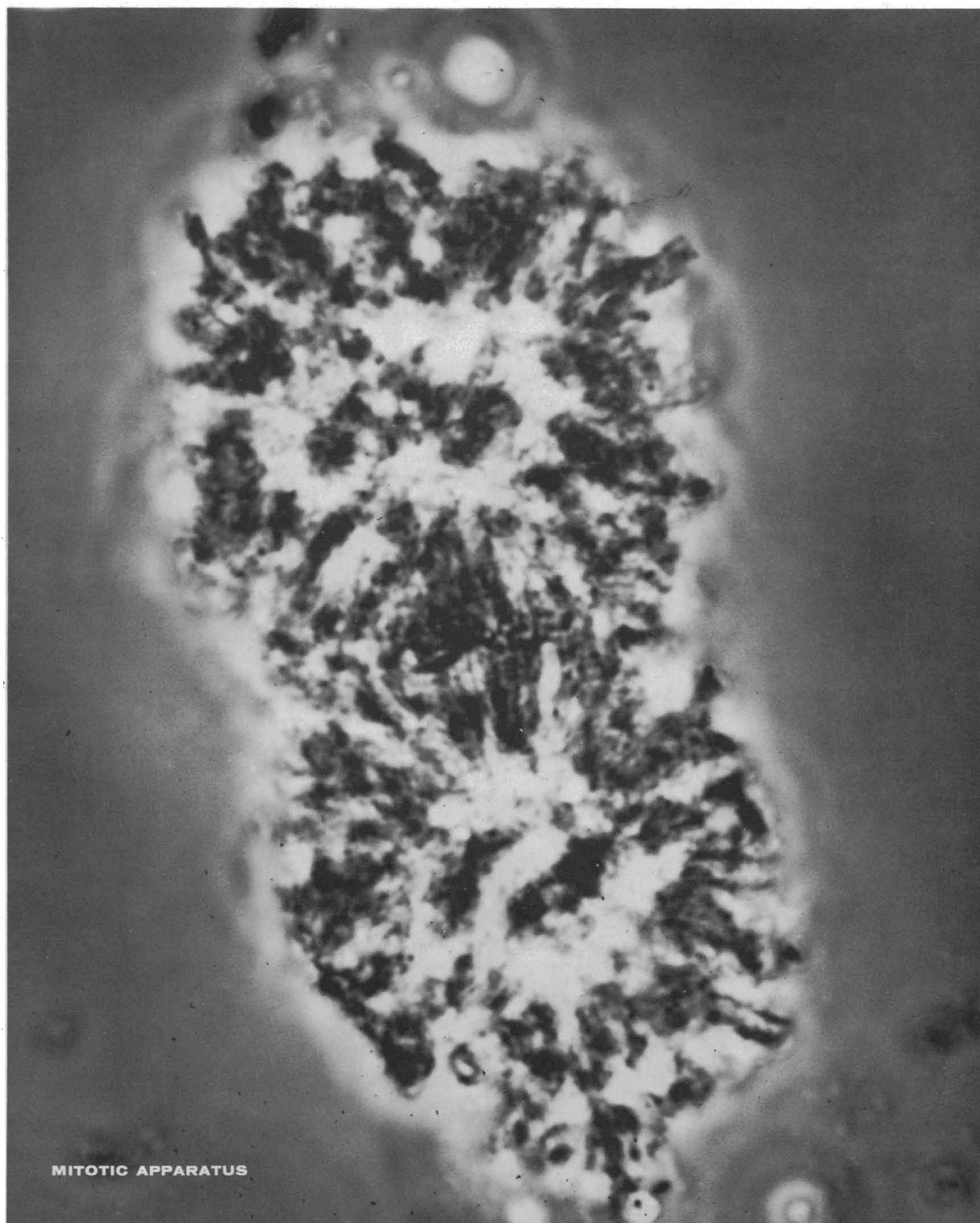


SCIENCE

7 February 1964

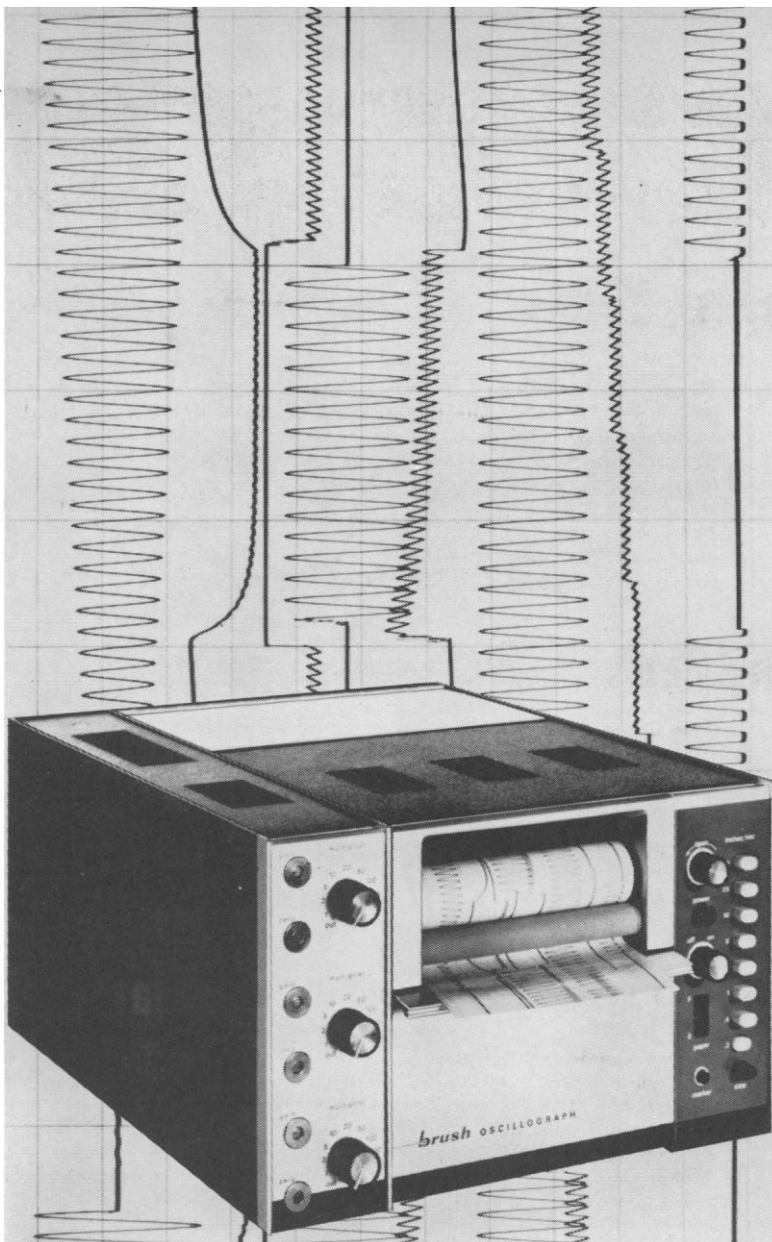
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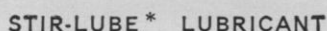
COVER

Mitotic apparatus isolated from the sea urchin, *Lytechinus variegatus*, in hexanediol. In this phase-contrast view of the metaphase mitotic apparatus, the chromosomes are visible midway between the two poles. Spindle fibers are visible in the mid-polar region but other achromatic fibrous components are not in focus (about $\times 2240$). See page 580.

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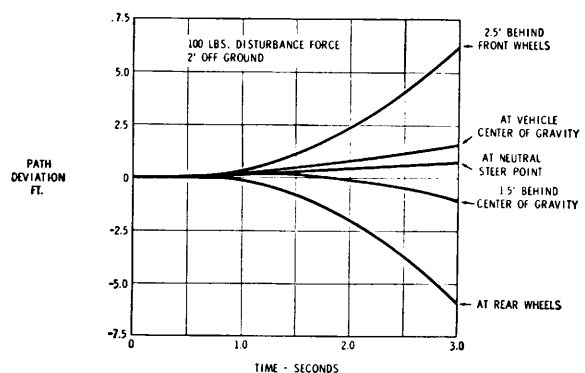
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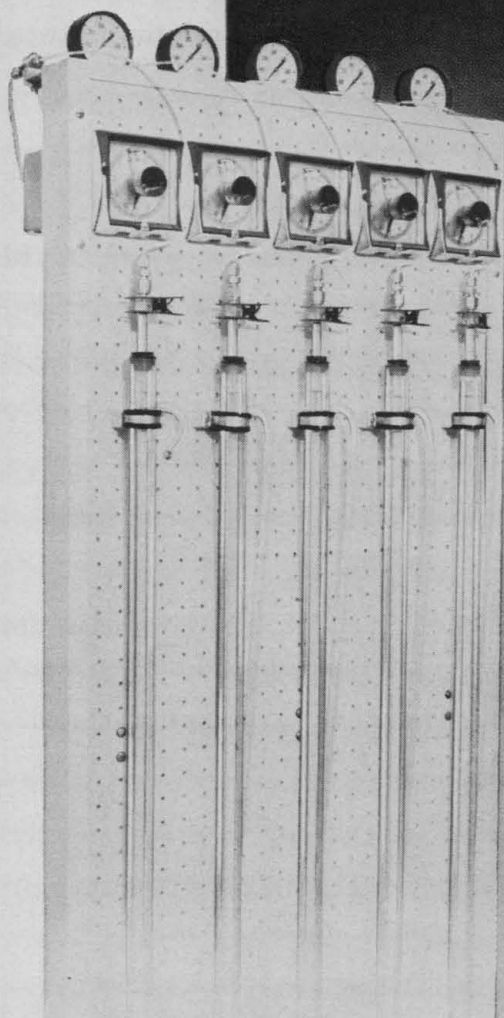
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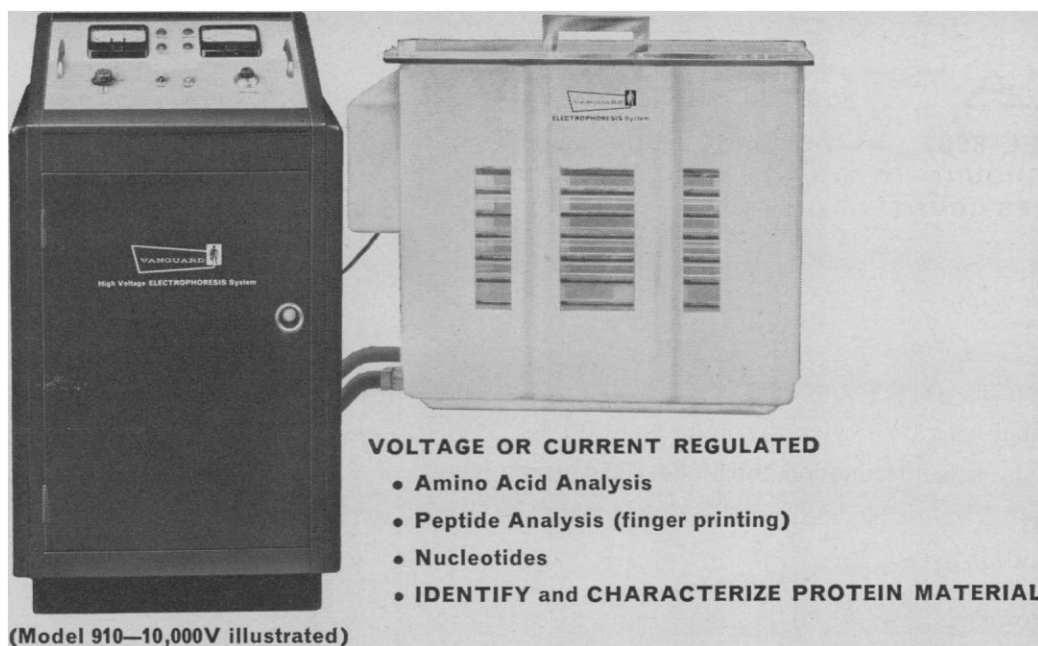
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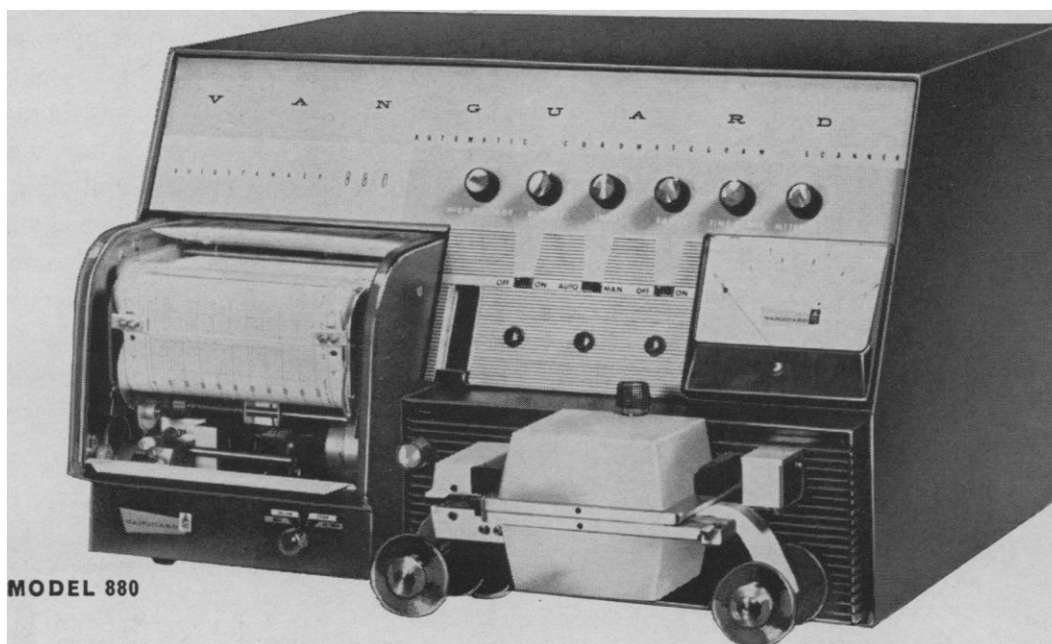
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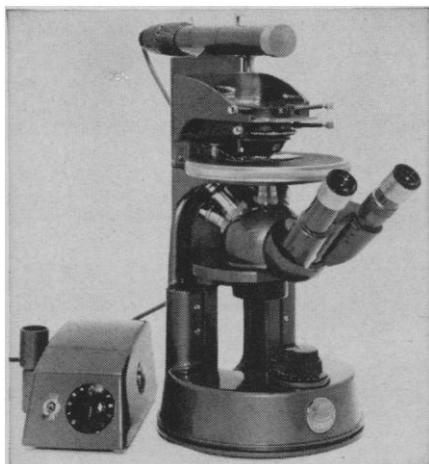
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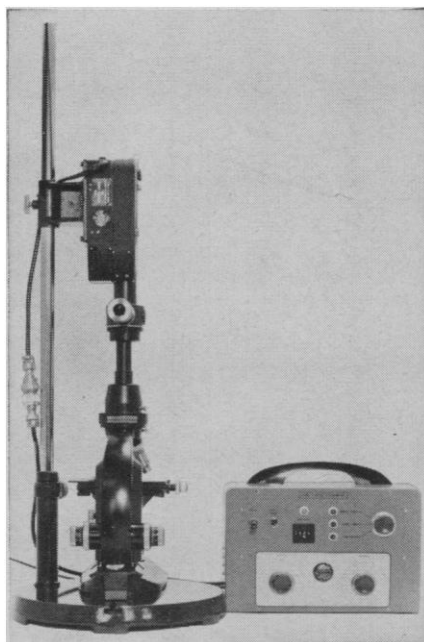
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Vickers-Vinten Time Lapse Equipment.

