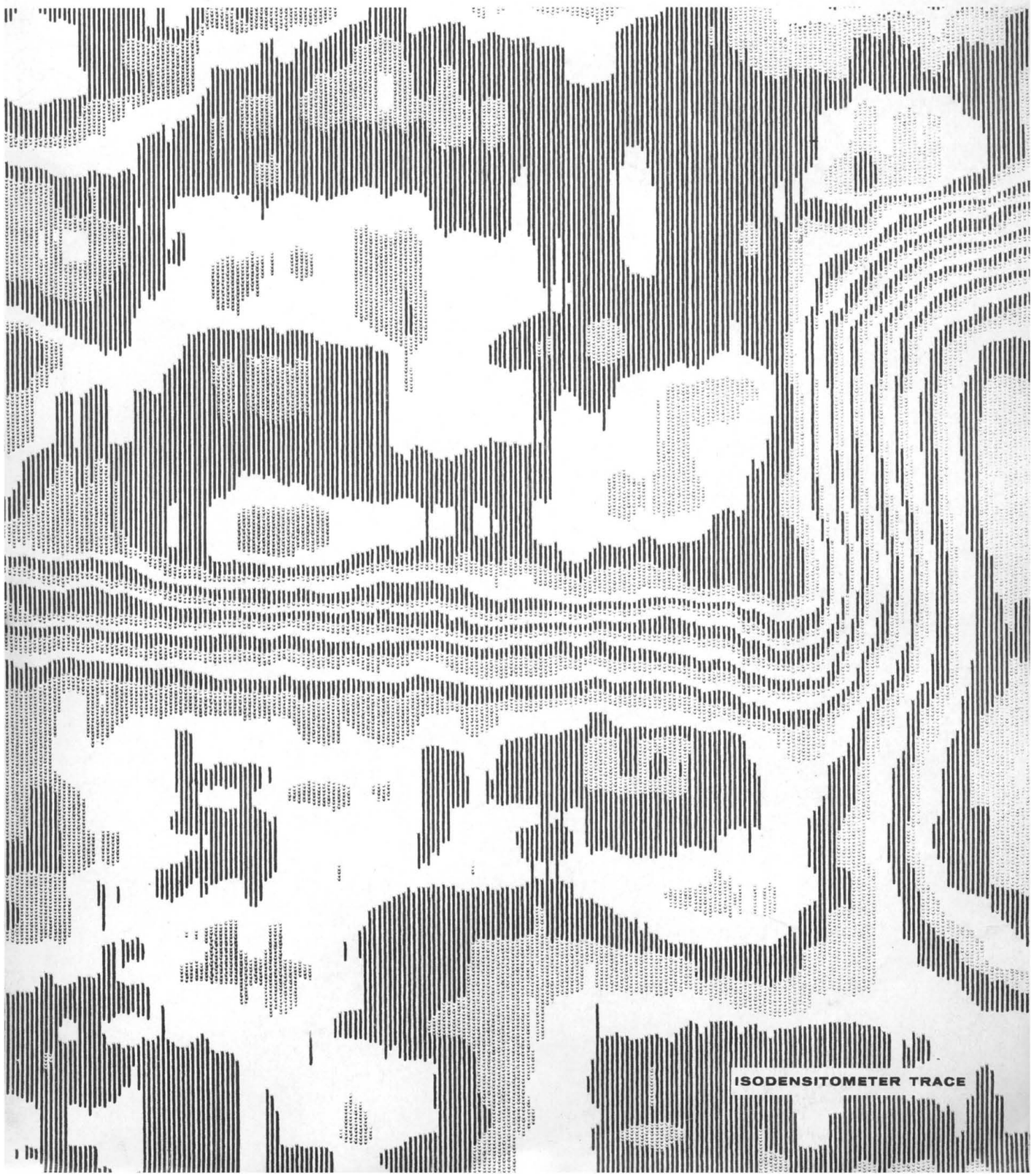
SCIENCE

6 January 1967

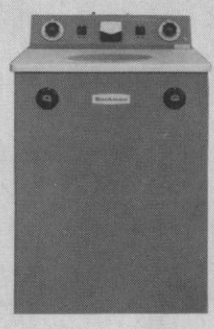
Vol. 155, No. 3758

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Questions about centrifugation?

Try these answers.



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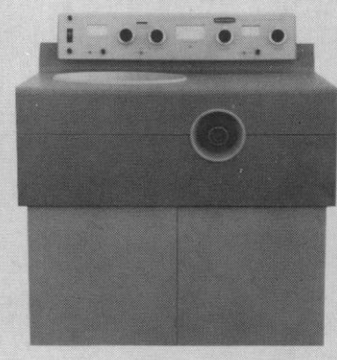
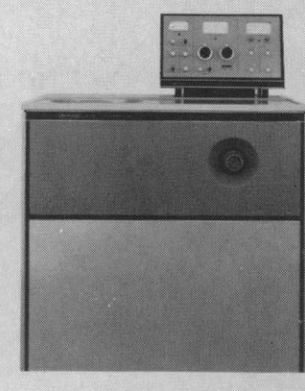
The lowest cost preparative ultracentrifuge available—and the most widely used. More than 3000 units in use throughout the world. The Model L gives you 50,000 rpm and 274,000 *g*, yet it costs less than many instruments offering lesser speeds. An unbeatable combination of high force and low cost for basic sedimentation work.



Model L2-65

65,000 rpm and forces to 420,000 g—the highest force in the field reduces sedimentation times, separates smaller particles, and improves resolution in density gradient studies. With its big chamber and large capacity rotors, the Model L2-65 is the outstanding general-purpose preparative ultracentrifuge.



Model L4

Continuous Flow, Zonal, and 65,000 rpm capabilities—the largest volume, most versatile preparative ultracentrifuge ever built. As a Zonal Ultracentrifuge, the L4 spins 1725 ml and permits recovery of fractions during rotation. As a Continuous Flow Ultracentrifuge, the L4 accepts sample at rates to 10 liters per hour. For additional utility, it also uses most rotors in the broad Beckman line.

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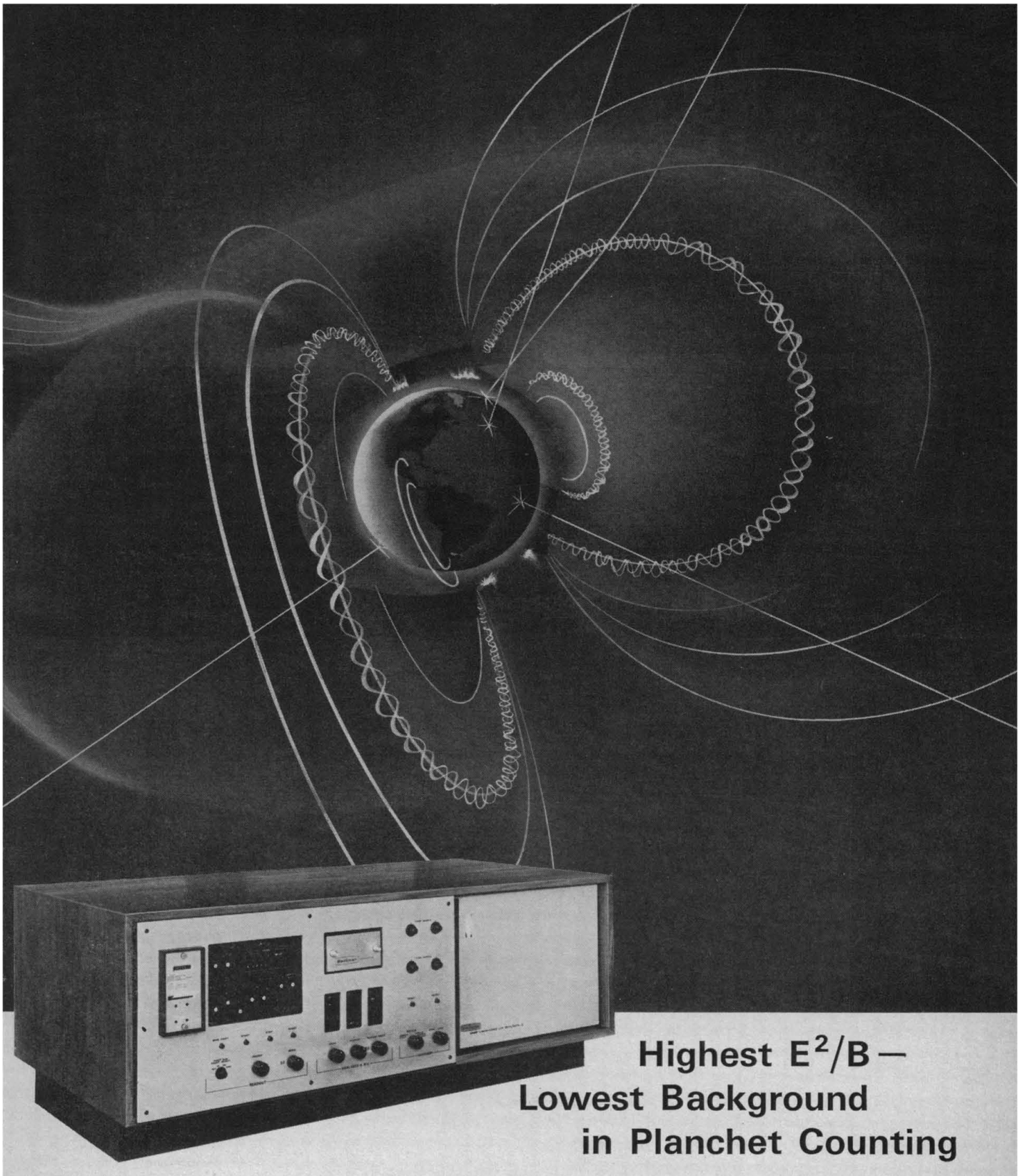

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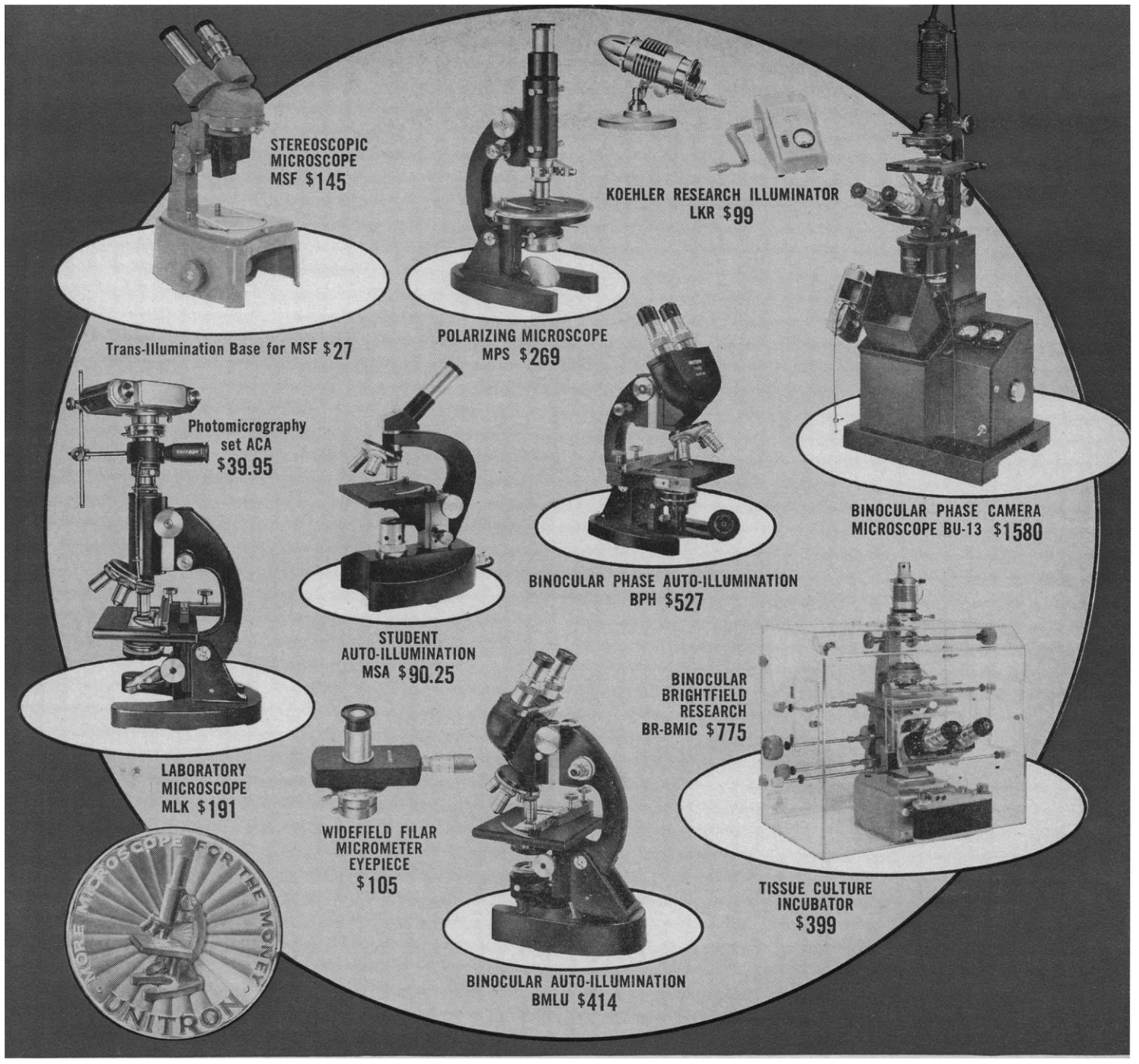
COVER

Isodensitometric trace of a portion of a photograph of tornado activity in which the quantized output of a microdensitometer is coded into a repeating series of symbols. When a set of scans is automatically completed, the contours of equal photographic density are readily recognizable. See page 27.



