 1801 Hinman Ave., Evanston, Ill. 60201)

10–12. **Vibration Problems in Industry**,

intern. symp., United Kingdom Atomic Energy Authority, Keswick in Cumberland, England. (J. R. Wakefield, UKAEA, Windscale, Seascale, Cumberland, England, CA20 1PF)

10–13. **Acoustical** Soc. of America, Boston, Mass. (B. H. Goodfriend, ASA, 335 E. 45 St., New York 10017)

11–13. American Assoc. for **Cancer Research**, Inc., 64th annual, Atlantic City, N.J. (H. J. Creech, AACR, Inst. for Cancer Research, Fox Chase, Philadelphia, Pa. 19111)

11–14. Symposium on **Physiological Ecology of Estuarine Organisms**, Georgetown, S.C. (F. J. Vernberg, Belle W. Baruch Coastal Research Inst., Univ. of South Carolina, Columbia 29208)

12–14. Society for **Applied Anthropology**, 33rd annual, Tucson, Ariz. (T. E. Downing, Bureau of Ethnic Research, Univ. of Arizona, Tucson 85721)

12–14. American Assoc. of **Physical Anthropologists**, Dallas, Tex. (E. I. Fry, Dept. of Anthropology, Box 339, Southern Methodist Univ., Dallas 75222)

12–14. Association of **Southeastern Biologists**, Bowling Green, Ky. (M. L. Gilbert, Biology Dept., Florida Southern College, Lakeland 33802)

12–15. International Assoc. for **Dental Research**, North American Div., Washington, D.C. (A. R. Frechette, IADR, 211 E. Chicago Ave., Chicago, Ill. 60611)

13. Utah **Acad. of Sciences, Arts and Letters**, Logan. (H. Buehanan, Dept. of Botany, Weber State College, Ogden 84403)

13–14. **Socio-Economics of Health Care**, American Medical Assoc., Chicago, Ill. (J. Rowland, Div. of Medical Practice, AMA, 535 N. Dearborn St., Chicago 60610)

15–18. Association of **American Geographers**, Atlanta, Ga. (J. W. Nystrom, AAG, 1710 16th St., NW, Washington, D.C. 20009)

15–19. **Industrial Aspects of Biochemistry**, Federation of European Biochemical Socs., Dublin, Ireland. (B. Masterson, FEBS Meeting Secretariat, IMA Conf. Centre, 10, Fitzwilliam Pl., Dublin 2)

15–20. American Soc. of **Biological Chemists**, Atlantic City, N.J. (R. A. Harte, ASBC, 9650 Rockville Pike, Bethesda, Md. 20014)

15–20. Federation of American Socs. for **Experimental Biology**, Atlantic City, N.J. (A. Nixon, FASEB, 9650 Rockville Pike, Bethesda, Md. 20014)

15–20. American **Physiological** Soc., Atlantic City, N.J. (R. G. Daggs, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

16–18. **Liquid State—Van der Waals Centenary**, Kent, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SW1X 8QX England)

16–18. **Nonlinear Elasticity**, Madison, Wis. (G. G. Moran, Mathematics Research Center, Univ. of Wisconsin, 610 Walnut St., Madison 53706)

16–20. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (G. B. Mider, ASEP, 9650 Rockville Pike, Bethesda, Md. 20014)

16–20. American **Geophysical** Union, 54th annual, Washington, D.C. (A. F. Spilhaus, Jr., AGU, 1707 L St., NW, Washington, D.C. 20036)

16–20. American Assoc. of **Immunologists**, Atlantic City, N.J. (H. Metzger, AAI, 9650 Rockville Pike, Bethesda, Md. 20014)

16–20. American Inst. of **Nutrition**, Atlantic City, N.J. (AIN, 9650 Rockville Pike, Bethesda, Md. 20014)

16–20. American Soc. for **Pharmacology and Experimental Therapeutics**, Atlantic City, N.J. (E. B. Cook, ASPET, 9650 Rockville Pike, Bethesda, Md. 20014)

18–20. **Great Lakes Research**, 16th conf., Intern. Assoc. for Great Lakes Research, Columbus, Ohio 43210. (C. E. Herdendorf, Center for Lake Erie Area Research, College of Biological Sciences, Ohio State Univ., 484 W. 12 Ave., Columbus 43210)

19–20. Symposium on **Controlled Release of Biologically Active Agents**, Birmingham, Ala. (A. C. Tanquary, Southern Research Inst., 2000 Ninth Ave. S., Birmingham 35205)

19–21. Louisiana **Acad. of Sciences**, Monroe. (B. F. Dowden, Dept. of Biological Sciences, Louisiana State Univ., Shreveport 71105)

19–21. Southern Soc. for **Philosophy and Psychology**, Knoxville, Tenn. (M. Loeb, Dept. of Psychology, Univ. of Louisville, Louisville, Ky.)