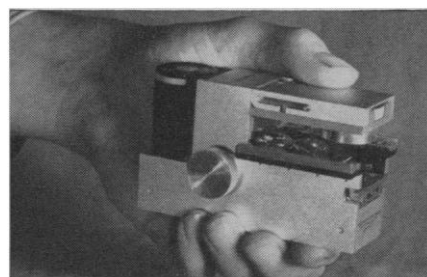
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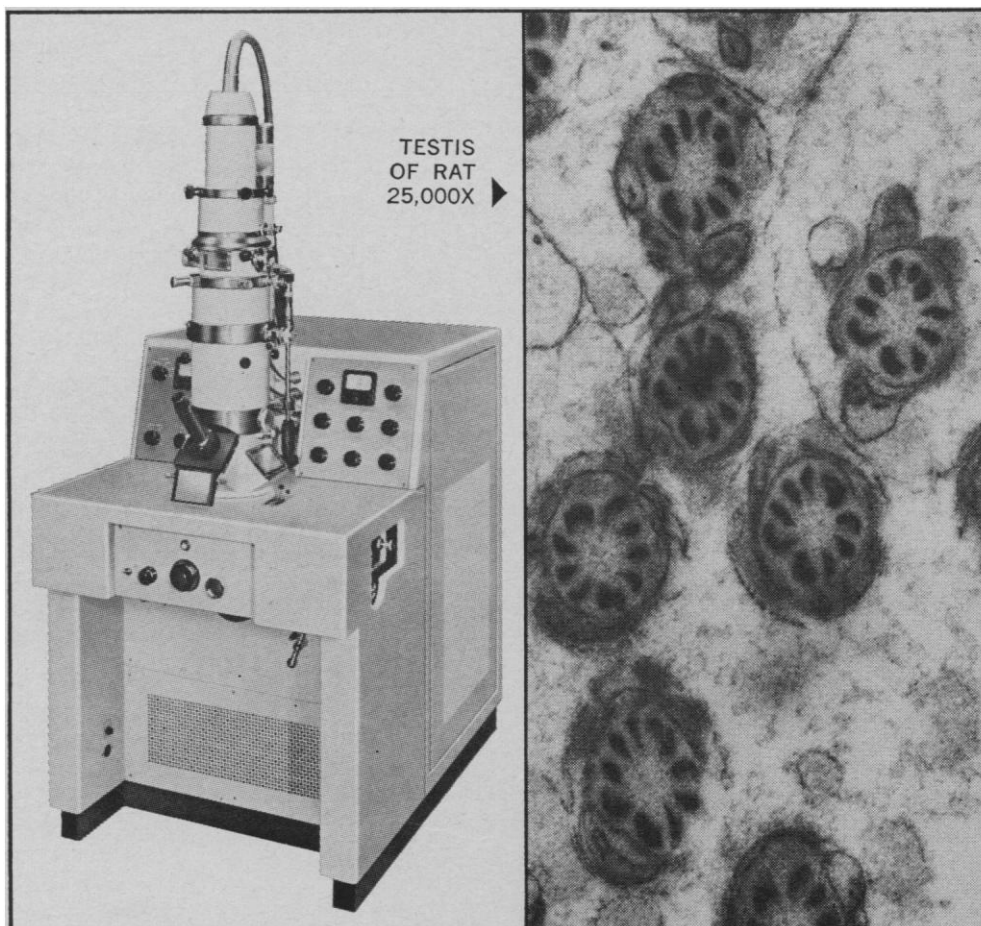


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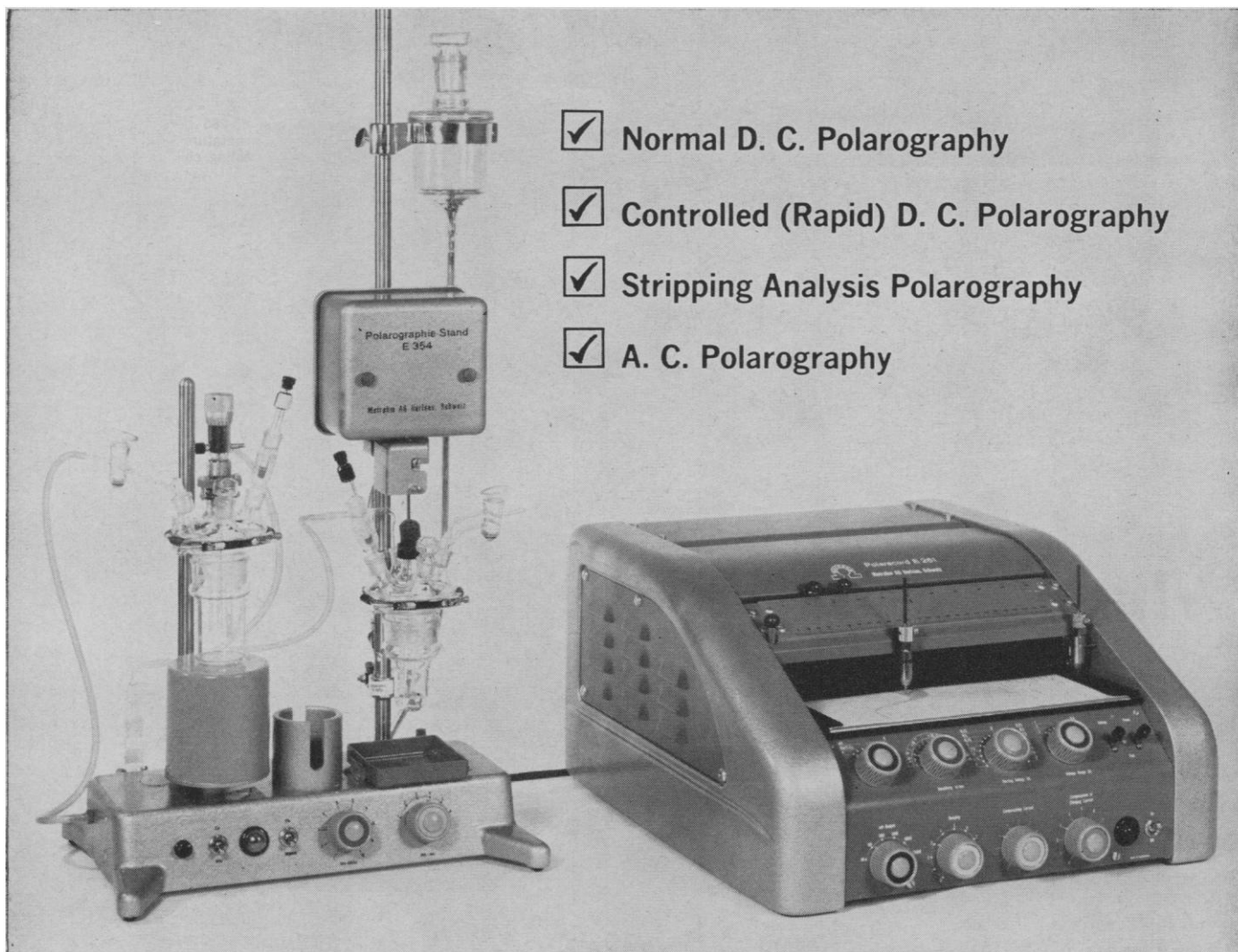
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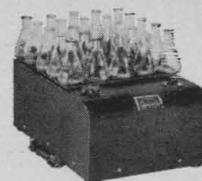
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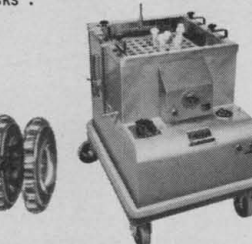
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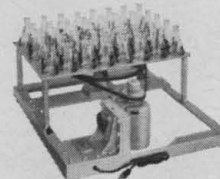
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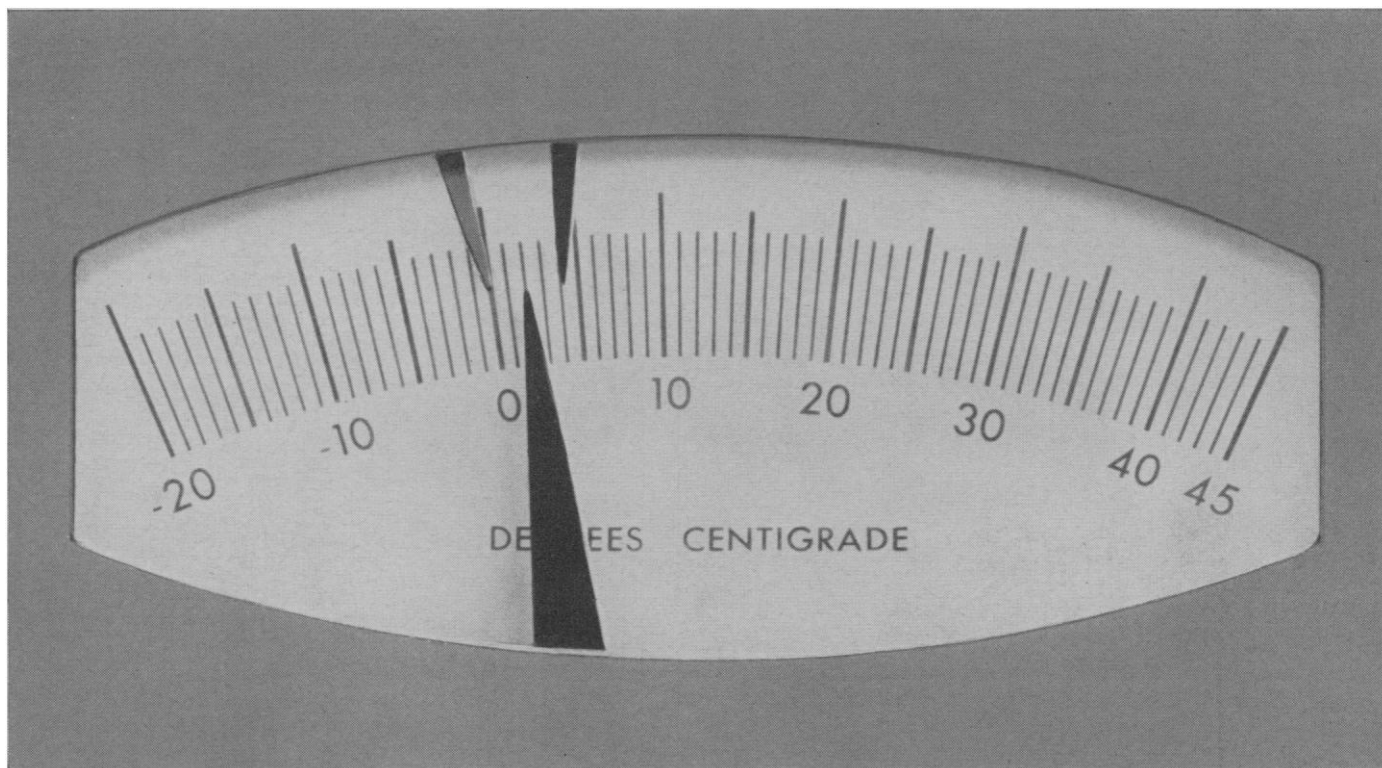
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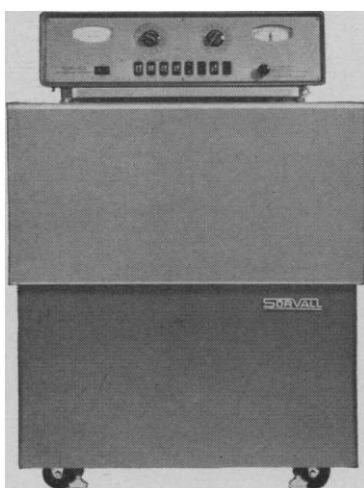
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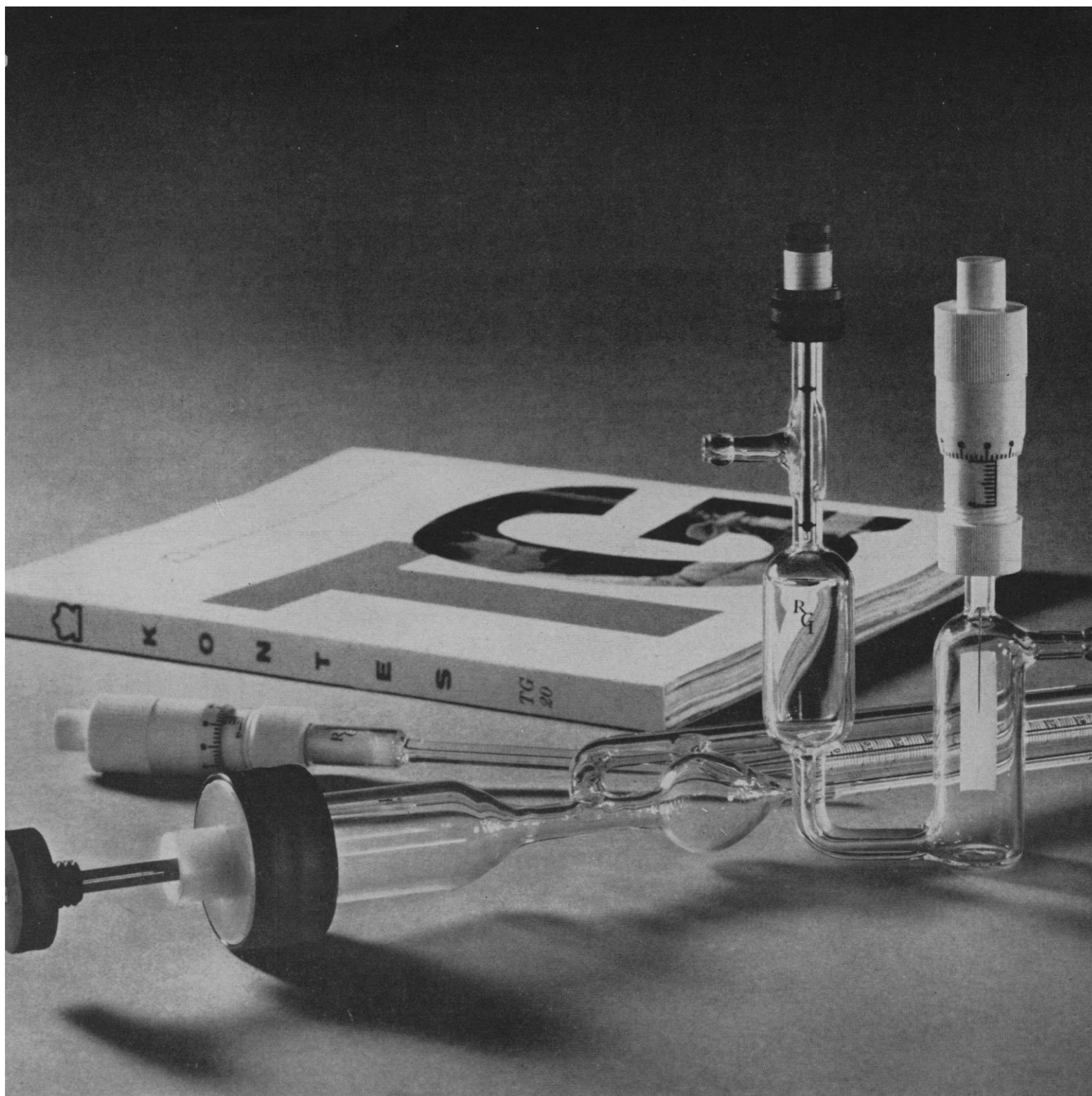