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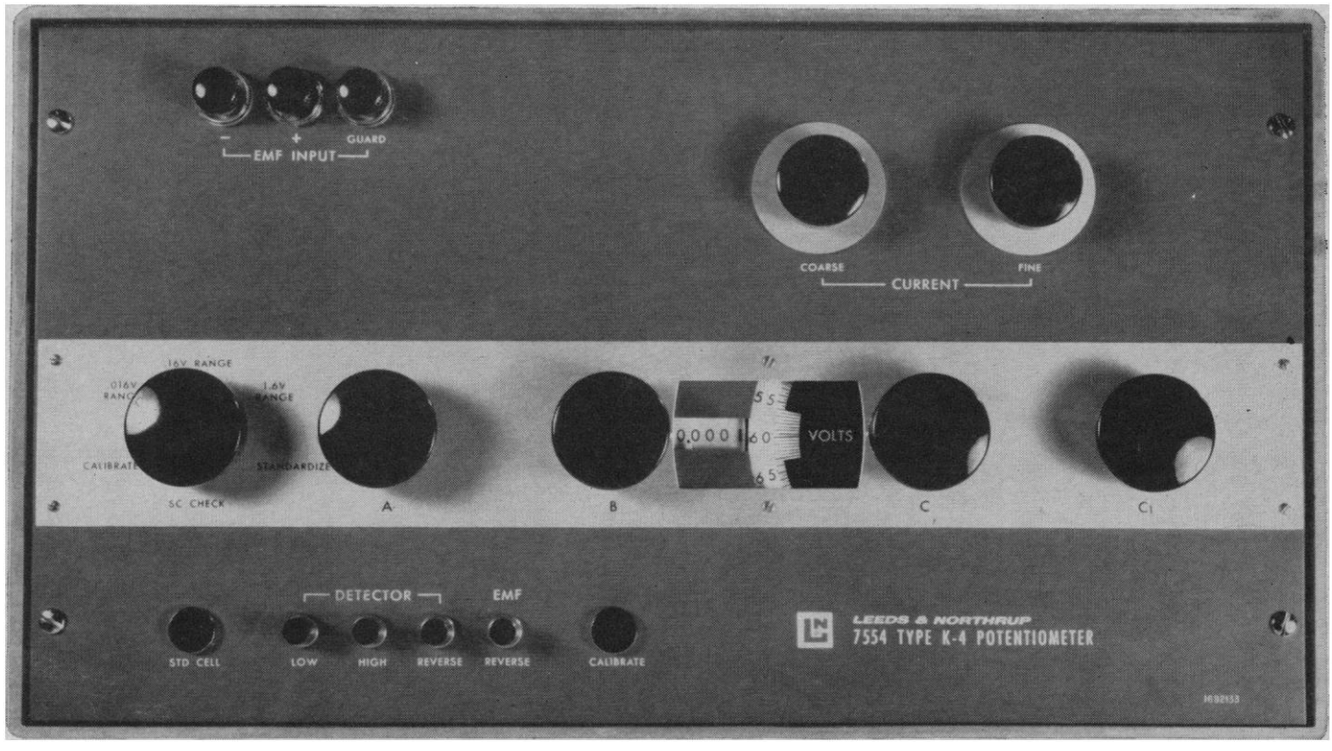

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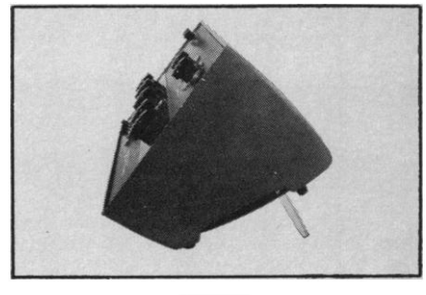

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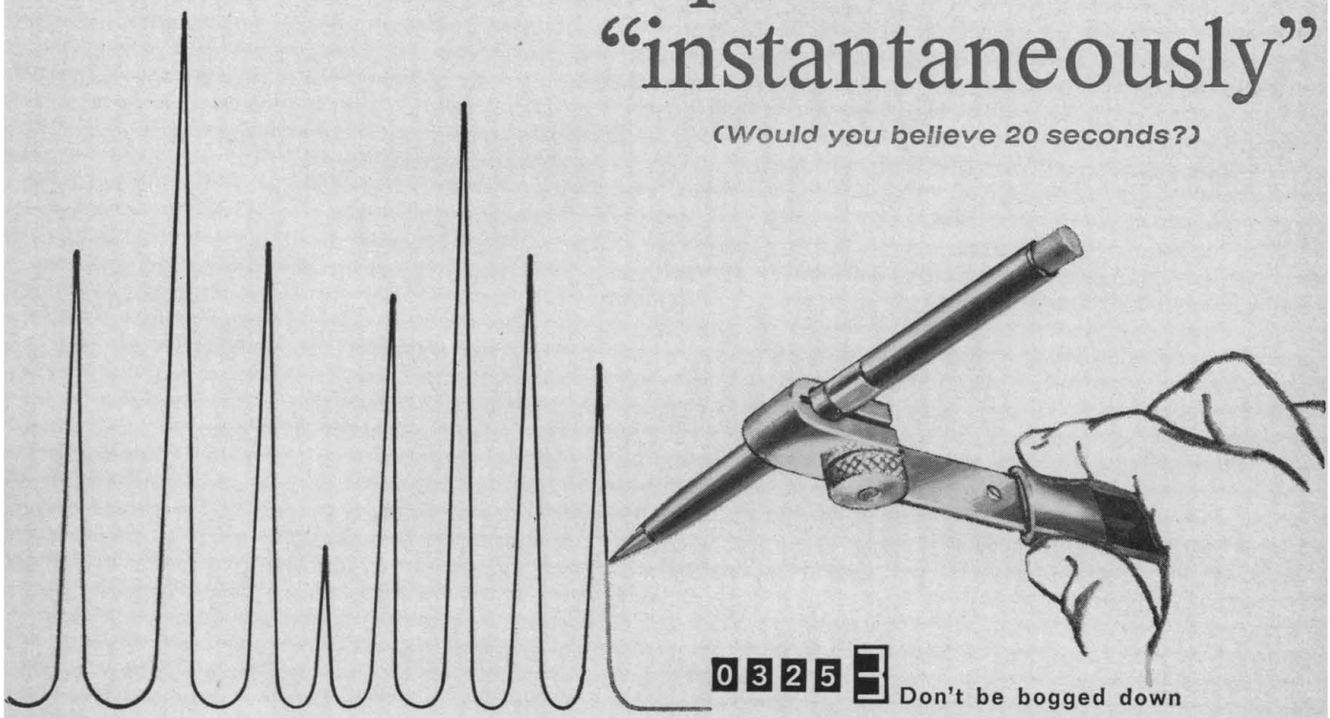

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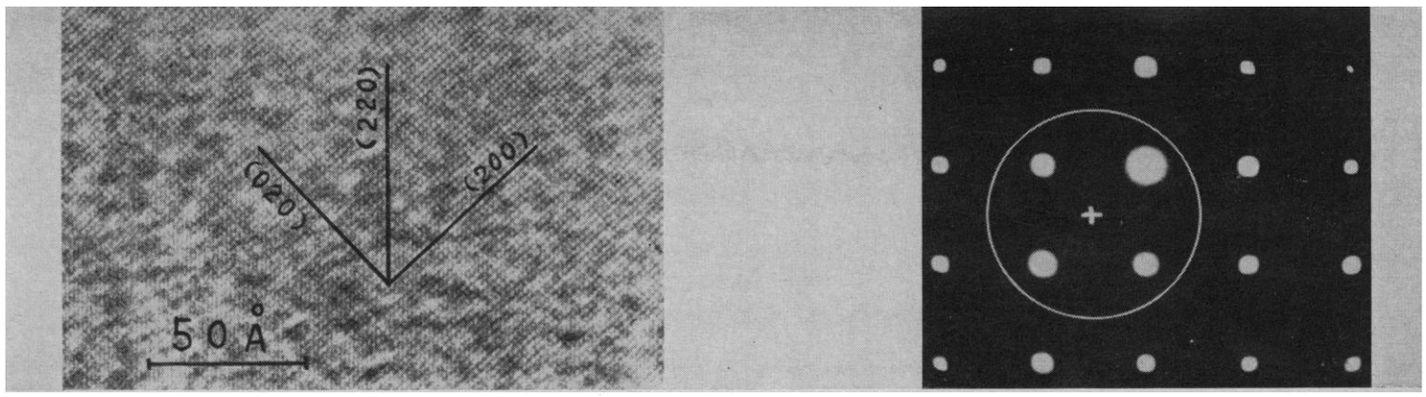

Electron micrograph and diffraction pattern taken on the HU-11C showing the crossed lattice images of the (200) planes of gold. The (020) and (200) planes = 2.04 Angstroms. The (220) plane = 1.44 Angstroms. All important factors such as contamination, stage drift, astigmatism and aberrations must be negligible to achieve this ultra-high resolution. The HU-11C was operated at an accelerating voltage of 100 KV and an electron optical magnification of 270,000 X. The illumination was tilted until the three reflections showed nearly equal intensity in the diffraction pattern; then the micrograph was taken.

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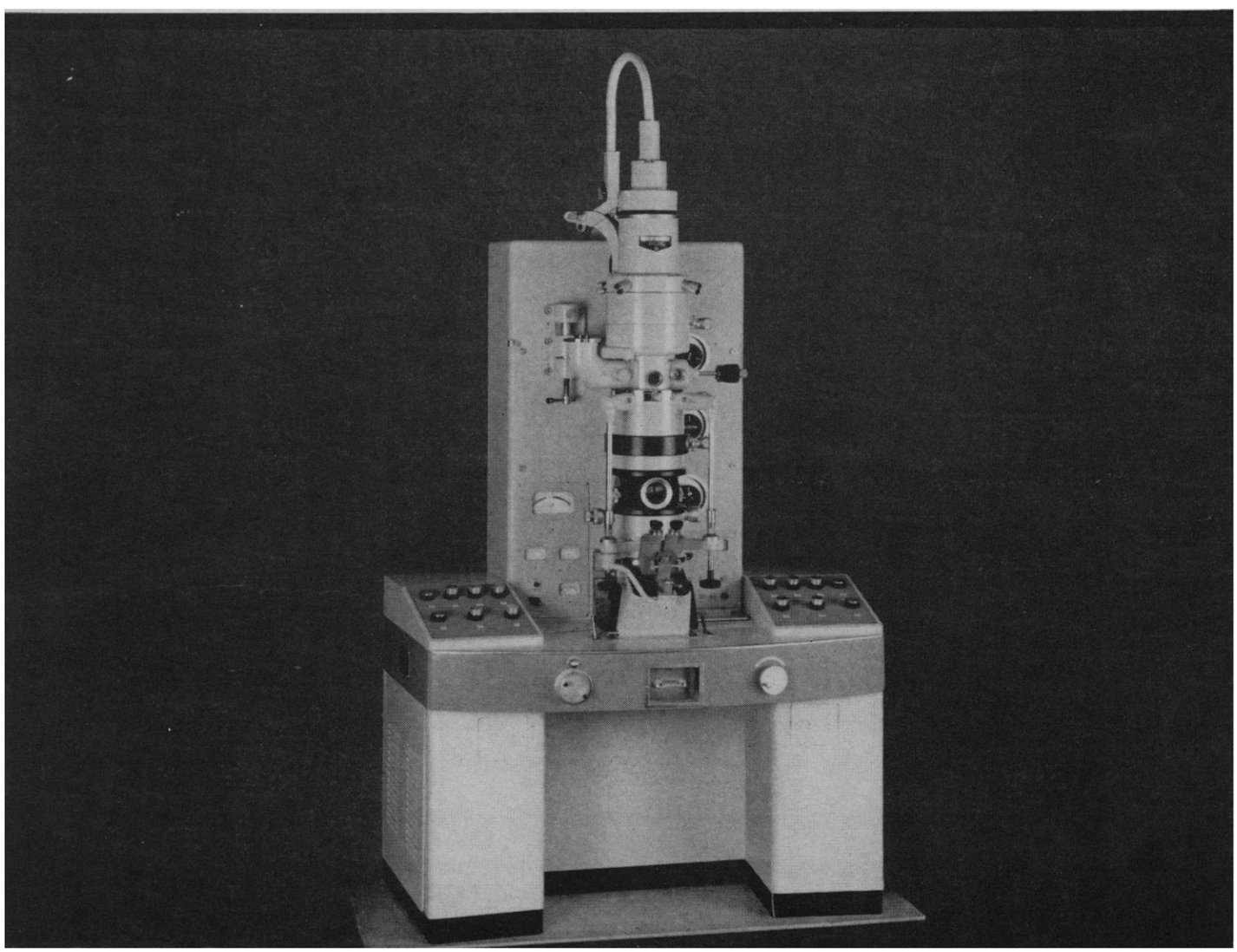