20–21. Illinois State **Acad. of Science**, Urbana. (N. R. Brewer, ISAS, 5757 S. Drexel Ave., Chicago)

22–26. American **Radium** Soc., Colorado Springs, Colo. (F. N. Rutledge, 4828 Caroline St., Houston, Tex. 77004)

22–27. Council for **Exceptional Children**, 51st annual intern. conv., Dallas, Tex. (P. W. Stavros, CEC, 1411 S. Jefferson Davis Hwy., Arlington, Va. 22202)

23–25. **Instrument** Soc. of America, 19th analysis instrumentation symp., 14th chemical and petroleum instrumentation symp., Process Measurement and Control Div. symp., St. Louis, Mo. (J. L. Kern, Monsanto Co., 800 N. Lindbergh St., St. Louis 63166)

23–28. American Acad. of **Neurology**, Boston, Mass. (S. A. Nelson, AAN, 4005 W. 65 St., Minneapolis, Minn. 55435)

23–30. American Soc. for **Clinical Investigation**, Atlantic City, N.J. (P. Calabresi, Roger Williams General Hospital, Providence, R.I. 02908)

24–27. International **Magnetics** Conf., Magnetic Soc. of the Inst. of Electrical and Electronics Engineers, Washington, D.C. (D. H. Looney, Bell Labs., Whippany Rd., Whippany, N.J. 07981)

25–26. American **Geriatrics** Soc., Beverly Hills, Calif. (E. Henderson, 10 Columbus Circle, New York 10019)

25–27. The **Ocean, Nuclear Energy, and Man**, American Nuclear Soc. and Marine Technology Soc., Palm Beach Shores (Singer Island), Fla. (M. J. Ohanian, Dept. of Nuclear Engineering, Univ. of Florida, Gainesville 32601)

25–28. International **Communication** Assoc., Montreal, P.Q., Canada. (M. Z. Sincoff, Center for Communication Studies, Ohio Univ., Athens 45201)

25–28. National Council of **Teachers of Mathematics**, Houston, Tex. (J. D. Gates, NCTM, 1201 16th St., NW, Washington, D.C. 20005)

26. **Sigma Pi Sigma**, Washington, D.C.

(D. W. J. Shea, State Univ. of New York, Stony Brook 11790)

26–27. **Scanning Electron Microscope** Symp., 6th annual, Chicago, Ill. (O. Johari, IIT Research Inst., 10 W. 35 St., Chicago 60616)

26–28. Louisiana **Acad. of Sciences**, Monroe. (B. F. Dowden, Dept. of Biological Sciences, Louisiana State Univ., Shreveport 71105)

26–28. Ohio **Acad. of Science**, Cleveland. (J. H. Melvin, OAS, 445 King Ave., Columbus 43201)

26–28. American **Philosophical** Assoc., Western Div., Chicago, Ill. (N. E. Bowie, Hamilton College, Clinton, N.Y. 13323)

26–28. **Population** Assoc. of America, New Orleans, La. (J. W. Brackett, PAA, P.O. Box 14182, Benjamin Franklin Sta., Washington, D.C. 20044)

27–28. Georgia **Acad. of Science**, Atlanta. (E. A. Stanley, Dept. of Geology, Univ. of Georgia, Athens 30601)

27–28. Iowa **Acad. of Science**, Grinnell. (R. W. Hanson, Dept. of Chemistry, Univ. of Northern Iowa, Cedar Falls 50613)

27–28. Missouri **Acad. of Science**, Columbia. (R. G. Combs, 206 Electrical Engineering Bldg., Univ. of Missouri, Columbia 65201)

27–28. North Carolina **Acad. of Science**, Charlotte. (J. A. Yarbrough, Dept. of Biology, Meredith College, Raleigh 27602)

27–28. American Assoc. of **University Professors**, St. Louis, Mo. (B. H. Davis, AAUP, Suite 500, 1 Dupont Circle, NW, Washington, D.C. 20036)

27–29. Wisconsin **Acad. of Sciences, Arts and Letters**, Prairie du Chien. (J. R. Batt, WASAL, 5001 University Ave., Madison 53705)

28. Society for **Investigative Dermatology**, Atlantic City, N.J. (J. S. Strauss, Boston Univ. Medical Center, 80 E. Concord St., Boston, Mass. 02118)

28. **Societal Problems of Water Resources**, 2nd annual symp., Illinois Earth Science Assoc., Chicago. (M. Qutub, Northeastern Illinois Univ., Bryn Mawr at St. Louis Ave., Chicago 60625)

28–29. Montana **Acad. of Sciences**, Dillon. (R. E. Juday, Dept. of Chemistry, Univ. of Montana, Missoula 59801)

29–1. **Classification** Soc., North American Branch, 4th annual, Atlanta, Ga. (F. J. Rohlf, Dept. of Biology, State Univ. of New York, Stony Brook 11790)

29–2. **Off-Shore Technology**, Inst. of Electrical and Electronics Engineers, Houston, Tex. (Technical Activities Bd., 345 E. 47 St., New York 10017)

29–3. American **Ceramic** Soc., Inc., Cincinnati, Ohio. (F. P. Reid, ACSI, 65 Ceramic Dr., Columbus 43214)

29–3. American **Oil Chemists** Soc., New Orleans, La. (J. Lyon, AOCS, 508 S. 6 St., Champaign, Ill. 61820)

30–12. Lindau **Psychotherapy** Weeks, Assoc. for Psychotherapeutic Training, Lindau, Germany. (H. Stolze, D-8 München 81, Adalbert-Stifter-Strasse 31)

May

1–2. **Electron Device Techniques** Conf., Inst. of Electrical and Electronics Engineers, New York, N.Y. (D. Slater, Advisory Group on Electron Devices, 9th Floor, 201 Varick St., New York 10014)