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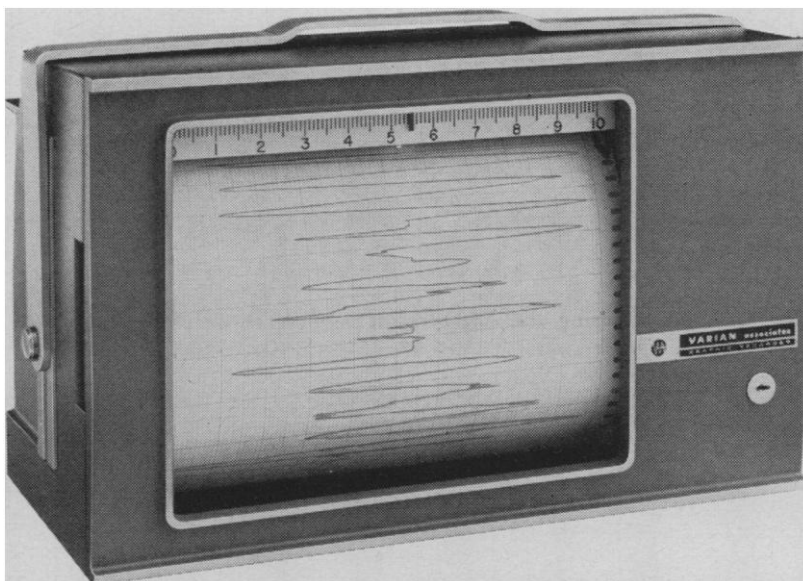
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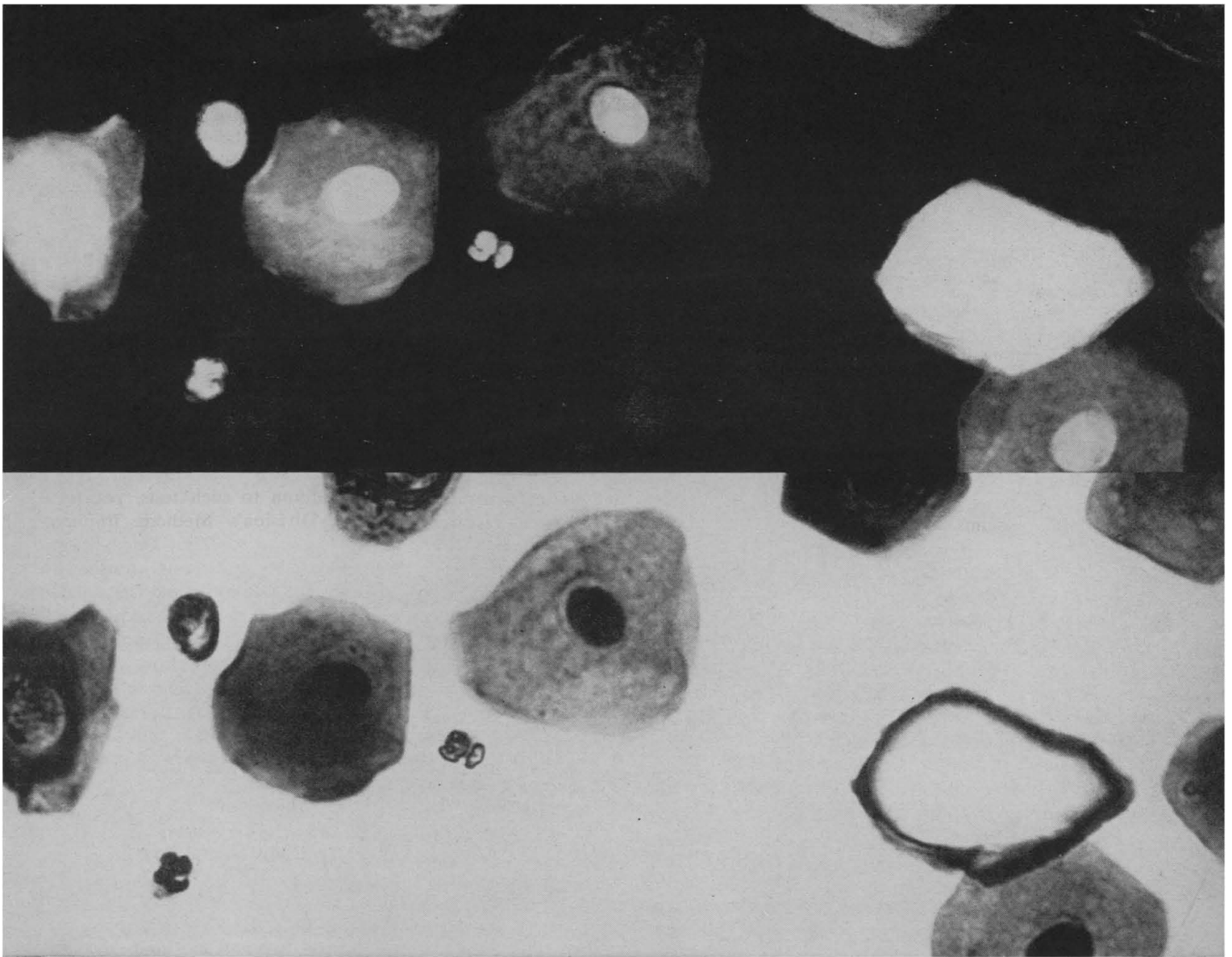
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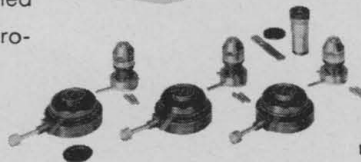
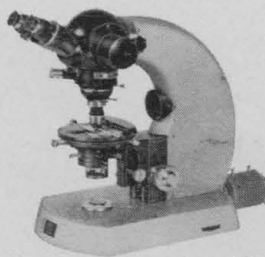


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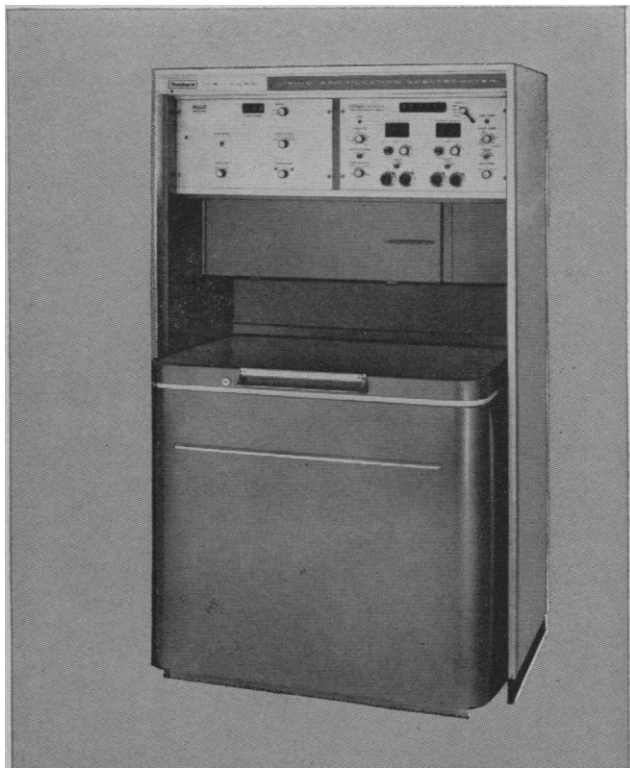
The lengthy controversy concerning Mohole drilling (*Science*, 10 Jan., 17 Jan., 24 Jan.) had some constructive aspects. Strong-minded, knowledgeable scientists cared enough and believed enough in deep-sea drilling to fight over how it should be conducted. Disagreement over the proper scope of the project led to recognition of the desirability of a broad program of exploration of the rocks under the oceans. Even the spectacle of scientists in conflict had a positive side, for the resultant open discussion provided the Congress and the public with a basis for trust in the eventual decisions. But a good thing can be overdone. There has been more than enough controversy about Mohole. We should all be pleased with the way Leland Haworth, director of the National Science Foundation, has assumed authority in the matter, and with the prospects for an effective future organization.