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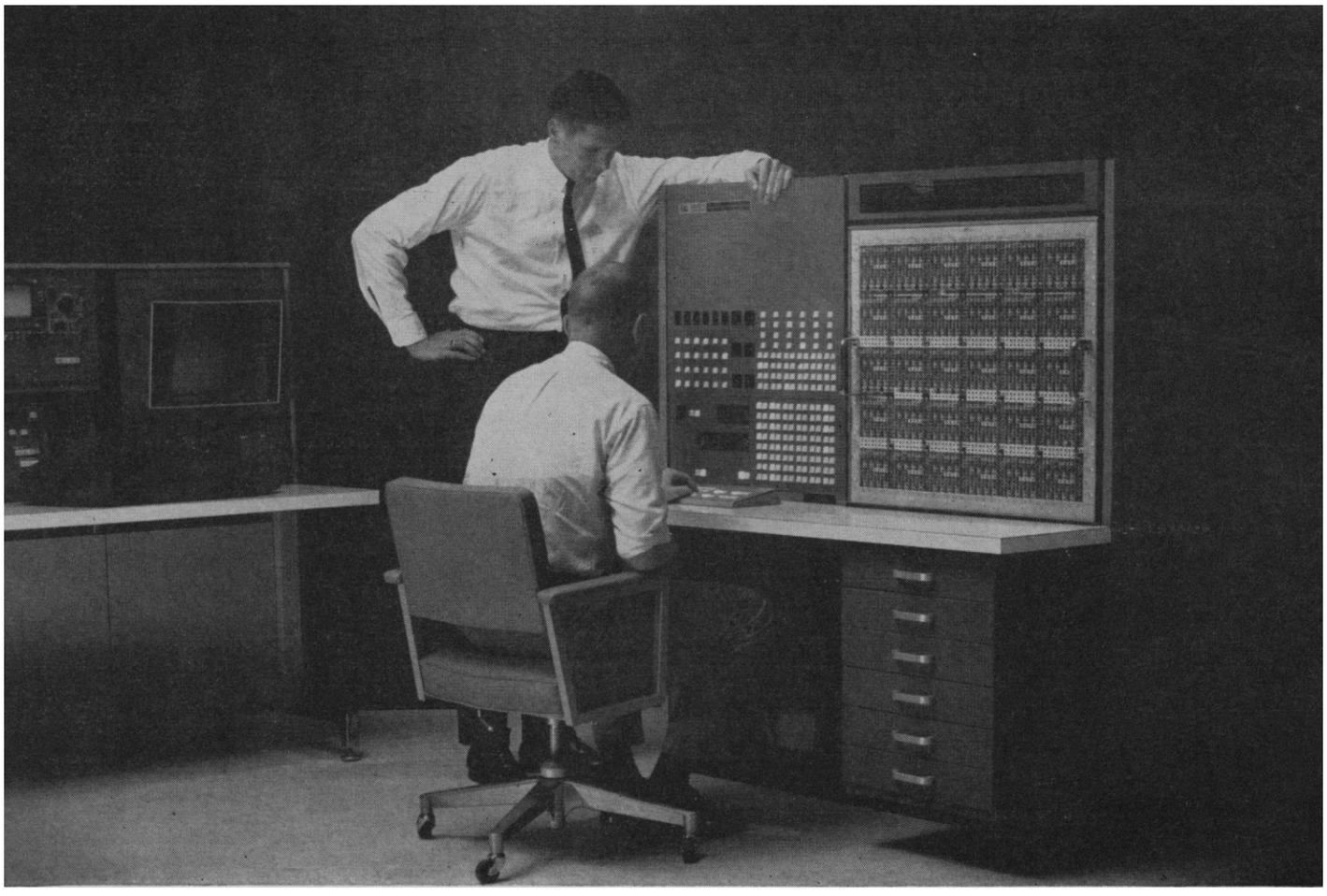

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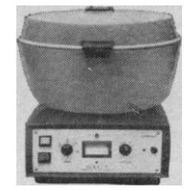

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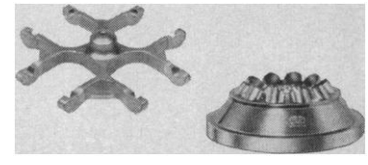

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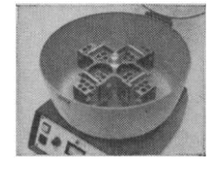

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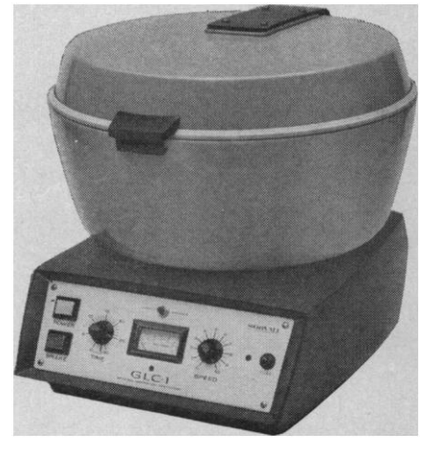

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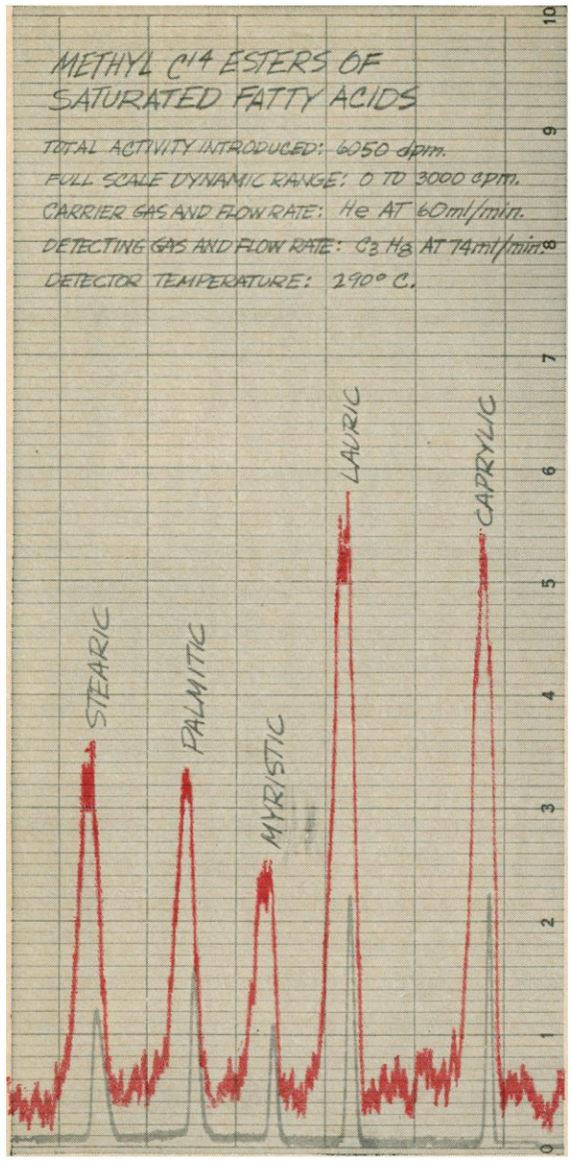

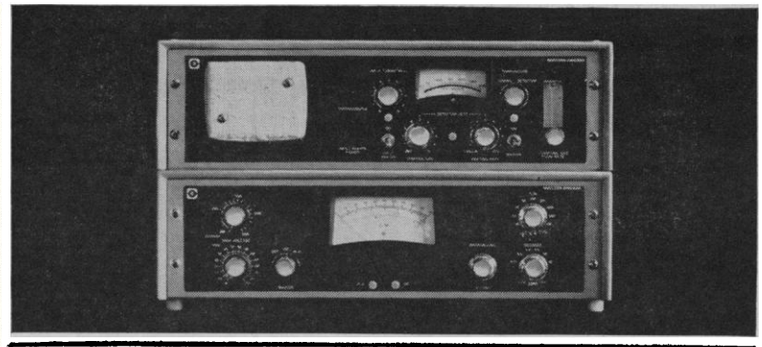

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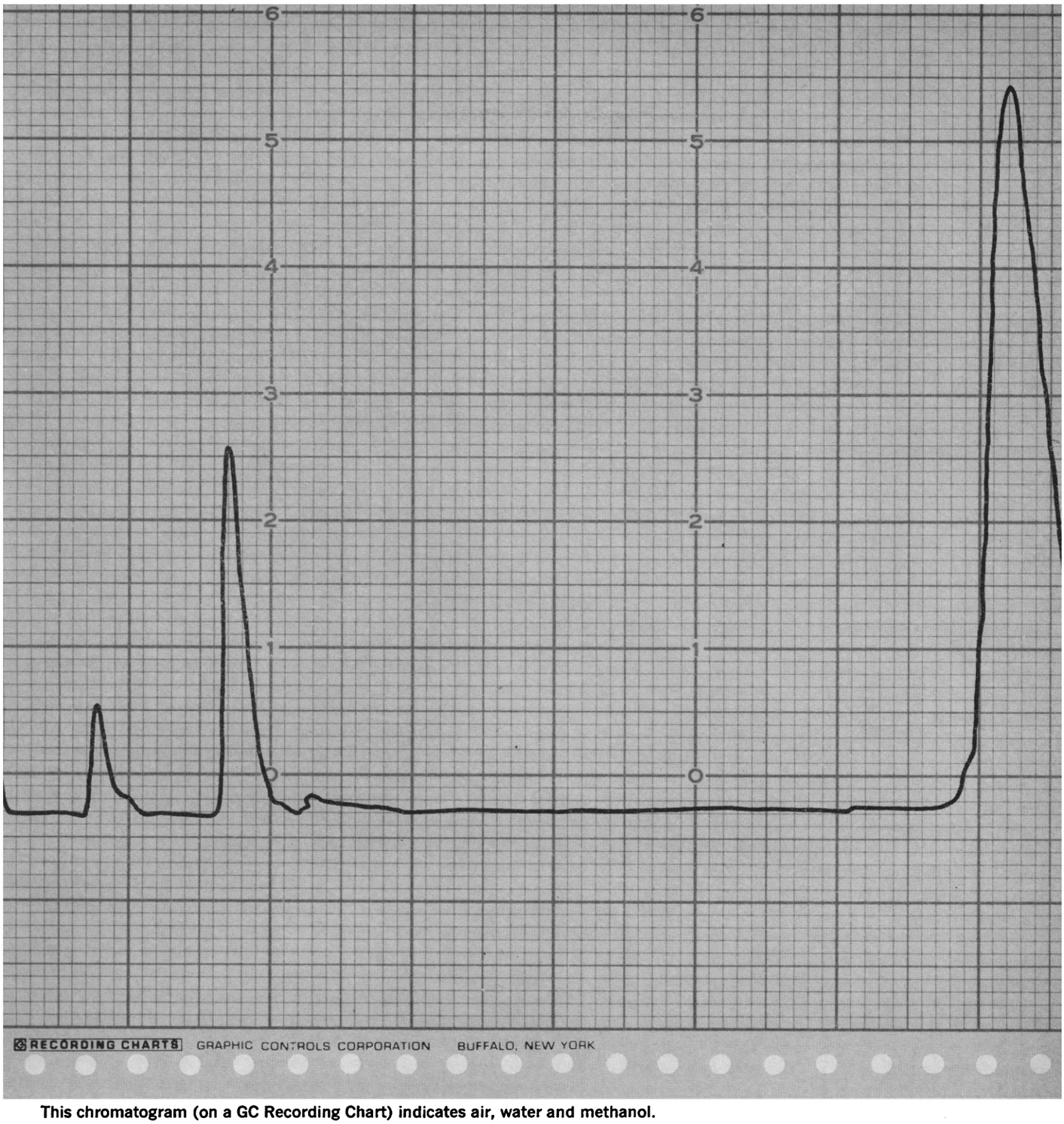

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Fact I

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A new fact in itself. For the first time a complete set of apparatus *and pre-coated glass plates* are available for separation of larger quantities—up to 0.5 gm. on a single 20 x 20 cm. plate.

Fact II

E. Merck Pre-Coated Preparative Silica Gel plate with inorganic fluorescent indicator.

Dry layer thickness is 2 mm. Abrasion-resistance is equal to that of Merck pre-coated analytical glass plates. Because of the remarkable stability of the layer, conventional pipets may be used for streaking samples. Packaged in lots of 12 (20 x 20 cm.).

Fact III

Seven significant advantages of preparative TLC over Column Chromatography:

1) Much shorter developing times—less than one day. 2) Sharper, clearly distinct separations because of the higher activity of the layer (smaller particle size range from 10-40 microns). 3) Substances are localized as a band on one surface, rather than in an undefined area. 4) The procedure requires only a fraction of the solvent volume necessary for column separations, and quantities ranging from 0.01 to 0.5 gm. can be separated on a single 20 x 20 cm. plate. 5) Identification of substances is possible after each individual development (column separations are identified only after eluting the zones). 6) Zones are easily removed. 7) Ideal developing conditions can be selected by rapid pretesting on an analytical thin-layer plate.

Fact IV

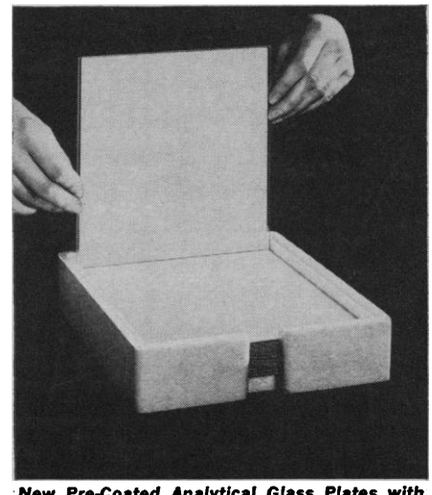
Complete preparative TLC equipment and chemicals.