The time has come to forget the trauma of the past and to look toward the opportunities of the future. We know so little about the rocks under the sea that the potentialities are difficult to evaluate. But that is precisely the reason we should explore them. In the scientific area, many major possibilities have been pointed out which are of interest to everyone, for drilling at sea may provide information on the history of the earth, the origin of life, the evolution of life, continental drift, and the emergence and submergence of continents. One of the possible results of such investigation would be of both scientific and practical importance. This is the elucidation of the geochemical processes which have occurred and of the resultant concentrations of chemicals to be found in the rocks. On continental shelves, exploration and exploitation are already proceeding.

Some of this activity can be carried out by techniques already developed by the petroleum industry. Most of the sea bottom, however, is not accessible to such techniques. In attempting to assess what might be found under the deep seas, there are two possible approaches. One is to look at the material obtained from the ocean floor. These samples are usually of only moderate interest, though there are exceptions, such as the manganese nodules. A second approach is a more general one. Most of the rocks at the surfaces of the present continents were formed from sediments deposited in marine environments. We can use them as a kind of rough yardstick to gauge what might be found under the present seas. In the past, the oceans have played the role of a gigantic laboratory in which chemical processes have led to concentration of relatively rare substances, both organic and inorganic, into commercially valuable occurrences. An example is the role of the marine environment in the formation of petroleum. Concentrations of trace elements in the black shales ultimately will have great economic significance. On the continents, exploitation of the crust is destined to provide returns of the order of trillions (10^{12}) of dollars.

Since the seas cover about 71 percent of the earth's surface, the wealth under them could be greater than that now known on land. To obtain even a glimpse of the scientific and economic potential will involve great effort and the application of our best scientific and engineering talents. We should not make small plans or squabble further about objectives. Both deep and shallow exploratory drilling are worth while. Both should be carried forward with no more delay.—P.H.A.

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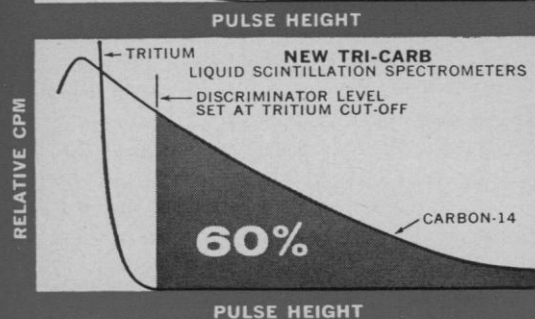
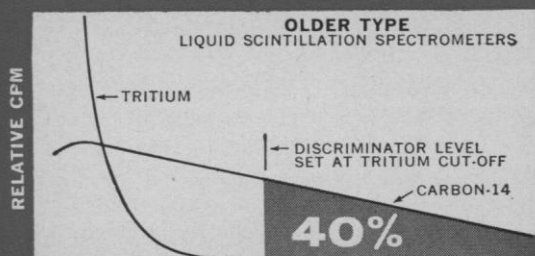
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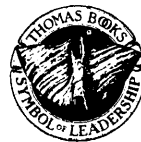
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- ☐ SPECTROPHOTOMETRIC ANALYSIS OF DRUGS INCLUDING ATLAS OF SPECTRA by Irving Sunshine and S. R. Gerber, *both of Cuyahoga County Coroner's Office, Cleveland, Ohio.* Aug. '63, 256 pp., 411 il., \$10.50

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| <ul style="list-style-type: none"> ☐ POISON DETECTION IN HUMAN ORGANS by Alan S. Curry, <i>Harrogate Scholar of Trinity College, Cambridge, England.</i> April '63, 172 pp., 7 il. (Amer. Lec. Living Chemistry edited by I. Newton Kugelmass), \$6.75 ☐ STATISTICS FOR MEDICAL STUDENTS by Robert G. Hoffman, <i>Univ. of Florida, Gainesville, Fla.</i> Jan. '63, 216 pp., 60 figs., 39 tables, \$7.50 ☐ A SOURCE-BOOK OF BIOLOGICAL NAMES AND TERMS (3rd Ed., Rev. & Enlarged 3rd Ptg.), by Edmund C. Jaeger, <i>Riverside, Calif.</i> Aug. '62, 360 pp., 106 il., \$5.75 ☐ COMPARATIVE PATHOLOGY IN MONKEYS by B. A. Lapin and L. A. Yakovleva, <i>both of Medical Biological Station, Sukhumi, Georgia, U.S.S.R.</i> May '63, 292 pp., 115 il. (National Institute of Neurological Diseases and Blindness, Symposia in Neuroanatomical Sciences edited by William F. Windle), \$10.00 ☐ ELECTRON MICROSCOPY OF SKIN AND MUCOUS MEMBRANE by Alvin S. Zelikson. <i>With a Chapter on "Technics of Electron Microscopy" by J. Francis Hartmann. Both of Univ. of Minnesota, Minneapolis, Minn.</i> Feb. '63, 188 pp., 84 il. (Amer. Lec. Dermatology edited by Arthur C. Curtis), \$8.50 ☐ READING COMPREHENSION FOR SCIENTISTS by Richard H. Bloomer, <i>Univ. of Connecticut, Storrs, Conn.</i> July '63, 228 pp., \$8.75 | <ul style="list-style-type: none"> ☐ URINE AND THE URINARY SEDIMENT: A Practical Manual and Atlas (2nd Ed., 3rd Ptg.) by Richard W. Lippman, <i>Beverly Hills, Calif.</i> Feb. '62, 160 pp. (7 x 10), 97 il. (92 in full color), \$9.50 ☐ MANUAL OF CLINICAL LABORATORY METHODS (4th Ed., 13th Ptg.) by Opal Hepler, <i>Northwestern Univ., Chicago, Illinois.</i> Dec. '63, 404 pp. (8½ x 11), 675 il. (8 full page plates in full color), \$10.50 ☐ AUTOPSY PATHOLOGY: A Guide for Pathologists and Clinicians by Philipp R. Rezek and Max Millard, <i>both of Univ. of Miami, Miami, Fla.</i> March '63, 864 pp. (7 x 10), 294 figs., 10 tables, \$24.50 ☐ A COMPARATIVE STUDY OF SKIN DISEASES OF DOG AND MAN by Robert M. Schwartzman. <i>Univ. of Pennsylvania, Philadelphia, Pa. and Milton Orkin, Univ. of Minnesota, Minneapolis, Minn. With a Chapter on "Oral Neoplasia in the Dog" by Robert James Gorlin, Univ. of Minnesota.</i> Oct. '62, 384 pp., 216 il. (Amer. Lec. Dermatology edited by Arthur C. Curtis), \$14.50 ☐ INTRODUCTION TO ANIMAL PARASITOLOGY by J. D. Smyth, <i>Australian National Univ., Canberra, Australia.</i> Nov. '62, 492 pp. (7¾ x 9¾), 308 il., \$11.50 |
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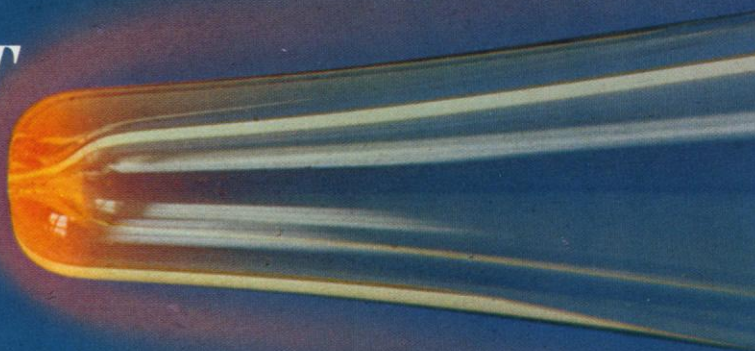
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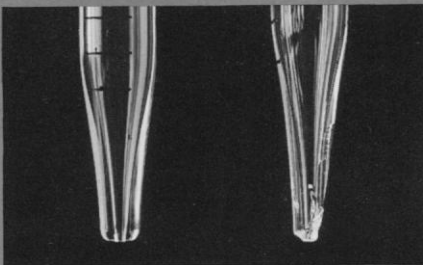
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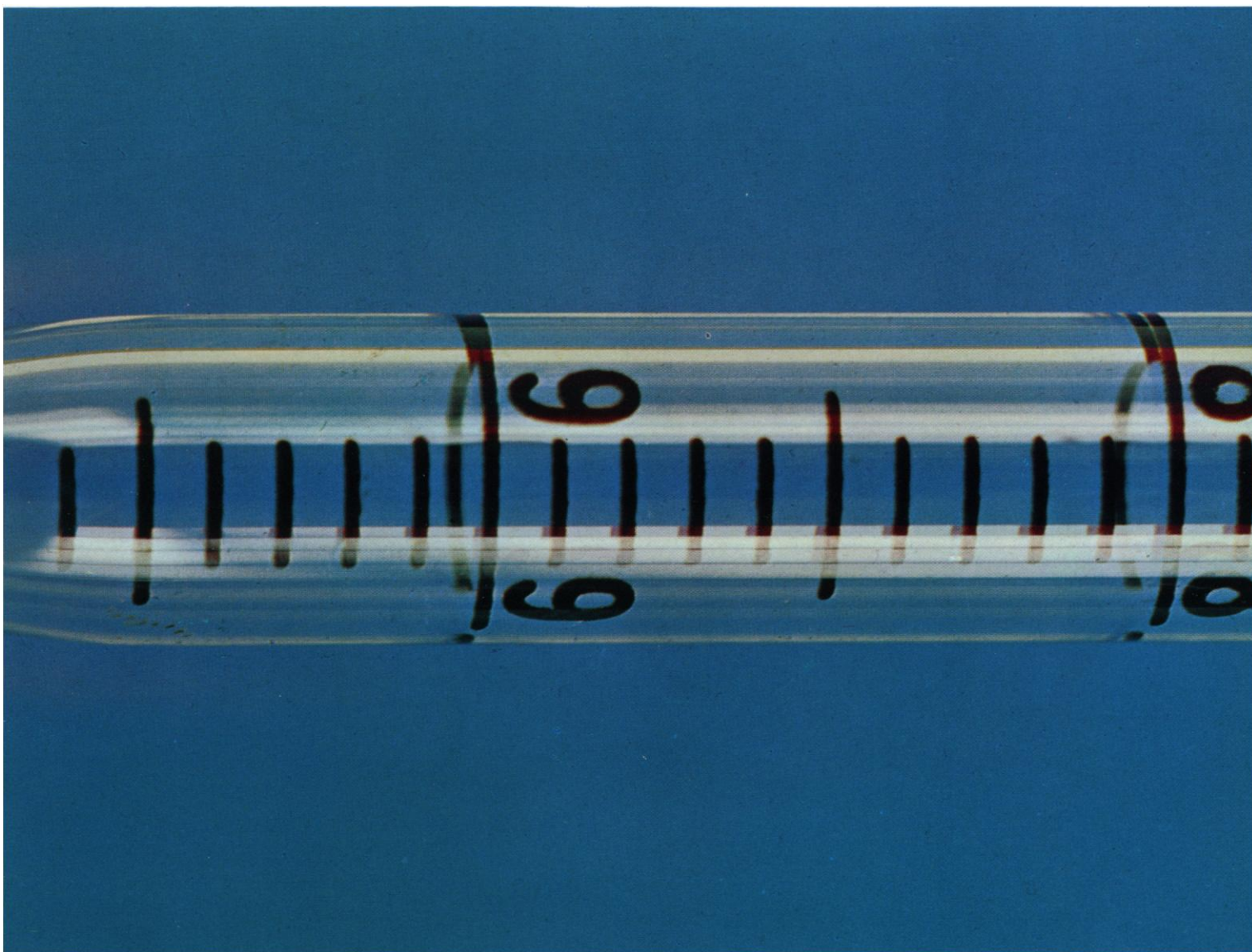
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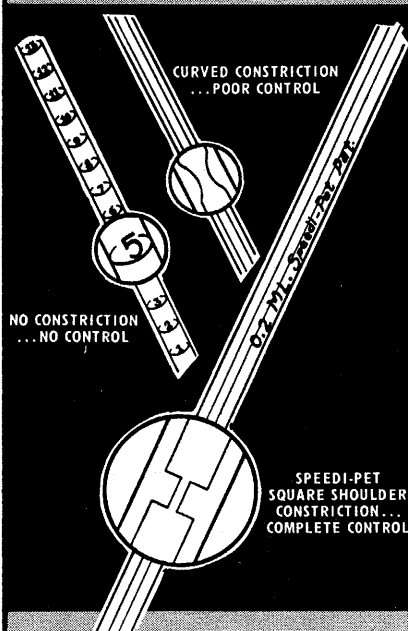
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proach to the study of synaptic relations in cortex was presented by Szen-tagothai (Hungary). Experiments on partially isolated cortex suggested that axosomatic synapses on pyramidal neurons come exclusively from local interneurons, whereas axodendritic synapses on the same neurons arise mainly from distant systems.

Several additional papers (Burês, Czechoslovakia, and Zanchetti, Italy) provided a broader perspective of the diversity and complexity of inhibitory mechanisms than is apparent in either studies of single neuron activities or the total behavior of intact animals. Storm van Leeuwen (Netherlands) showed an impressive film of the relation between behavior and electrical activity in various parts of the dog's brain.

The keynote address in the symposium on general principles of self-regulation in cortical-subcortical correlations was presented by Anokhin (U.S.S.R.), whose report on mechanisms of a functional system as a unit of self-regulation summarized 35 years of work along these lines. According to Anokhin, neurophysiological mechanisms of behavioral acts are elaborated through stages beginning with an afferent synthesis formed on the basis of ascending activating influences connected with the orienting reflex. This is succeeded by corticofugal activities, which in turn influence cortical neurons in accordance with the biological quality of the ascending activations. From this stage efferent mechanisms are brought into operation which initiate reverse afferentation. During the course of experiments on these factors, Anokhin and his collaborators have defined specific characteristics of ascending reticulocortical activations in terms of different biological and chemical processes. Ontogenetic studies were also cited in support of the view that different afferent pathways activate different types of synaptic organizations of cortical and subcortical neurons.

Self-regulation mechanisms in cortico-subcortical relationships were also discussed by Sager (Rumania), whose notion of cortico-subcortico-cortical reverberating circuits negates the necessity for the existence of special centers for sleep-wakefulness function. Less speculative reports of electrophysiological data on input-output relations at various levels of afferent pathways were offered by Gersuni (U.S.S.R.), Nari-kashvili and Kadjaya (U.S.S.R.), and Meschersky (U.S.S.R.). The latter two

papers dealt with cortical inhibition and modulation of transmission through specific thalamic relay nuclei.

It is noteworthy that in other communications dealing with the role of the meso-diencephalic activating system in higher nervous activity (Lissak and Endroczi, Hungary), particular attention was directed to the finding that all subcortical facilitatory and inhibitory systems form an inseparable unity with the cortex. Thus, while it may be argued that various subcortical circuits are primarily involved in reinforcement or facilitation of conditioned reflexes, it is at the level of the cortex where integrative closure of all behavioral activities takes place. The report of Rosenblith, Albe-Fessard, Maissou, and Hall (U.S., France) attracted considerable interest. In his introductory remarks, Rosenblith pleaded for the development and use of new analytical methods in neurophysiology that could conceivably provide new information on neuronal organization. The paper dealt with changes in averaged, evoked responses that were recorded during sleep and wakefulness from nonspecific and specific thalamic nuclei and cortex. Preliminary results of this study have indicated that the transition from sleep to wakefulness is accompanied by alterations in averaged, evoked responses to peripheral stimulation which are most prominent in mid-line components of the thalamic reticular system. Hugelin and Dell (France) reported on reticular regulation of peripheral and central reflex activities in the context of the general problems of vigilance.

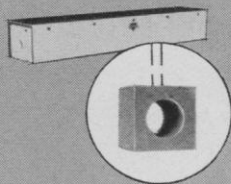
A symposium on evolutionary physiology of the nervous system and brain ontogenesis opened with a general report on the evolution of afferent systems in vertebrates (Voronin *et al.*, U.S.S.R.), which stressed the progressive development of ascending activating systems in vertebrates, the manner in which specific systems develop relative to the specific ecology of different species, and the evolution of axosomatic and axodendritic synaptic pathways at different neuraxial sites. Kar-amyran (U.S.S.R.) continued this phylogenetic analysis in terms of experimental findings on the overt characteristics of specific and nonspecific effects of pharmacological agents on these evoked activities in different species.

In an attempt to broaden the scope of this symposium, attention was directed to several aspects of the development of different biochemical proper-

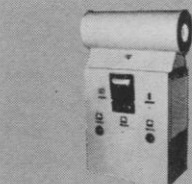
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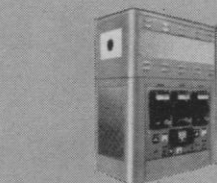
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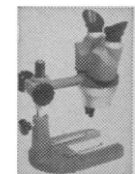
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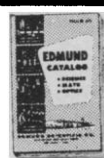
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ties of the nervous system during phylogenesis. Kreps (U.S.S.R.) discussed the qualitative and quantitatively different characteristics of phospholipids in vertebrates and invertebrates, on the one hand, and warm and cold blooded vertebrates on the other. Vinnikov (U.S.S.R.) considered the structural, chemical, and functional features in sense organs at cellular and subcellular levels of organization. In the only other paper concerned with metabolic properties of developing cell systems, Gutmann (Czechoslovakia) discussed the differentiation of metabolism in muscles of different function during ontogenesis.

The 6-day meeting closed with a series of papers on various aspects of the ontogenesis of morphological, electrophysiological, and pharmacological properties of the mammalian central nervous system and the postnatal development of conditioned reflexes. In considering the different rates of maturation of afferent functions, Scherrer (France) explained how an attempt was made to find out how the behavioral features of immature animals might be explicable, in part, in terms of the excitability and conductile properties of afferent pathways and the progressive elaboration of different synaptic organizations. Comparative studies by Volokov (U.S.S.R.) of the postnatal development of analyzers stressed the different time of appearance of orienting reactions to various stimuli. It was proposed by Sheveleva (U.S.S.R.) that in early stages of postnatal development adrenergic synapses predominate in the brain, whereas during maturation cholinergic synapses increase in number in association with changes in bioelectrical activity and in the reaction of neurons to pharmacologic agents. In presentations from Soviet workers, the importance of ecological factors as determinants of the ontogenesis of different analyzer functions in different species was repeatedly emphasized.

The last session on brain ontogenesis was opened by Mysliveček (Czechoslovakia) who reported on the differential rate of maturation of different components of the auditory pathway to neocortex in the kitten. Lindsley (U.S.) reviewed his long experience with the postnatal development of EEG and relationship to changes in neuronal structure as well as more recent data on evoked potentials in infants and newborn animals. The development of spontaneous and evoked activ-

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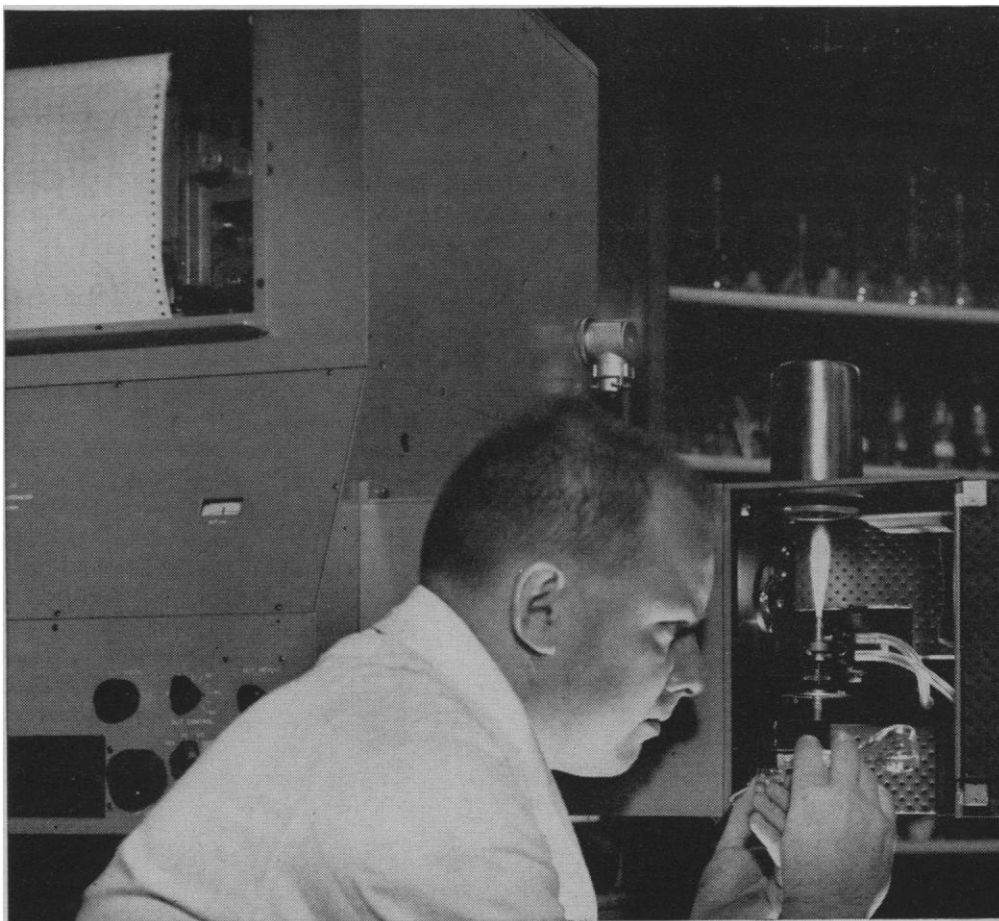
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ity in the rabbit hippocampus was analyzed by Dzidzishvili and Kvirkvelia (U.S.S.R.); they attempted to correlate the appearance of post-tetanic potentiation of evoked potentials with the appearance of convulsant activity in hippocampal neuronal organizations. Finally, Purpura and Shofer (U.S.) indicated how experimentally induced modifications of ontogenetic patterns in cerebral and cerebellar cortex may increase the value of developmental studies aimed at clarifying the origin and nature of evoked potentials.

In order to assess the significance of the Sechenov Conference it should be noted that this meeting was the first of its kind in which all aspects of neurophysiological and behavioral studies carried out in the Soviet Union provided the central themes of the 6-day international meeting. It may be appreciated, therefore, that the occasion of the Sechenov centenary prompted a major effort on the part of various members of the U.S.S.R. Academies of Sciences and Medical Science to indicate the general importance and development of neurobiological research in the Soviet Union in recent years. The papers presented by Soviet workers comprised more than 50 percent of the 6-day program. In broad outline they touched upon all aspects of neurophysiological investigation ranging from classical Pavlovian studies to microphysiological analysis of complex electrocortical potentials. Analytical methods currently employed in Western countries for obtaining quantitative descriptions of neural events are being applied increasingly in many of the larger institutions in the Soviet Union. There can be little doubt that the use of these methods in the studies of higher nervous activity has already yielded significant results and will supplement the traditional Pavlovian approach. Whereas little time was devoted during the meeting to other areas of brain sciences, present-day biochemical and biophysical concepts appeared to play a considerable role in the interpretation of the data.

In addition to the conference, two Sechenov lectures were presented, one in Moscow and one in Leningrad on 25 November and 2 December, respectively. The lectures were given by H. Waelsch on the subject of nitrogen metabolism and cerebral function. He defined the dynamic cytoarchitectonics of the brain in terms of metabolic compartments by the use of examples from the metabolism of ammonia. Fur-

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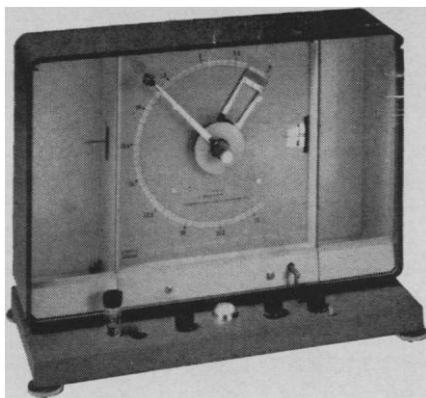
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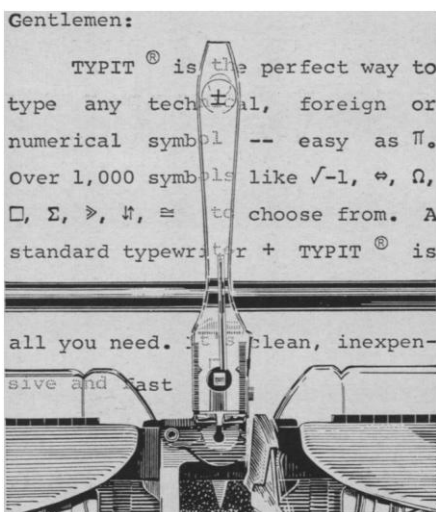
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thermore, he showed how ammonia metabolism, and with it the metabolism of glutamic acid and glutamine, is closely linked to the operation and rate of the citric acid cycle and of CO₂ fixation in the central nervous system. The role of CO₂ fixation as a possible link between function and metabolism of the nervous system was pointed out.