The special High Capacity Preparative Applicator that holds up to 450 ml. of slurry and can coat layers up to 5 mm. thick. Sorbents with fluorescent indicators. A complete line of preparative developing chambers (including sandwich developing systems), storage facilities, and the Brinkmann/Heraeus Drying Oven for preparative size racks and plates. Extraction Cylinders and Vacuum Zone Collectors in macro and micro versions for recovery of separated fractions.

Fact V

E. Merck (Darmstadt) pre-coated glass plate for analytical TLC.

Vastly superior in uniformity and homogeneity of the layers. Abrasion-proof coating is the hardest yet developed—and it is 250 microns thick for higher capacity than other previously available pre-coated systems. Separating characteristics are equivalent to the plate you make yourself. Unique organic binder may be used with organic solvents, stains, and charring techniques.



New Pre-Coated Analytical Glass Plates with abrasion-resistant layer, stacked in compact styrofoam containers. Delivered ready-for-use.

Smaller size (5 x 20 cm.) Pre-Coated Analytical Plates are now available with Silica Gel and Micro Crystalline Cellulose Powder layers. Also a pre-scored 10 x 20 cm. plate that can be broken by snapping into 5 x 20, 10 x 10, or 5 x 10 cm. sizes.

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☐ 3. Catalog on chromatography. ☐ 4. I have the following problem:

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- ☐ Relative Accuracy*—±0.03 pH within 4 pH of buffer set point.

  *Relative to buffer accuracy and assuming proper standardization technique.
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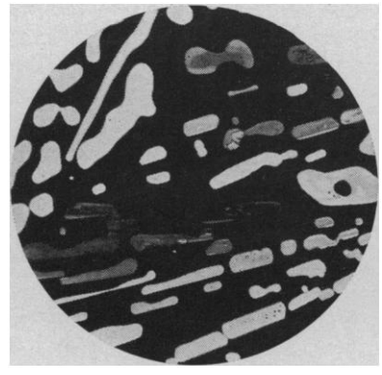

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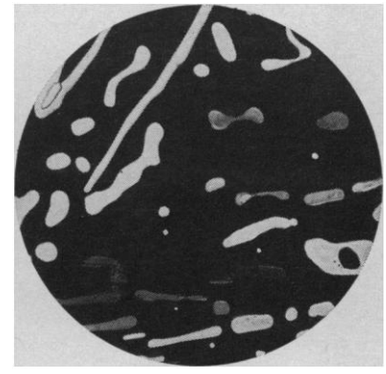

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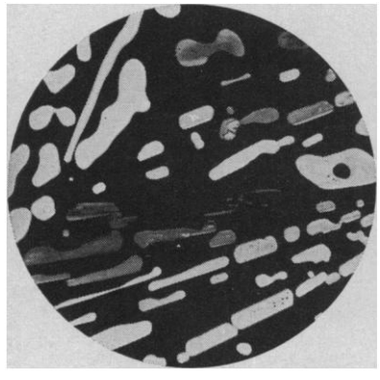

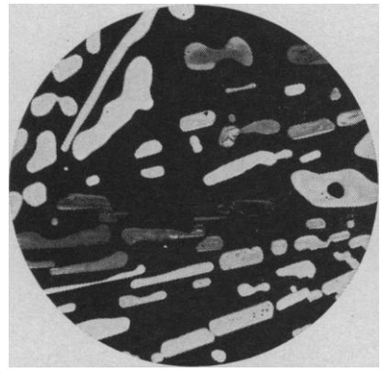

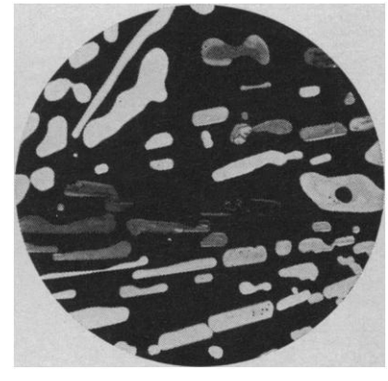

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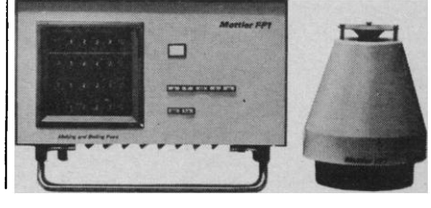
Ask your Mettler dealer for literature describing the new Mettler FP-1 or request a demonstration or trial in your own laboratory. Write Mettler Instrument Corp., 20 Nassau St., Princeton, N. J. 08540.



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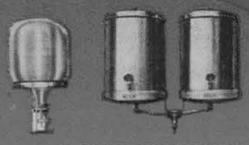

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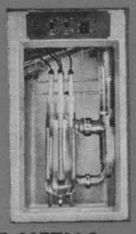

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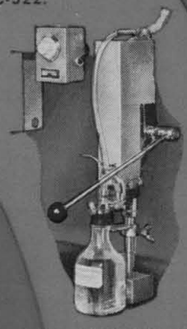

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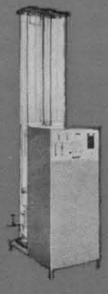

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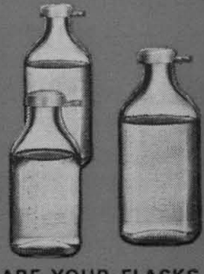

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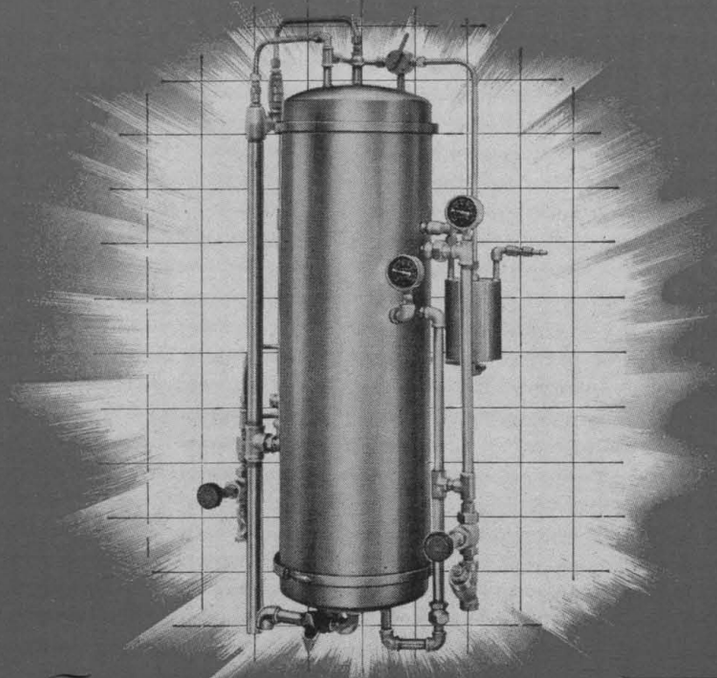

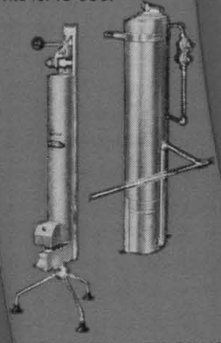

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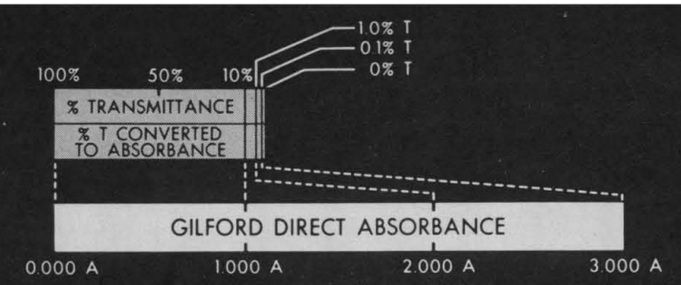

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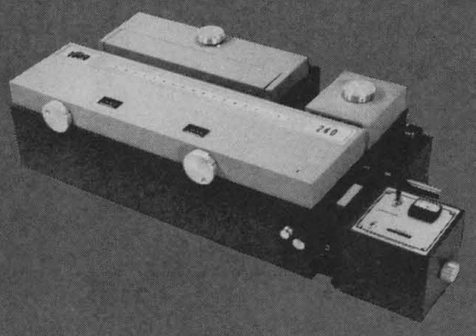

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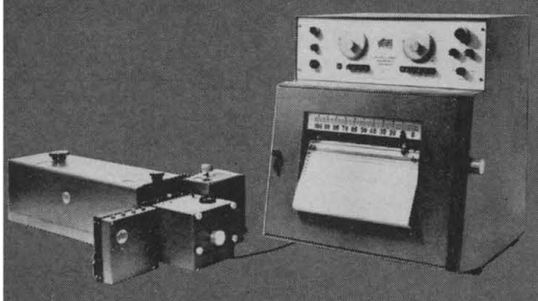
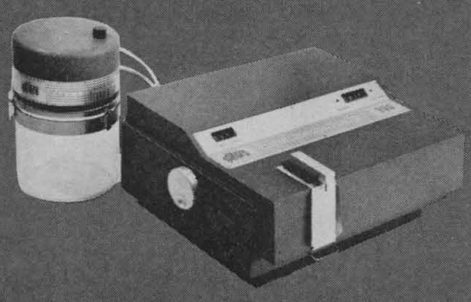


MODEL 2000 AUTOMATIC SPECTROPHOTOMETER

The Model 2000 is a versatile, all-purpose spectrophotometer of superior range, stability, and photometric resolution. It is packaged into two self-contained units: (1) The lamp source, monochromator, automatic cuvette positioner, and photometer/indicator unit. (2) The main console with controls, recorder, power source, photometric circuit, line-voltage regulator, extended cuvette dwell-timer (up to 15 minutes), and circuitry and connections for additional accessories. The Model 2000 is particularly suited for determining time-dependent reaction rates and for automatic, quantitative monitoring of effluents from multiple chromatographic columns or density gradient tubes. Other applications include observation of dissolution and polymerization changes, spectrophotometric titration, precision turbidimetry and colorimetry, large-scale clinical testing, and industrial process and quality control.



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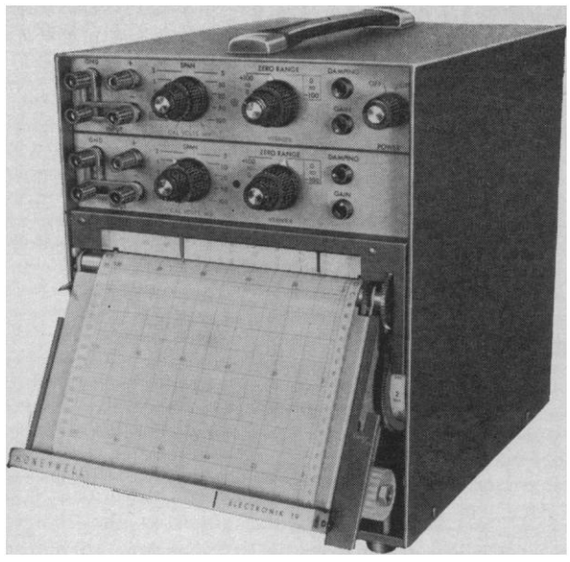

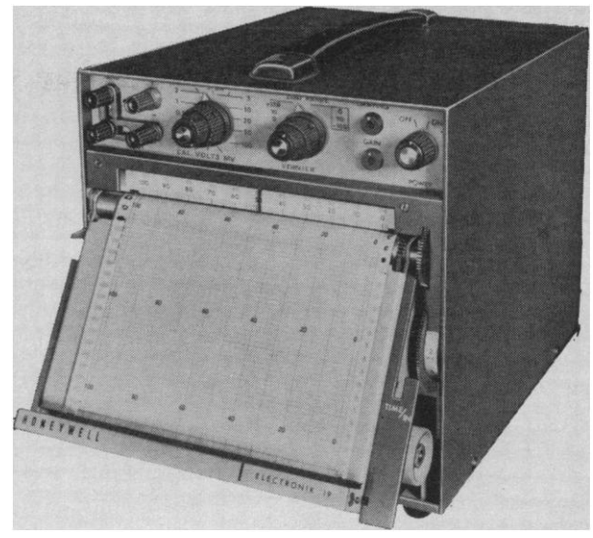

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pillar extended in front of the houses. Figure 1 (bottom) shows a 200× trace of the region including the roof and chimney. Again the flatness of the roof contours is apparent. The intersymbol density difference is 0.01 density units and the scanning aperture is 100 μ^2. Apparently the pillar goes behind the house or stops suddenly at the roof line. The latter explanation is just too unlikely especially since the roof line is not flat. Any faulty exposure or development technique would not give this result.

A further detailed study was made of the structure of the two luminous pillars. Figure 2 shows the trace at 20× with a density increment of 0.012 and with a 100-μ^2 aperture. The appropriate portion of the photograph at the same magnification is shown for comparison. The wires do cross the pillars but are not resolved at this scanning aperture size. Structure is apparent in the pillar with a maximum high up. A similar result is apparent in the other pillar of light on the right hand side of the photograph as indicated in Fig. 3.