Among the institutes and laboratories both in Moscow and Leningrad visited by the participants during the week and the days following the conference was the Sechenov Institute of Physiology. The present director, P. K. Anokhin, holds the position which corresponds to the chair of physiology at the University held by Sechenov. Anokhin acquainted the participants with many of the original apparatus, manuscripts, and memorabilia of Sechenov's scientific life.

Much contact was established with the younger generation of Soviet scientists in the medical sciences and throughout all the discussions a strong desire for closer collaboration on the international and interdisciplinary level was apparent. The great general interest in brain sciences may be seen in the fact that on Friday, 28 November, Asratyan and Anokhin (U.S.S.R.), Dell (France), and Waelsch (U.S.) were invited to discuss international and interdisciplinary research in brain sciences on Soviet television.

The conference was sponsored jointly by the U.S.S.R. Academy of Science and the International Brain Research Organization.

D. P. PURPURA

H. WAELSCH

*College of Physicians and Surgeons,
Columbia University, and New York
State Psychiatric Institute, New York*

Reference

1. H. Waelsch, *Nature* 198, 344 (1963).

Magnetism

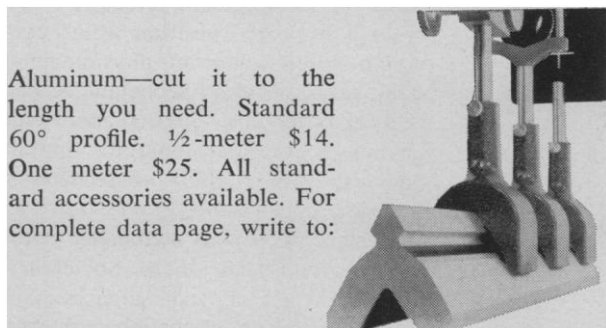
The fundamental and applied aspects of magnetism were discussed at the 9th Annual Conference on Magnetism and Magnetic Materials, Atlantic City, N.J., 12-15 November 1963. Approximately 20 percent of the 167 papers were delivered by representatives from foreign countries.

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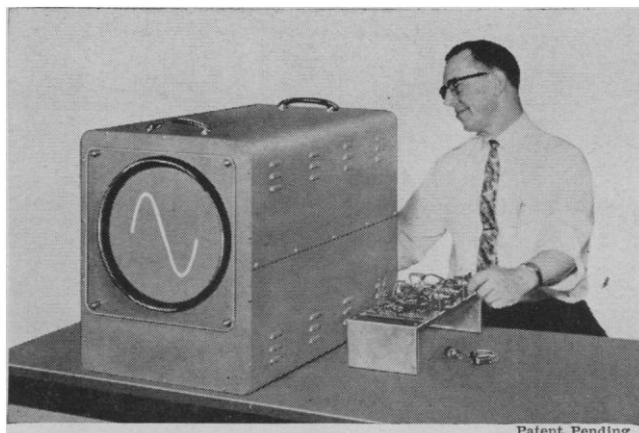
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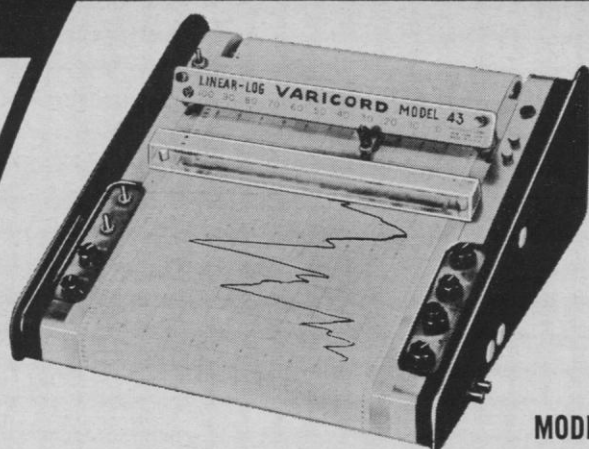
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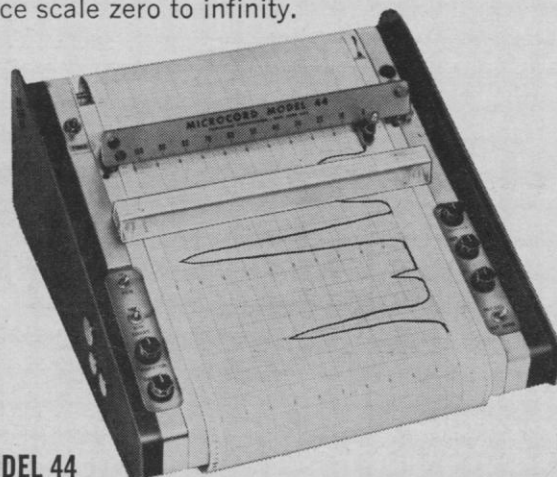
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moments attached to some fraction of the constituent atoms. This model, with which the names of W. Heisenberg, P. A. M. Dirac, and J. H. Van Vleck are associated, is literally applicable only to magnetic compounds, and to rare earth metals, and it is, at best, only the basis for a phenomenology of the "classic" ferromagnets, iron, nickel, and cobalt. Because of their nonintegral spins and large electronic-specific heat, and because of other evidence, notably high field galvanomagnetic measurements on nickel reported by W. A. Reed (Bell Telephone Laboratories), the itinerant-electron concept is expected to be applicable to these metals. Making use of existing calculations of the band structure of nickel in its non-ferromagnetic state, H. Ehrenreich (Harvard) and H. R. Philipp (General Electric) constructed a model of the band structure of ferromagnetic nickel which is consistent with the available data.

For the metals of the first transition series, the band theory has yielded the same phenomenology as the Heisenberg-Dirac-Van Vleck model. T. Izuyama (M.I.T.) and R. Kubo (University of Chicago) showed that an itinerant-electron model can account for the existence of spin waves as well as the existing neutron-diffraction data in the neighborhood of the Curie temperature if the electron-correlation effect is taken into account. D. C. Mattis (I.B.M.) also found spin waves in a band picture with the dominant interaction among *d*-band electrons or holes, taken to be the Hund's rule mechanism of intra-atomic exchange.

The long-range indirect exchange by means of conduction electrons is generally invoked in discussions of the behavior of rare metals. F. Holtzberg *et al.* (I.B.M.) discussed the striking properties of rare-earth group compounds with the ThP_4 structure, relating the Curie temperature to electrical conductivity in the $\text{GdSb}_2\text{-GdBi}_2$ system in terms of this model. Similarly, the ferromagnetic conductor $\text{Gd}_{2.1}\text{Se}_{2.0}$ becomes semiconducting and paramagnetic when it is doped with $\text{Eu}_{0.5}$; it remains conducting and ferromagnetic when doped with $\text{Y}_{0.5}$. S. H. Liu (I.B.M.) found that the indirect exchange model leads to a term in the equation for electrical resistivity proportional to the deviation of the magnetization from its ground state value, but unfortunately, no appropriate experimental data are available. This model was also applied to the case of dilute magnetic impurities in a

nonmagnetic conductor. M. W. Klein (Sperry Rand) was able to explain simultaneously the very different dependences of the excess low-temperature specific heat on small concentrations c of iron, cobalt, and manganese in copper. In terms of the indirect exchange model, the different effective spins on these ions in copper, and the limited experimental temperature range, he showed that the result is proportional to c^0 , c , and c^2 for manganese, iron, and cobalt, respectively.

In compounds, we have recently seen the development of materials having, from the theoretical point of view, very nearly ideal Heisenberg-Dirac-Van Vleck properties. Joining the very simple antiferromagnet RbMnF_3 are the europium chalcogenides on which T. R. McGuire and M. W. Shafer (I.B.M.) reported. For the cubic ferromagnet EuS , S. H. Charap (I.B.M.) used spin-wave theory to determine the exchange interactions between the nearest and next-to-nearest neighbor europium atoms from low-temperature magnetization and specific heat data. An independent test was provided by P. J. Wojtowicz (R.C.A.). He derived an expression for the magnetic specific heat of EuS above its Curie point and showed that the low-temperature constants obtained by Charap, when used in his expression, reproduce the measured high-temperature specific heat within experimental uncertainty. A. Narath (Sandia) discussed the antiferromagnet CrCl_3 as ferromagnetic sheets (two-dimensional ferromagnets) antiferromagnetically ordered. He successfully analyzed the sublattice magnetization measured by nuclear magnetic resonance of Cr^{53} nuclei in terms of the spin-wave theory and determined the exchange constants.

The study of the interaction of the magnetic lattice with its surroundings is interesting in its own right and valuable as a tool for studying the nature of magnetism itself. Because of their simple crystalline and spin structure, garnets doped with rare earths provide an excellent opportunity for both the theoretician and experimentalist to study the loss mechanisms in conducting ferromagnetic materials. The losses are experimentally investigated by measuring the ferromagnetic resonance line width. J. H. Van Vleck (Harvard) reviewed the state of the theoretical interpretation of the resonance data on the basis of both a longitudinal (slow) and a transverse (fast) relaxation process. F. Hartmann-Boutron (University

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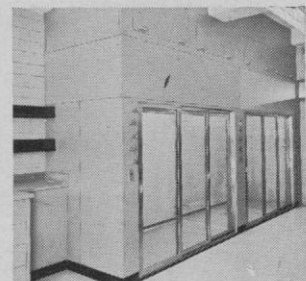


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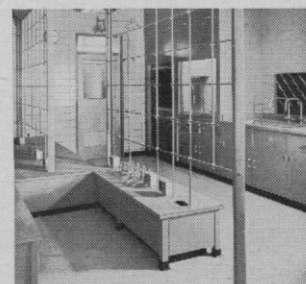
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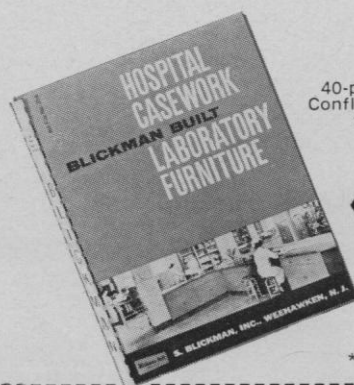
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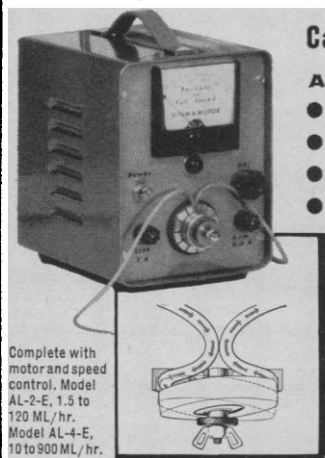
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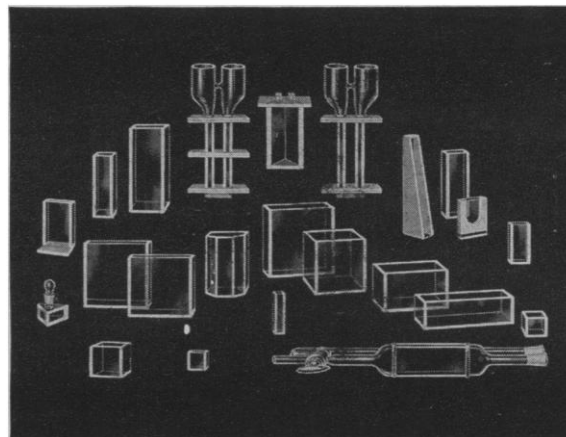
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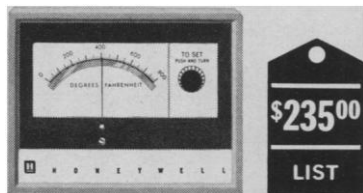
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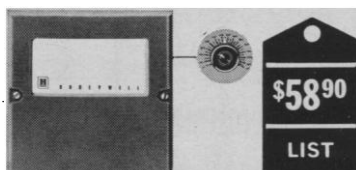
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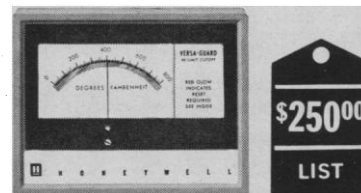


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of Paris) extended and generalized the theoretical calculations of both processes. P. E. Seiden (I.B.M.) presented experimental results showing that over most of the observable temperature range the loss mechanism is of the "slow" relaxation type. However, he pointed out that, for very low temperatures, the "slow" relaxation model is not complete.

The interest in memory applications and fundamental properties of thin magnetic films is continuing to grow (33 papers were presented on the subject). J. I. Raffel (Lincoln Laboratory) discussed the problems of large-capacity magnetic film memories. He pointed out that the prime requirements of the magnetic element are capability of sharing common drive and sense circuitry, small size and low power consumption, and ability to be batch-fabricated. He then described an approach to a 36-million bit, thin-film memory with an access time of less than 1 microsecond at a cost of about 3 mils per bit. Along the same lines, T. J. Matcovich, W. Flannery, W. Luciw, and A. A. Adomines (Univac) discussed a low-power, 64- by 24-bit film memory plane. Output signals of 50 microvolts were obtained with drive currents of less than 35 milliamperes.

Recently, magnetic film elements exhibiting biaxial anisotropy (possessing four stable states of remanent magnetization) have received attention because of their possible storage and logic applications in the computer industry. Three types of biaxial films were treated. H. Chang (I.B.M.) calculated the static and dynamic properties of a biaxial structure formed by magnetostatically coupling two uniaxial thin films. R. J. Prosen, Y. Gondo, and B. E. Gran (Honeywell Research Center) investigated the properties of biaxial films simulated by a collection of small rectangularly shaped isotropic films. W. D. Doyle (Franklin Institute) described a series of torque and rotational hysteresis measurements of single-crystal cobalt films possessing biaxial crystal-line anisotropy.

The conference was jointly sponsored by the American Institute of Physics and the Institute of Electrical and Electronics Engineers. A complete record of the meeting is scheduled to appear in the spring as a supplement to the *Journal of Applied Physics*.

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Meteorological Satellites

Some recent results of the Meteorological Satellite Program, specifically, research with pictures and radiation data from the Tiros satellites, were presented on 27 December during sessions of the 3rd western national meeting of the American Geophysical Union, held at the University of Colorado, Boulder, 26-28 December 1963.

An overall impression gained from the session on satellite meteorology, and also from other sessions, including the general assembly of the Union, was that interdisciplinary boundaries within geophysics are breaking down. This observation, often noted and perhaps trite, doubtless is a well known fact among those of broad background, but its more striking impact upon those of lesser experience may be one of the more desirable aspects of such a meeting. Indeed, it is obvious that the Tiros data in themselves cannot be considered as solely "meteorological"; they also have implications for hydrology, oceanography, aeronomy, and space physics.

C. O. Erickson (U.S. Weather Bureau, Washington, D.C.) reviewed selected research results and emphasized the fundamentally different nature of picture data obtained by satellites as compared to conventional meteorological observations obtained at fixed points. Although the data are increasingly useful, the initial problem of how to use them proficiently has been only partially overcome by the numerous case studies relating the Tiros pictures to conventional meteorological analyses.

Tiros pictures yield considerable information, including amounts of cloud cover, the presence of cyclonic circulations, and estimates of atmospheric stability, wind direction, and wind shear. However, the information is still largely qualitative and subjective and may vary greatly in time and space. It appears that further real progress in the use of satellite picture data in weather analysis and prediction will depend increasingly on our ability to make these data more quantitative and objective so that they may be incorporated into numerical models.

Albert Arking (New York University) described an interesting and significant attempt to quantify Tiros picture data. Nearly 1500 Tiros III pictures were analyzed on a digital computer in a study of the global distribution of cloud cover. General agree-

ment with climatological averages was obtained, but there were certain regional differences, for example, greater cloudiness over North Africa. Because of the limited period (3 months) and the inferior quality of the later Tiros III pictures, further study along this line would be very desirable.

James Arnold (Chicago) presented some work of T. Fujita which utilized both Tiros pictures and certain of the Tiros radiation data to give the pattern of equivalent blackbody temperatures. The patterns fit very well, and allow for estimating the height of cloud tops. Although radiation data are not yet available operationally, because of calibration and data-reduction problems, this demonstration of combined potential is significant for the future, especially for tropical areas where data are sparse. Erickson earlier had pointed out that Tiros measurements of outgoing, long-wave radiation had been used in preliminary studies of the earth-atmosphere heat budget and that more extensive data would permit global studies not heretofore possible.

Research with Tiros VII radiation measurements in the 15-micron CO_2 band was described by W. Nordberg (NASA, Greenbelt, Md.). Assuming a uniform mixing ratio of CO_2 with altitude, these measurements were interpreted in terms of mean equivalent blackbody temperatures and gave the gross temperature structure of the stratosphere. A more sophisticated effort, using spectrometer measurements from several narrow intervals in the 15-micron band, is planned for the future. The spectrometer will first be flown from a balloon, and the measurements from several intervals are expected to aid a more detailed analysis of stratospheric temperatures.

Julius London (University of Colorado) arranged the program for this and other meteorology sessions. The entire meeting was favored by delightful weather for the season.

CARL O. ERICKSON

U.S. Weather Bureau, Washington, D.C.

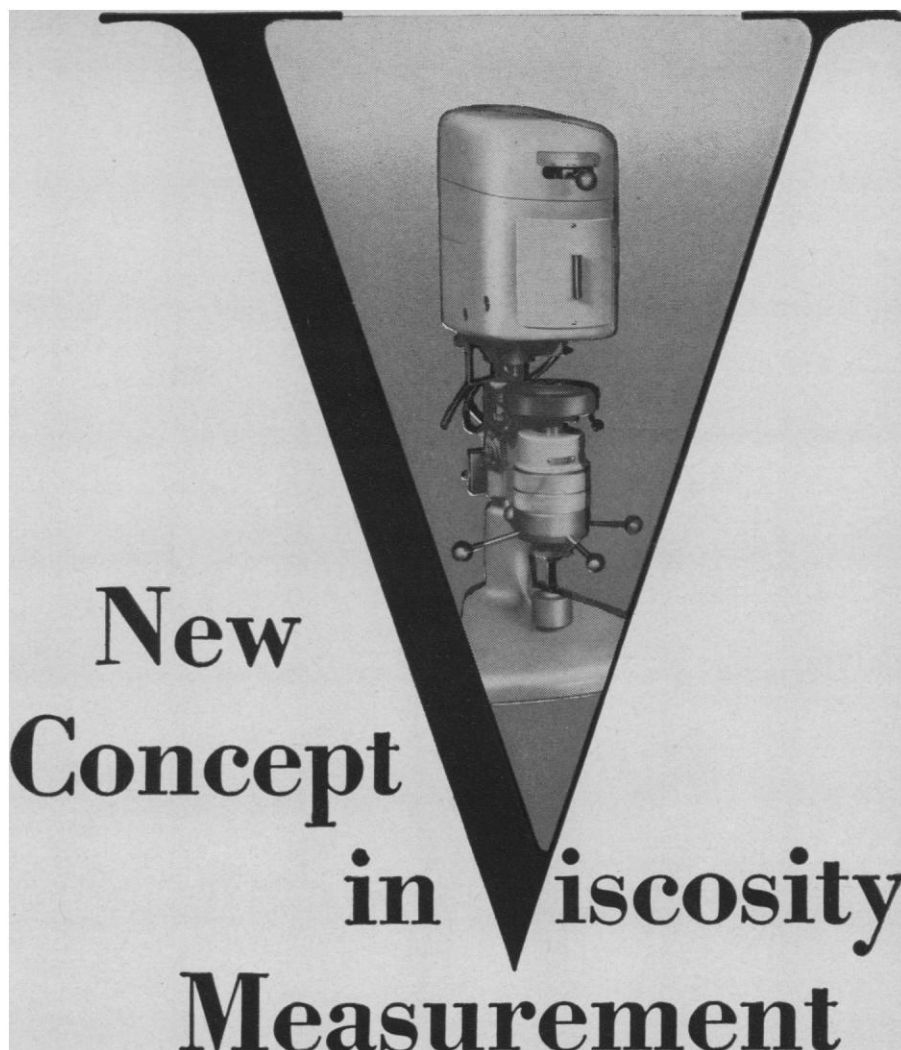
Forthcoming Events

February

12-16. American College of Cardiology, 13th annual, New Orleans, La. (P. Reichert, Empire State Bldg., New York, N.Y. 10001)

13-14. Texas Industrial Pharmacy Seminar, Austin. (L. R. Parker, Pharmacy Extension Service, Univ. of Texas, Austin)

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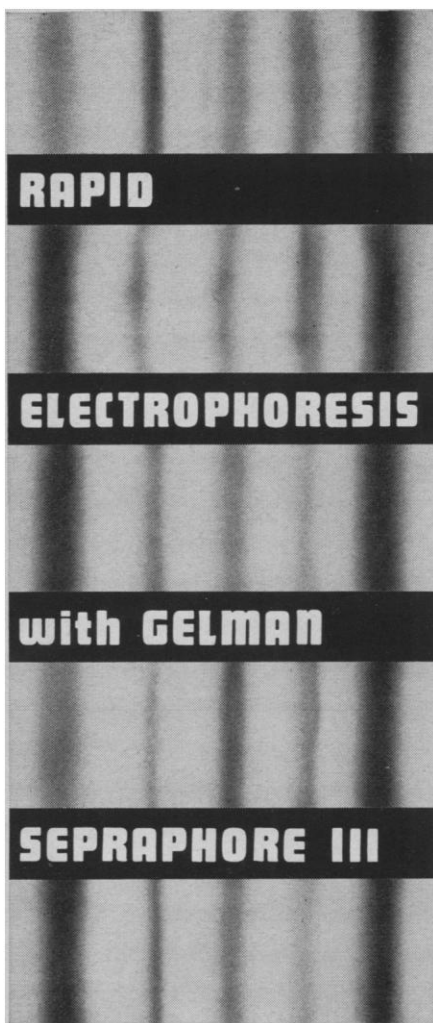
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15-16. **Atomic Energy**, Japanese natl. symp., Tokyo. (Atomic Energy Soc. of Japan c/o Atomic Energy Research Inst., 1-1 Shiba-tamura-cho, Minato-ku, Tokyo)

16-22. **National Engineers' Week**, sponsored by the National Society of Professional Engineers. (2029 K St., NW, Washington, D.C. 20006)

17-19. **American Standards Assoc.**, 14th annual conf., Washington, D.C. (ASA, 10 E. 40 St., New York, N.Y. 10016)

17-20. **Metals for Use at High Temperature**, intern. symp., New York, N.Y. (D. A. Parks, Metallurgical Soc., 345 E. 47 St., New York, N.Y. 10017).

17-21. **Information Storage and Retrieval**, 6th, Washington, D.C. (L. W. Hattery, American Univ., 1901 F St., NW, Washington, D.C. 20006)

19-21. **National Soc. of College Teachers of Education**, Chicago, Ill. (E. J. Clark, Indiana State College, Terre Haute, Ind.)

19-21. **Solid-State Circuits**, intern. conf., Philadelphia, Pa. (L. Winner, 152 W. 42 St., New York, N.Y. 10036)

19-22. **American Educational Research Assoc.**, Chicago, Ill. (J. R. Gerberich, 1201 16th St., NW, Washington, D.C.)

19-5. **Pan American Medical Assoc.**, 39th congr., the Americas, during a cruise aboard the S.S. *Independence*. (J. J. Eller, 745 Fifth Ave., New York, N.Y.)

23-27. **Technical Assoc. of the Pulp and Paper Industry**, 49th annual, New York, N.Y. (TAPPI, 360 Lexington Ave., New York, N.Y. 10017)

23-28. **Otorhinolaryngology and Bronchoesophagology**, 9th Pan American congr., Bogota, Colombia. (C. M. Norris, 3401 N. Broad St., Philadelphia, Pa.)

24-25. **Atmospheric Movements of Radioactive Materials**, Geneva, Switzerland. (World Meteorological Organization, Geneva)

24-25. **Writing-Improvement Programs for Engineers**, seminar, New York, N.Y. (C. A. Meyer, RCA Commercial Engineering, Harrison, N.J.)

24-28. **Institution of Electrical Engineers**, intern. conf. on transmission aspects of communications networks, London, England. (IEE, Savoy Pl., London, W.C.2)

25-26. **Dairy Engineering**, natl. conf., East Lansing, Mich. (C. W. Hall, College of Agriculture, Michigan State Univ., East Lansing)

26-28. **Biophysical Soc.**, Chicago, Ill. (W. Sleator, Jr., Washington Univ. Medical School, 660 Kingshighway, St. Louis 10, Mo.)