The indications are that the luminous pillars constitute a genuine exposure and are not an artifact of either exposure or development. Unfortunately no information was available concerning the characteristic curve of the film so that the brightness distribution of the pillars cannot be determined quantitatively. However, qualitatively the information in Figs. 2 and 3 is meaningful. Could the luminous pillars be caused by reflected ground-based lights? The maximum in each pillar looks too high up for that. This short note indicates the validity of the pictures and shows the usefulness of this particular densitometric technique in quantizing photographic density for the study and evaluation of photographic results. Of course, this work can give no indication of the nature or cause of the pillars.

BRIAN J. THOMPSON
RONALD H. JOHNSON
Technical Operations Research, Burlington, Massachusetts

The intermittent luminosity occurred after the tornado had developed; therefore, it seems to be a side effect rather than a cause. The partial vacuum in the eye of a tornado (which is capable of lifting an automobile) provides the path of least resistance for electricity between the overhead storm clouds and the earth. It might act as an enormous vacuum tube, somewhat similar to a geissler, neon, or fluorescent light tube, conducting very low density electric current wherever there is a sufficient accumulation of electricity in the clouds to make the jump to earth. The discharge is reported to last only a few seconds; also, some observers were within the luminous area with no ill effects.

The partial vacuum in the tornado, together with the difference in potential between the earth and clouds, appears to be the direct cause of this illuminated path of the discharge. It is conceivable that spiraling supersonic winds in the eye of the tornado actually throw the air from the center toward the wall of the core so hard that additional vacuum is produced in the center. This augments the partial vacuum produced by the thermodynamic process at work in the system.

SAMUEL BLAKESLEE ROBERTS
27 *Anderson Road, Greenwich, Connecticut*

Early ideas similar to Roberts' were advanced by Robert Hare in 1840 when he was professor of chemistry at the University of Pennsylvania. In discussing the tornado problem, he offered a translation of suggestions made by Peltier, the French physicist [*Amer. J. Sci. and the Arts* **38**, 73 (1840)]:

> . . . Flashes and fiery balls of sparks accompanying the tornado, a smell of sulfur remains for several days in the houses, in which the curtains are found discolored. Everything proves that the tornado is nothing else than a conductor formed of the clouds which serves as a passage for a continual discharge of electricity from above.

While we hope that eyewitnesses will continue to report in as great detail as possible what they see at the time of a tornado, we think it is clear that the most important thing that needs to be done is to obtain good photographic evidence of what is going on. It is our own opinion that we have certainly not established that the photograph indeed represents the two tornadoes, but it seems that an atmospheric phenomenon of some kind is probably present and that further studies are desirable.

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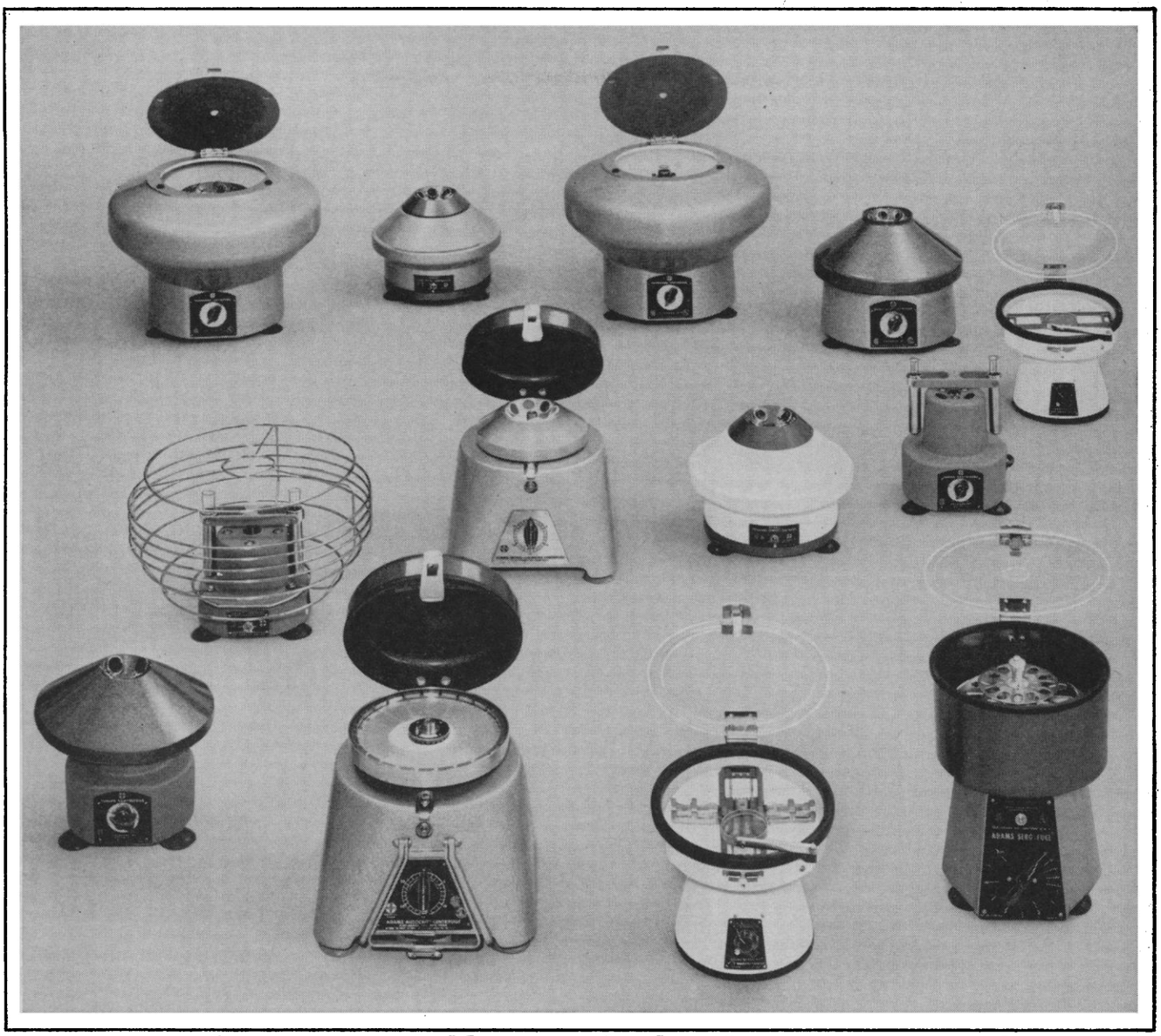

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Publishing without Review

Abelson's point is very well taken in his editorial "Information exchange groups" (11 Nov., p. 727). I am familiar with a number of similar expedients to beat, so to speak, the system of adequate review and responsible authorship. He did not mention them, but there are two other ways to circumvent review. One is the publication in book form of papers given at symposia and the other, the "transactions" published by some engineering societies. The latter are open to discussion but, in the meantime, one can have just about anything printed. Fortunately, symposia proceedings are usually very slow in coming out and are not attractive as a medium. He also did not mention a cause for preferment of unreviewed and unedited publication media: the need for gathering what the trade knows as "brownie points" under the "Publish or Perish" system.

As I see it, the only solution is the speeding up of publication in reputable journals and increasingly incisive screening. Also, we need administrative policies of government agencies and universities toward the suppression of quasi-journals. I would welcome continued editorial focus on this problem in your columns.

C. H. M. VAN BAVEL
U.S. Water Conservation Laboratory, 4331 East Broadway, Phoenix, Arizona 85040

Spreading the Gospel

By coincidence, shortly before reading Van Vleck's letter ("Population stabilization," 7 Oct.), I talked to two high school biology classes about the need to stabilize human populations. I can attest that such concepts, including birth control, were accepted with aplomb by sophomores. In fact, I am convinced that the high school biology course is an ideal place to introduce this problem. When it follows the study of the simple principles of animal and plant ecology such as is found in many texts, especially the Biological Sciences Curriculum Study texts, population control is quite comprehensible to the student. He can understand why man has instinctively been so diligent and successful in turning his efforts to death control, and has been reluctant to interfere with his own reproduction. The conflict becomes apparent and leads to the conclusion

that, in order to compensate for our successful death control, we must introduce a conscious, well planned, and vigorous program of birth control.

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Hickman's "Oases for the future" (4 Nov., p. 612) provides startling data and interesting speculation regarding the uses and conservation of our water supplies. Human ingenuity is probably capable of achieving the science-fiction advances that Hickman discusses. But it should be recognized that the primary purpose of such proposals is to make room for increasing populations. If, instead of developing such schemes, men have the courage and wisdom to direct even a fraction as much ingenuity, effort, and capital into a program of population adjustment to bring the birth and death rates into balance during the next two or three decades, the quality of living for individuals and the world generally would be incomparably better and more attractive.

C. F. BENTLEY
Faculty of Agriculture,
University of Alberta,
Edmonton, Alberta, Canada

"Krow" Units: A New Evaluation

Considerable discussion revolves around the productivity of research workers and its lack of criteria for evaluation. It occurred to me that such productivity could be expressed in some objective form. This would greatly facilitate evaluation and also provide criteria for determining when a unit of research work is completed. I would like to suggest that the minimal unit of research activity which is internally consistent and illustrates a specific cause and effect relationship be designated as one "Krow" unit. I recognize that there are research activities and publications which qualify as "Multi-Krow," and similarly, the individual steps or logical progressions which ultimately constitute a "Krow" could be designated as "Milli-Krow," while the elemental beginnings of an investigation (and in some less fortunate circumstances, the actual work itself) might be considered as "Micro-Krow" units.

SHAWN SCHAPIRO
Veterans Administration Hospital,
San Fernando, California 91342

6 January 1967, Volume 155, Number 3758 **SCIENCE**

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Cost-Benefit Competition

Vietnam, the possibility of a tax increase, and uncertainties over future economic conditions and the amount of federal revenue all color the budget the President will soon submit to Congress. Military requirements, fixed charges, and appropriations for education, poverty, and Great Society programs all have strong claims. Figures are not yet available on the science portion of the budget, but assuredly the amount will be smaller than many scientists would like.

Because cost-benefit analysis has proved so useful in the Department of Defense, other agencies are now expected to give the Bureau of the Budget information on the total costs, over several years, and the expected results of proposed programs. The applied-research agencies clearly have an advantage in this regard over agencies that support undirected research, and two of the former have recently released reports that will do them no harm in competing for funds. Project Hindsight of the Department of Defense (*Science*, 18 November and 2 December) analyzed the sources of the events and key ideas that have made our weapon systems as effective as they are. This excellent study found that research conducted to solve specific problems has been highly productive, while undirected research, conducted without specific applications in mind, has contributed little to modern weaponry. The original report made it very clear that the analysis dealt only with weapon developments of the past 2 decades, but some news accounts which had wider circulation than the report itself overgeneralized the results to imply that basic research generally has been largely a waste of money.

A recent Public Health Service study cited the expected costs and the prospective savings, in medical and hospital expenses and in increased earnings, of programs to reduce or eliminate venereal disease, automobile accidents, arthritis, and other health hazards.

If basic research (undirected and largely academic research) is to receive what advocates consider adequate support, a stronger case must be made on its behalf. (Last year the National Science Foundation got no increase over the previous year's appropriations.) It is impossible to make dollar-and-cents forecasts of the benefits of a basic research program which have the apparent precision and assurance of, for example, the conclusion that $119 million spent on detection and early treatment of uterine cervical cancer would save the lives of 34,000 women and a billion dollars in reduced medical expenses and increased earnings.

Because basic research is handicapped in this kind of competition, we should be more effectively presenting its benefits—all the real benefits and not just those that can easily be translated into dollars and cents. I have seen no government-agency report that does this as convincingly as the annual reports of the Carnegie Institution of Washington. The 1965–66 report starts with an eloquent analysis of the values of fundamental research and continues with a persuasive account of specific research conducted in Carnegie laboratories and departments.

The Office of Science and Technology and the National Science Foundation must take the lead in dealing with the Bureau of the Budget and the Congress, but there is also work to be done by scientists throughout the nation. There are congressmen to talk to and write to. When new findings are announced, it is good insurance for the future to make certain that the reporters know that "this work was supported by a grant from ——." Agencies and individuals alike must recognize that there will be only as much federal money for basic research as a majority of individual congressmen are willing to appropriate.

—DAEL WOLFLE

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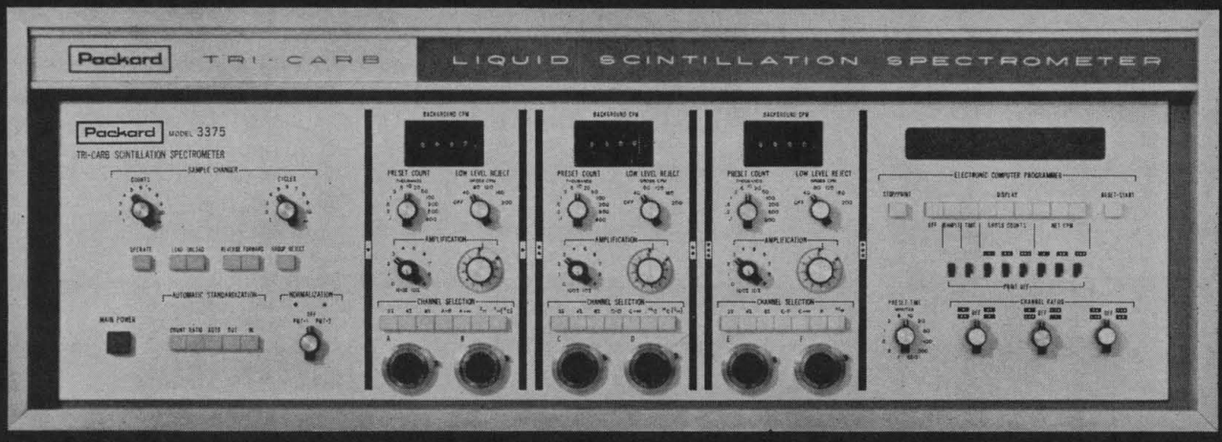

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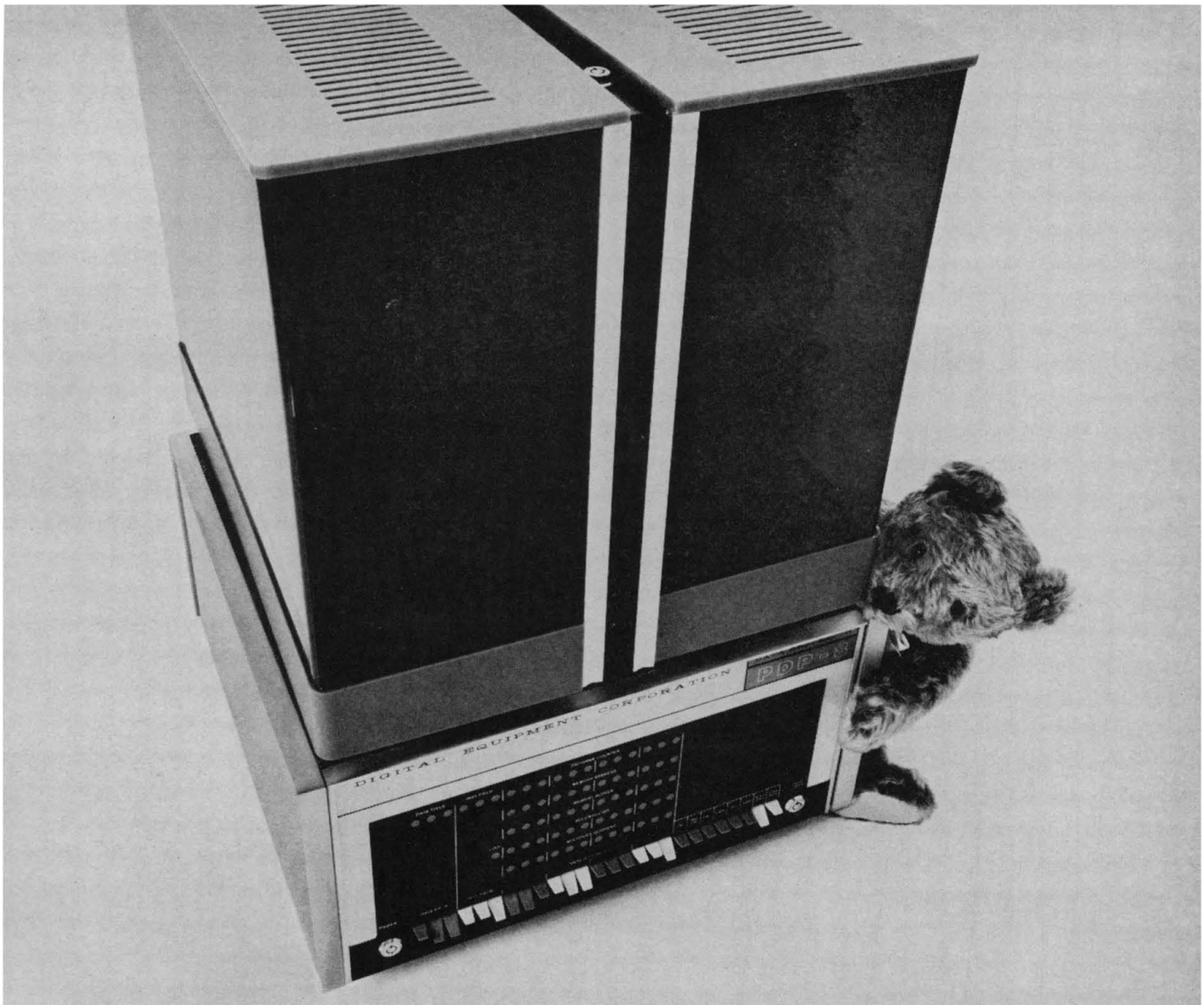

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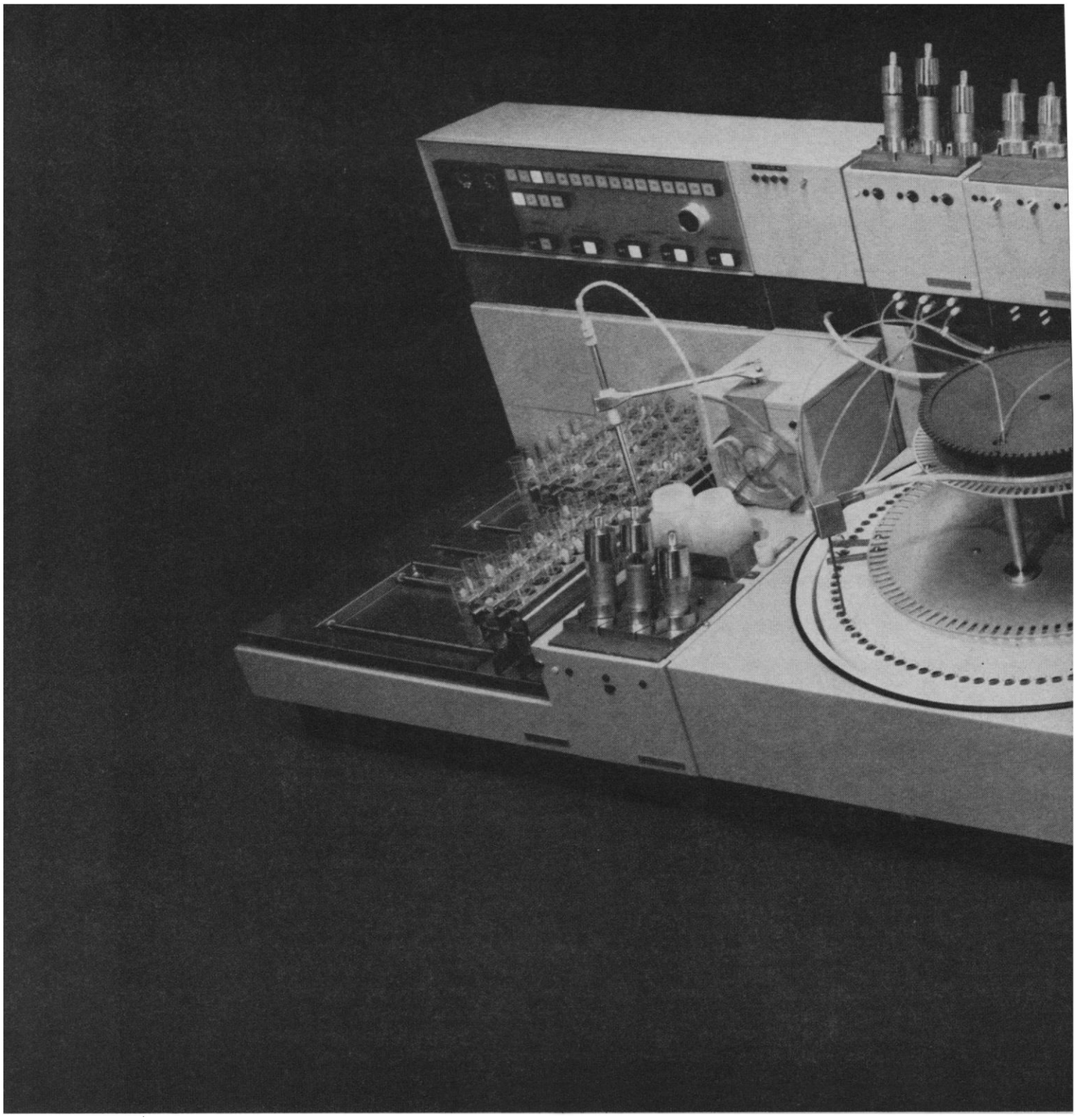

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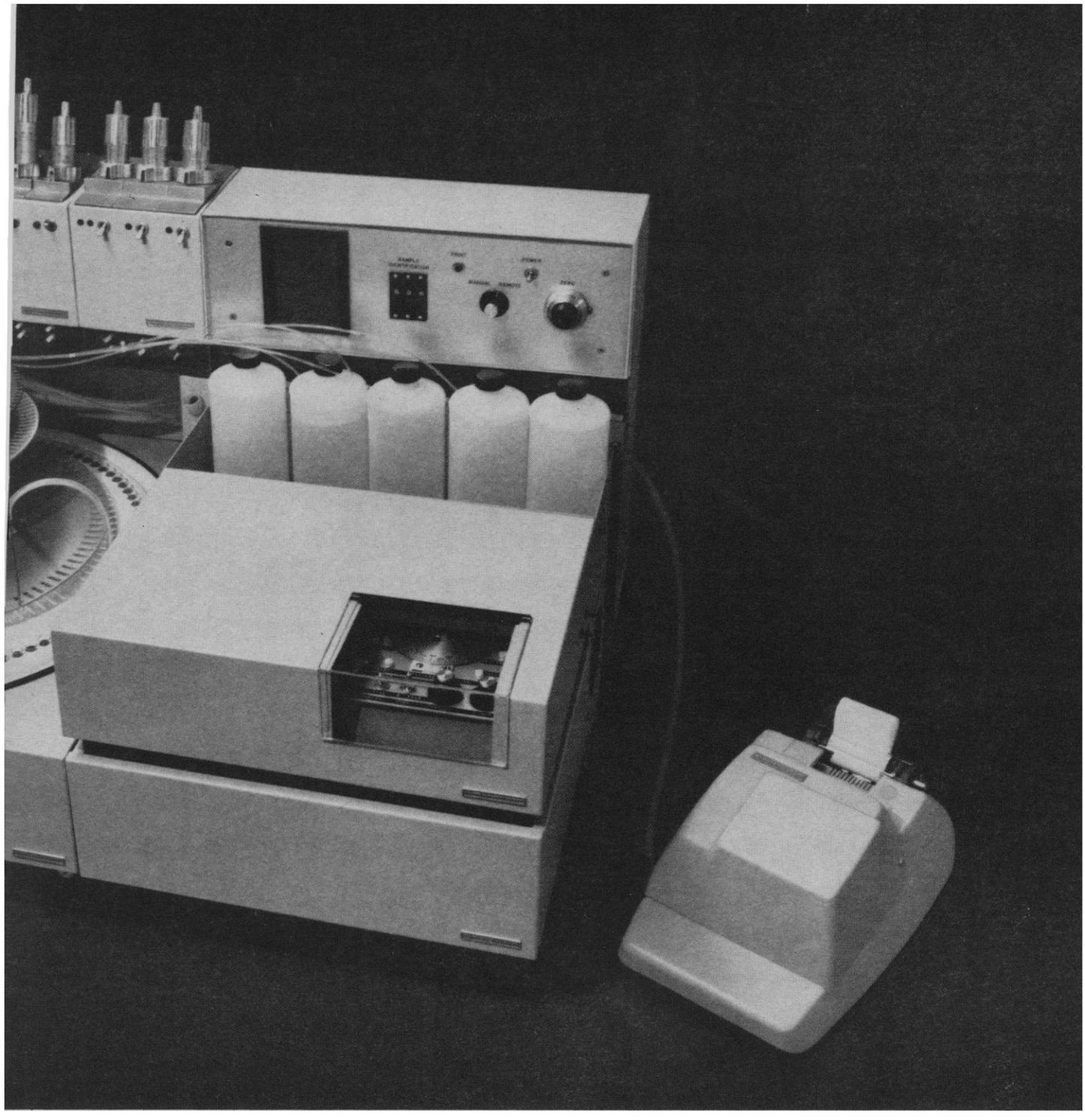

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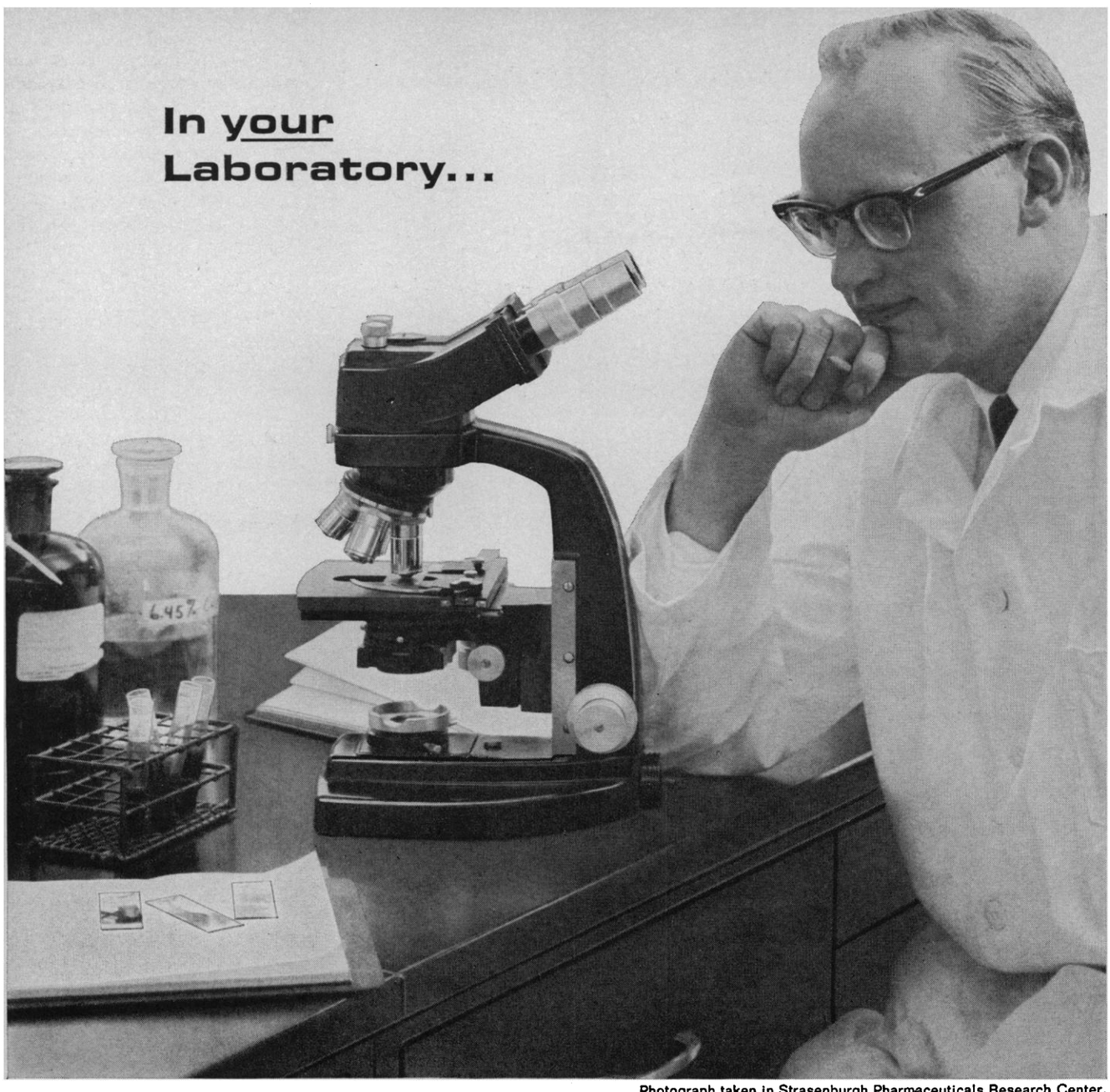
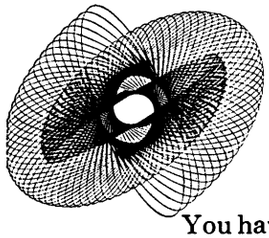


Photograph taken in Strasenburgh Pharmaceuticals Research Center, Division Wallace & Tiernan Inc., Rochester, N.Y.



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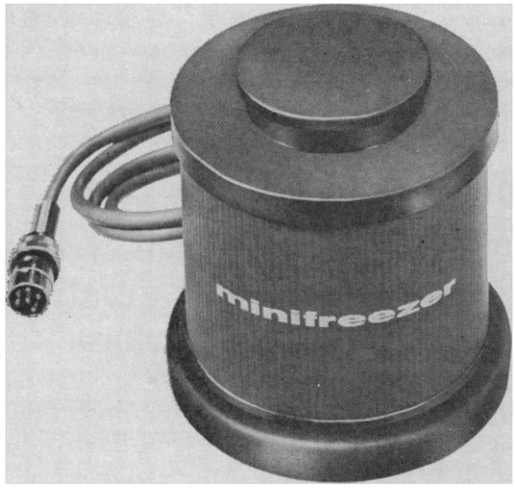

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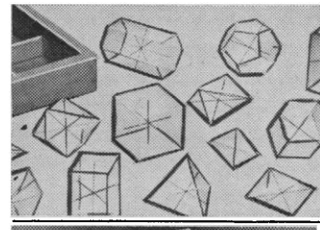

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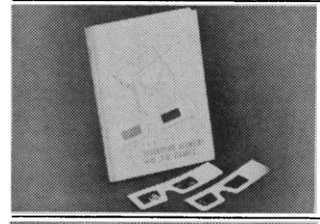

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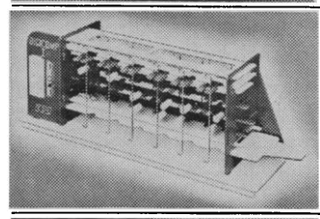

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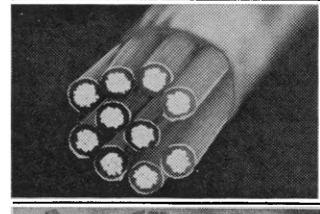

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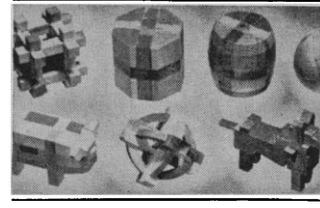

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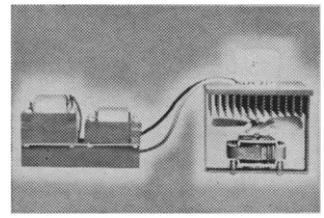

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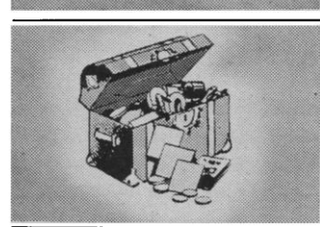

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clay topsoil have established its degradation by soil microorganisms. The herbicide does not affect the nitrogen metabolism of the soil microorganisms but above 1 part per million the respiratory activity of the soil is enhanced. The relation between photosynthesis, photorespiration, and dark respiration in plants continues to be of interest to a number of groups across Canada. B. Tregunna (Vancouver) commented that among a variety of algal species dark respiration is inhibited during photosynthesis and in many is not replaced by photorespiration. F. Poskuta and G. Krotkov (Queens, Kingston) and C. D. Nelson (Simon Fraser, Vancouver) observed that dark respiration is a different process from photorespiration in spruce seedlings and in detached leaves of a number of higher plants. DCMU inhibits photosynthesis, stimulates dark respiration, but has no effect on photorespiration. Increasing the oxygen concentration in light stimulates photorespiration, whereas the dark respiration component is almost unaffected. Of further interest is the marked stimulation of photorespiration in blue light but not in the red. Among several papers presented on translocation, P. V. Rangnekar and D. Forward (Toronto) found very slow rates of C^{14} movement from the branches to the stems of red pine. The main utilization of translocated C^{14} in the stems appears to be in the formation of new tracheids. P. Trip and P. R. Gorham (N. R. C., Ottawa) fed tritiated sucrose to mature Cucurbit leaf blades and found tritium movement confined to phloem tissue. M. Suzuki and D. C. Mortimer (National Research Council, Ottawa) found no correlation between sugar gradients and translocation in the sugar beet. Changes in sugar gradients with the development of leaf blades do not alter the smooth linear patterns of translocated sucrose from the blade to the root.

Officers of the society elected for 1966–67 were: president, D. C. Mortimer (National Research Council, Ottawa); vice president, F. R. Forsyth (Department of Agriculture, Kentville); secretary-treasurer, D. T. Canvin (Queens University, Kingston); eastern director, A. R. A. Taylor (University of New Brunswick, Fredericton); western director, E. B. Tregunna (University of British Columbia, Vancouver).

JOHN A. WEBB

Biology Department, Carleton University, Ottawa, Canada

Salivary Secretion

By virtue of its functional versatility, the salivary gland continues to attract the attention of an unusual variety of experimental biologists. Three aspects of salivary gland activity —secretion of electrolytes and enzymes, biochemical differentiation, and neural regulation of secretion, differentiation, and growth—were extensively considered by a gathering of physiologists, pharmacologists, biochemists, and pathologists at an International Conference on Mechanisms of Salivary Secretion and Their Regulation held in Birmingham, Alabama, at the University of Alabama Medical Center, 9–11 August 1966.

Two major problems which currently engage workers in secretion of electrolytes are, first, determining the loci in the gland at which transfer of salts occurs and, second, elucidation of the transport mechanisms involved. J. A. Young (Free University of Berlin) presented impressive new results from micropuncture and perfusion studies of the submaxillary gland in the rat. An isotonic, plasmalike, primary secretion occurs in the acinar-intercalated duct region of the gland. Ductal reabsorption of sodium and secretion of potassium are as active processes. An interesting new regulatory pathway, involving centrally located osmoreceptors, was reported for electrolyte and water secretion by H. Yoshimura (Kyoto Prefectural University of Medicine).

A. S. V. Burgen (University of Cambridge) discussed cellular mechanisms involved in transport of electrolytes, while L. H. Schneyer (University of Alabama Medical Center) described an in vitro slice system in which some cellular aspects of secretion of potassium in vivo could apparently be duplicated. The role of Na^+-, K^+-stimulated adenosine triphosphatase in providing a biochemical basis for active transport was reported by A. Schwartz (Baylor University College of Medicine).

When the concept of humoral transmission was introduced many years ago, support for this was partly based on experimental findings from salivary glands, since these were known to have both a parasympathetic and sympathetic nerve supply. Indeed, most of the transmitter substance in salivary gland seems to reside in the nerves in the gland (I. Nordenfelt, University of Lund). This autonomic nerve supply apparently regulates a

variety of processes in the glands, and the mechanisms of control are still not well understood. For example, secretion of saliva is certainly controlled by the autonomic nerves; yet in some glands secretion occurs spontaneously, even in the presence of autonomic blocking agents. This aspect was discussed by N. Emmelin (University of Lund) and compared with secretion after denervation. Glands which do not ordinarily secrete in the absence of nerve stimulation become sensitized after denervation and secrete (paralytic secretion) whenever the level of catecholamines becomes elevated in the blood. However, these glands may also secrete in response to an increased leakage of acetylcholine from degenerating nerve fibers (degeneration secretion) which endures for some time after postganglionic, parasympathetic denervation. The development of sensitivity in the gland after denervation is quite enigmatic.

The autonomic nerve supply also regulates the blood flow to the glands. This flow is adjusted to the level of secretory activity. Some investigators have concluded that vasomotor control in the glands is not directly attributable to the nerves. M. Schachter (University of Alberta) disputes this. He has shown that the proteolytic enzyme, kallikrein, which has been implicated in vasomotor control, does not produce effects which duplicate the rapid adjustments in blood flow normally observed when stimulation to a gland is started or stopped.

A significant function of the autonomic innervation which is currently receiving wide attention involves regulation of the morphological and functional status of the gland and even regulation of its postnatal growth and differentiation. C. Schneyer and H. D. Hall (University of Alabama Medical Center) and H. Wells (Harvard School of Dental Medicine) discussed the controversial role of gland activity as distinct from trophic nervous influences in this function. Both groups of investigators find that the level of secretory activity induced by nerve stimulation is an important regulatory factor in maintaining normal growth and function. However, they are less certain of the role of trophic factors not related to the secretory activity. Cellular mechanisms of regulation of normal growth and morphology are even less easily understood. Wells suggested a possible role of cyclic adenosine monophosphate; G. Seifert (University of Ham-

burg) proposed a connection between β receptors and DNA synthesis, for sympathetically induced effects.

Biochemical differentiation was discussed by R. Kulka (Hebrew University of Jerusalem), W. Rutter, P. J. Keller, L. M. Sreebny (University of Washington), and L. C. U. Junqueira (University of Sao Paulo). Kulka finds that differentiation, with regard to formation of digestive enzymes by embryonic chick pancreas, occurs in separable phases. Surprisingly, secretion of the differentiating enzymes could be obtained in vitro from embryonic pancreas even before the later differentiation stage was complete.

Several interesting new hormonal relationships were presented. Shannon (USAF School of Aerospace Medicine, Texas) suggested that in some circumstances steroid levels in saliva can be pathognomic; Kraintz (University of British Columbia) reported a paradoxical increase in calcium of submaxillary saliva and gland, in rat, after parathyroidectomy.

Attendance at the conference was by invitation and was limited to 30 participants. The papers and discussion will be edited by Leon H. Schneyer and Charlotte A. Schneyer and published by Academic Press as a book entitled *Mechanisms of Salivary Secretion and Their Regulation.*

This was the second international conference to be devoted to aspects of salivary secretion and like the first, 4 years before in Seattle, was supported by the National Institute of Dental Research.

LEON H. SCHNEYER
Department of Physiology and Biophysics, University of Alabama Medical Center, Birmingham

Forthcoming Events

January

23–25. **Aerospace Science**, 5th mtg., American Inst. of Aeronautics and Astronautics, New York, N.Y. (Manager of Public Information, AIAA, 1290 Sixth Ave., New York 10019)

23–25. Society of **Thoracic Surgeons**, mtg., Kansas City, Mo. (F. X. Byron, Society of Thoracic Surgeons, City of Hope Medical Center, 1500 E. Duarte Rd., Duarte, Calif. 91010)

23–27. **Relativistic Astrophysics**, symp., New York, N.Y. (A. G. W. Cameron, Belfer Graduate School of Science, Yeshiva Univ., New York 10033)

24–27. **Comparative Pharmacology**, in-

tern. symp., Natl. Inst. of Health, Bethesda, Md. (G. J. Cosmides, Room 5B29, Bldg. 31, NIH, Bethesda 20014)

25–27. American **Crystallographic** Assoc., mtg., Georgia Inst. of Technology, Atlanta. (W. L. Kehl, Gulf Research and Development Co., P.O. Drawer 2038, Pittsburgh, Pa. 15230)

25–27. American **Mathematical** Soc., 73rd annual mtg., Houston, Tex. (The Society, P.O. Box 6248, Providence, R.I. 02904)

25–28. American **Group Psychotherapy** Assoc., New York, N.Y. (Mrs. M. Schiff, 1790 Broadway, New York 10019)

26–28. **Mathematical** Assoc. of America, 50th annual mtg., Houston, Tex. (H. L. Alder, Univ. of California, Davis)

28–30. **Radiology**, southern conf., Point Clear, Ala. (M. Eskridge, P.O. Box 4097, Mobile, Ala.)

28–1. American Acad. of **Allergy**, Phoenix, Ariz. (J. O. Kelley, 756 North Milwaukee St., Milwaukee, Wis. 53202)

29. **Mössbauer Effect Methodology**, 3rd annual symp., New York, N.Y. (P. A. McNulty, New England Nuclear Corp., 575 Albany St., Boston, Mass. 02118)

29–3. **Power**, mtg., Power Group, Inst. of Electrical and Electronics Engineers, New York, N.Y. (E. C. Day, IEEE, 345 E. 47 St., New York 10017)

30. American Soc. of **Heating, Refrigerating, and Air Conditioning Engineers**, semi-annual mtg., Detroit, Mich. (Miss J. I. Szabo, 345 E. 47 St., New York 10017)

30–1. **Personnel Radiation Dosimetry**, symp., Chicago, Ill. (J. H. Pingel, Argonne Natl. Laboratory, Bldg. 301, 9700 S. Cass Ave., Argonne, Ill. 60439)

30–2. American **Physical** Soc., annual mtg., New York, N.Y. (The Society, Executive Secretary, Columbia Univ., New York 10027)

30–2. American Assoc. of **Physics Teachers**, New York, N.Y. (A. B. Arons, Physics Dept., Amherst College, Amherst, Mass.)

30–3. **Zodiacal Light and the Interplanetary Medium**, intern. symp., Honolulu, Hawaii. (F. E. Roach, Aeronomy Lab., Inst. for Telecommunication Sciences and Aeronomy, Environmental Science Services Administration, Boulder, Colo. 80302)

31–2. Ciba Foundation symp. on **Cell Differentiation**, London, England. (Ciba, 41 Portland Pl., London W.1)

31–3. **Reinforced Plastics**, 22nd conf., Soc. of the Plastics Industry, Washington, D.C. (The Society, 250 Park Ave., New York 10017)

31–4. American College of **Radiology**, mtg., Los Angeles, Calif. (American College of Radiology, 20 N. Wacker Dr., Chicago, Ill.)

February

1–3. Southwestern Federation of **Geological** Soc., Hobbs, N.M. (American Assoc. of Petroleum Geologists, P.O. Box 979, Tulsa, Okla. 74101)

1–3. **Neural Regulation of Food and Water Intake**, conf., New York, N.Y. (P. J. Morgane, Communication Research Inst., 3430 Main Highway, Miami, Fla. 33133)

4–11. Pan American **Medical Women's Alliance,** 10th congr., Lima, Peru. (R. Quiroz B., Los Castanos 395, San Isidro, Lima)

5–6. American Soc. for **Testing and Materials,** natl. symp., Toronto, Ont., Canada. (ASTM, 1916 Race St., Philadelphia, Pa.)

5–10. American Soc. for **Testing and Materials,** winter mtg., Detroit, Mich. (ASTM, 1916 Race St., Philadelphia, Pa.)

6–7. **American Chemical Soc.,** 2nd Mid-Atlantic mtg., New York, N.Y. (S. M. Gerber, Ciba Co., Fairlawn, N.J. 07410)

6–8. **Flight Test, Simulation, and Support,** conf., Cocoa Beach, Fla. (Meetings Manager, American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

6–8. Society of **Rheology,** winter mtg., Santa Barbara, Calif. (M. C. Shen, North American Aviation Science Center, 1049 Camino Dos Rios, Thousand Oaks, Calif. 91360)

7–8. **Sanitary Engineering,** 9th conf., Urbana, Ill. (J. H. Austin, 203 Engineering Hall, University of Illinois, Urbana 61801)

7–9. Institute of **Electrical and Electronic Engineers,** winter conv., Los Angeles, Calif. (Office of Technical Activities Board, 345 E. 47 St., New York 10017)

8–10. Canadian Inst. of **Surveying,** annual mtg., Ottawa, Ont. (Secretary, 157 McLeod St., Ottawa)

13–17. Australia-New Zealand Conf. **Soil Mechanics and Engineering,** 5th mtg., Auckland, New Zealand. (P. W. Taylor, Conf. Secretary, P.O. Box 6422, Auckland)

14–19. **Triplet State,** symp., American Univ. of Beirut, Beirut, Lebanon. (A. B. Zahlan, American Univ. of Beirut)

15–16. **Electron Probe Microanalysis,** conf., London, England. (Institute of Physic and the Physical Soc., 47 Belgrave Sq., London, S.W.1)

15–17. **Solid-State Circuits,** intern. conf., Philadelphia, Pa. (V. I. Johannes, Room 3E-323, Bell Telephone Labs., Holmdel, N.J. 07733)

15–24. **Scientific and Technical Films,** 4th intern. festival, Brussels, Belgium. (Centre Universitaire du Film Scientifique, 50 Ave. F. D. Roosevelt, Brussels 5)

16–18. **American Educational Research** Assoc., New York, N.Y. (L. Walters, 1201 16 St., NW, Washington, D.C. 20036)

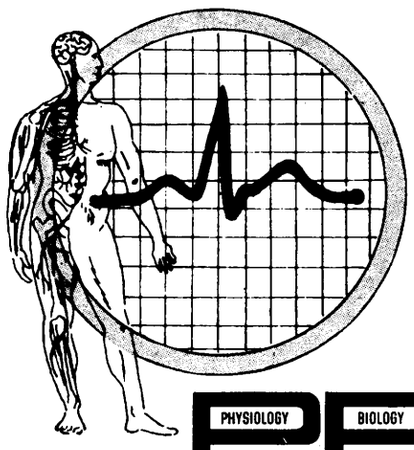
17–18. **Thyroid,** 3rd Midwest conf., Columbia, Mo. (Executive Director, Continuing Medical Education, M-176 Medical Center, Univ. of Missouri, Columbia 65201)

18–22. American Acad. of **Allergy,** 23rd annual mtg., Palm Springs, Calif. (Executive Secretary, 756 N. Milwaukee St., Milwaukee, Wis. 53202)

19–23. American Inst. of **Mining, Metallurgical and Petroleum Engineers,** annual mtg., Los Angeles, Calif. (Executive Secretary, 345 E. 47 St., New York 10017)

19–25. **Biochemistry,** Chemical Inst. of Canada, conf., Ste. Marguerite, P. Q. (General Manager, 48 Rideau St., Ottawa 2, Ont.)

20–25. American Acad. of **Forensic Sciences,** mtg., Honolulu, Hawaii. (S. R. Gerber, 2153 Adelbert Rd., Cleveland, Ohio 44106)



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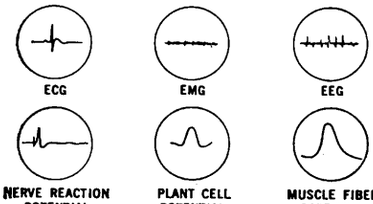

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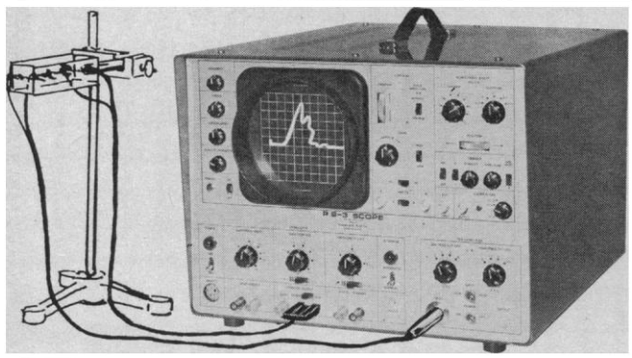

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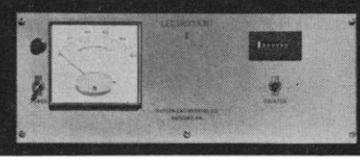

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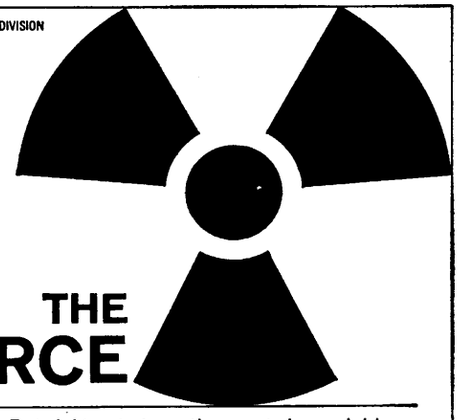

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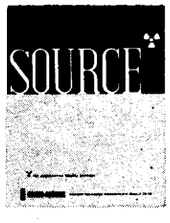

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Modern Genetics. Haig P. Papazian. Norton, New York, 1966. 370 pp. Illus. $7.50.

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Modern Optical Engineering: The Design of Optical Systems. Warren J. Smith. McGraw-Hill, New York, 1966. 490 pp. Illus. $15.

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The Nature of Perceptual Adaptation. Irvin Rock. Basic Books, New York, 1966. 303 pp. Illus. $8.50.

Nobel Lectures in Chemistry. vol. 1, *1901–21.* Published for the Nobel Foundation. Elsevier, New York, 1966. 422 pp. Illus. Set of three volumes, $85.

Non-Compact Groups in Particle Physics. Proceedings of a conference (Milwaukee, Wis.), May 1966. Yutze Chow, Ed. Benjamin, New York, 1966. 224 pp. Illus. $12.50. Eleven papers.

Opencast Mining, Quarrying and Alluvial Mining. Proceedings of a symposium (London), November 1964. Sponsored by Institution of Mining and Metallurgy, Institution of Mining Engineers, and Institute of Quarrying. J. H. Taylor, Ed. Elsevier, New York, 1966. 786 pp. Illus. $19. Thirty-four papers

Optimal Shutdown Control of Nuclear Reactors. Milton Ash. Academic Press, New York, 1966. 183 pp. Illus. $8.50. Mathematics in Science and Engineering, vol. 26.

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The Plains of Camdeboo. Eve Palmer. Viking Press, New York, 1966. 320 pp. Illus. $6.

Polymerization by Organometallic Compounds. Leo Reich and A. Schindler. Interscience (Wiley), New York, 1966. 750 pp. Illus. $25.

The Principles of Chemical Equilibrium: With Applications in Chemistry and Chemical Engineering. Kenneth Denbigh. Cambridge Univ. Press, New York, ed. 2, 1966. 516 pp. Illus. Paper, $3.95; cloth, $9.50.

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The Principles of Lubrication. A. Cameron. Wiley, New York, 1966. 605 pp. Illus. $24.

Protein Biosynthesis and Problems of Heredity, Development, and Ageing. Zh. A. Medvedev. Translated from the Russian edition (Moscow, 1963) by Ann Synge. Plenum, New York, 1966. 606 pp. Illus. $25.

Psychoanalysis: A General Psychology. Essays in honor of Heinz Hartmann. Rudolph M. Loewenstein, Lottie M. Newman, Max Schur, and Albert J. Solnit, Eds. Internatl. Universities Press, New York, 1966. 698 pp. Illus. $15. Thirty-two papers.

Psychodiagnosis in Schizophrenia. Irving B. Weiner. Wiley, New York, 1966. 587 pp. Illus. $11.95.

Pulver-Atlas der Drogen des Deutschen Arzneibuches. Walter Eschrich. Fischer, Stuttgart, 1966. (order from Intercontinental Medical Book Corp., New York). 216 pp. Illus. $7.25.

Radioecology of Aquatic Organisms. The accumulation and biological effect of radioactive substances. G. G. Polikarpov. Translated from the revised Russian edition (Moscow, 1965) by Scripta Technica. Vincent Schultz and Alfred W. Klement, Jr., Translation Eds. Reinhold, New York, 1966. 342 pp. Illus. $16.50.

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The Romance of Physics. Keith Gordon Irwin. Scribner, New York, 1966. 240 pp. Illus. $4.95.

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Russian-English Dictionary and Reader in the Cybernetical Sciences. With a selected bibliography of Soviet publications in the cybernetical sciences. Samuel Kotz. Academic Press, New York, 1966. 236 pp. $11.

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Shaft Fractures and Pseudarthroses. Bruce M. Cameron. Thomas, Springfield, Ill., 1966. 132 pp. Illus. $6.75.

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Statesmen of Science. J. G. Crowther. Dufour, Chester Springs, Pa., 1966. 407 pp. Illus. $8.95. Studies of nine statesmen during the last 150 years.

Strong Solids. A. Kelly. Oxford Univ. Press, New York, 1966. 228 pp. Illus. $6.75.

The Structure and Functions of the Brain. S. A. Sarkisov. Translated from the Russian edition (Moscow, 1964) by Scripta Technica. Naomi Raskin, Translation Ed. Indiana Univ. Press, Bloomington, 1966. 317 pp. Illus. $12.50.

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The Systematics and Distribution of Permian Miospores. George F. Hart. Witwatersrand Univ. Press, Johannesburg, South Africa, 1965. 260 pp. Illus. $12.05.

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Theories of Counseling and Psychotherapy. C. H. Patterson. Harper and Row, New York, 1966. 528 pp. $9.75.

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Theory of Spectrochemical Excitation. P. W. J. M. Boumans. Plenum, New York, 1966. 395 pp. Illus. $12.50.

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