26-28. **Scintillation and Semiconductor** symp., Washington, D.C. (G. A. Morton, RCA Laboratories, Princeton, N.J.)

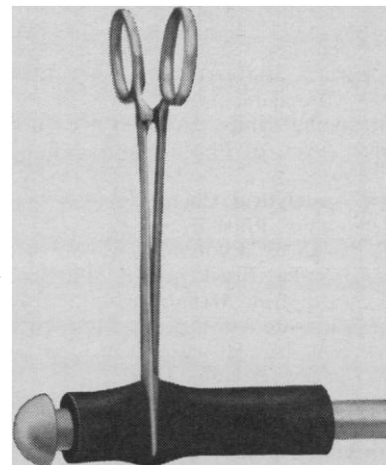
27-28. **Cellular Basis for the Action of Cardiac Drugs**, Philadelphia, Pa. (Heart Assoc. of Southeastern Pa., 318 S. 19 St., Philadelphia 3)

27-28. **National Assoc. for Mental Health**, annual conf., London, England. (General Secty., 39 Queen Anne St., London, W.C.1)

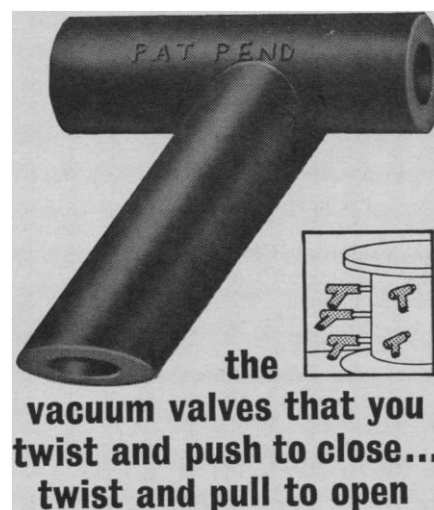
27-29. **American Acad. of Forensic Sciences**, Chicago, Ill. (W. J. R. Camp, 1853 W. Polk St., Chicago 12)

27-29. **American Physical Soc.**, Tucson, Ariz. (K. K. Darrows, American Physical Soc., Columbia Univ., New York, N.Y.)

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March

1-4. Canadian Assoc. of Radiologists, annual, Vancouver, B.C. (A. I. Ekstrand, 1555 Summerhill Ave., Montreal 25, P.Q., Canada)

1-5. Raman Spectroscopy, colloquium, Stuttgart, Germany. (J. Goubeau, Dept. of Chemistry, Technische Hochschule Stuttgart, 7 Stuttgart N)

2-4. Fundamental Cancer Research, 18th annual symp., Houston, Tex. (R. J. Shalek, Dept. of Physics, Univ. of Texas, Houston)

2-6. Analytical Chemistry and Applied Spectroscopy, Pittsburgh, Pa. (R. B. Fricioni, Allegheny Ludlum Steel Corp., Research Center, Brackenridge, Pa.)

2-6. Applied Meteorology, 5th conf., American Meteorological Soc., Atlantic City, N.J. (A. Hilsenrod, Federal Aviation Agency, Atlantic City)

3-7. Inter-American Nuclear Energy Commission, 5th, Valparaiso, Chile. (Pan American Union, Constitution Ave., NW, Washington, D.C. 20006)

3-21. World Health Assembly, 17th annual, Geneva, Switzerland. (WHO, Palais des Nations, Geneva)

4-6. Thermal Radiation of Solids, symp., San Francisco, Calif. (W. D. Harris, Engineering and Sciences Extension, Univ. of California, Berkeley 4)

5-6. Theoretical and Applied Mechanics, southeastern meeting, Atlanta, Ga. (Dept. of Short Courses and Conferences, Georgia Inst. of Technology, Atlanta 30332)

5-7. Macromolecular Colloquium, Freiburg im Breisgau, Germany. (Institut für Makromolekulare Chemie, Univ. Freiburg, Stefan-Meier-Str. 31, 78 Freiburg im Breisgau)

5-7. Pacific Sociological Assoc., Colorado, Calif. (S. M. Dornbusch, Stanford Univ., Stanford, Calif.)

6-8. Society of Nuclear Medicine, southwestern chapter, Houston, Tex. (S. N. Turiel, SNM, 333 North Michigan Ave., Chicago 1, Ill.)

6-8. National Wildlife Federation, 28th annual, Las Vegas, Nev. (NWF, 1412 16th St., NW, Washington, D.C. 20036)

7-12. Proctology, 16th teaching seminar, Miami Beach, Fla. (J. Reichert, 147-41 Sanford Ave., Flushing, N.Y. 11355)

8-12. Water Resources Engineering, conf., Mobile, Ala. (American Soc. of Civil Engineers, 345 E. 47 St., New York 10017)

8-15. North American Clinical Dermatologic Soc., Mexico City, Mexico. (E. F. Finnerty, 510 Commonwealth Ave., Boston, Mass.)

9-10. Aerodynamic Testing Conf., American Inst. of Aeronautics and Astronautics, Washington, D.C. (J. N. Fresh, David Taylor Model Basin, Code 630, U.S. Navy, Washington, D.C.)

9-11. Computers in Education, conf., Eugene, Ore. (J. W. Loughary, School of Education, Univ. of Oregon, Eugene)

9-11. Society of Toxicology, annual, Williamsburg, Va. (C. S. Weil, Mellon Inst., 4400 Fifth Ave., Pittsburgh, Pa. 15213)

9-13. National Assoc. of Corrosion Engineers, 20th conf., Chicago, Ill. (W. H.

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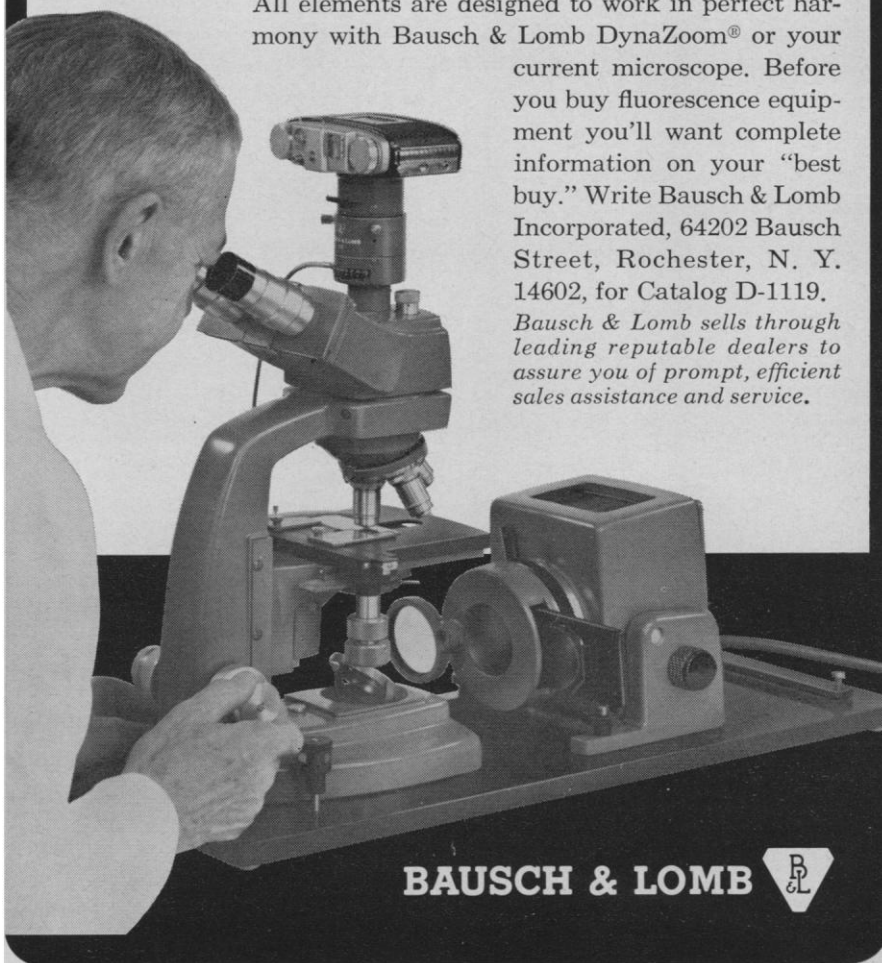
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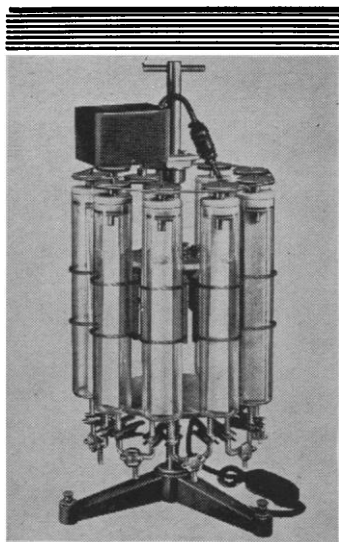
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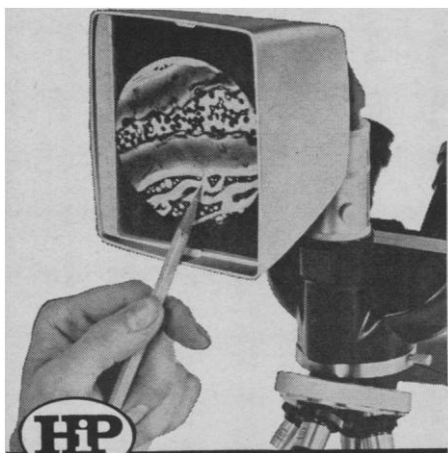
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Compiled by the
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AAAS Symposium Volume No. 74

Editor: Carle Hodge, Associate Editor:
Peter C. Duisberg. 604 pages, 98 illustrations, references, index.

December 1963. Price: \$12.00. AAAS Member's cash orders: \$10.00.

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9-13. Peaceful Applications of **Nuclear Energy**, 5th inter-American symp., Valparaiso, Chile. (J. D. Perkinson, Inter-American Nuclear Energy Commission, Pan American Union, Washington, D.C.)

10-12. **Exploding Conductor Phenomena**, 3rd conf., Boston, Mass. (W. G. Chace, Air Force Cambridge Research Laboratories, Hanscom Field, Bedford, Mass.)

10-14. American Inst. of **Chemical Engineers**, New Orleans, La. (AIChE, 345 E. 47 St., New York 17)

11-12. Instrument Soc. of America, 14th conf. on **instrumentation** for the iron and steel industry, Pittsburgh, Pa. (N. F. Simcic, Research Laboratory, Jones and Laughlin Steel Corp., 900 Agnew Rd., Pittsburgh 30)

12. **Interplanetary Monitoring Platform** Experiments, symp., Greenbelt, Md. (C. P. Boyle, Code 207, Goddard Space Flight Center, Greenbelt, Md. 20771)

12-13. **Information** Organization, New Brunswick, N.J. (S. Artandi, Graduate School of Library Service, Rutgers Univ., New Brunswick)

12-15. International College of Applied **Nutrition**, Las Vegas, Nev. (D. C. Collins, Suite 503, 7046 Hollywood Blvd., Los Angeles, Calif. 90028)

13-14. **Louisiana Acad.** of Sciences, Baton Rouge. (H. J. Bennett, Dept. of Zoology, Louisiana State Univ., Baton Rouge)

13-14. Institute of **Management Sciences**, 11th intern., Pittsburgh, Pa. (IMS, Box 273, Pleasantville, N.Y.)

13-14. Effects of **Shock and Vibration** on the human body, Denver, Colo. (A. E. Paige, Dept. of Electrical Engineering, University of Denver, Denver)

14-15. **Endocrinology**, 2nd annual symp., Salisbury, N.C. (H. Nushan, Medical Service, Veterans Administration Hospital, Salisbury)

14-19. American Assoc. of **Psychiatric Clinics for Children**, annual, Chicago, Ill. (AAPCC, 250 W. 57 St., New York 19)

15-19. **Microcirculation**, 3rd European conf., Jerusalem, Israel. (E. Davis, Capillary Research Laboratory, Hadassah Univ. Hospital, P.O. Box 499, Jerusalem)

15-21. American Soc. of **Photogrammetry**, congr. on surveying and mapping, Washington, D.C. (ASP, 44 Leesburg Pike, Falls Church, Va.)

17-18. **Hypervelocity Flight** Techniques, symp., Denver, Colo. (W. G. Howell Denver Research Inst., Univ. of Denver, Denver Colo. 80210)

17-19. Society for **Nondestructive Testing**, Los Angeles, Calif. (D. E. O'Halloran, Northrop Corp., 1001 E. Broadway, Hawthorne, Calif.)

17-19. Statistical Assoc. Methods for **Mechanized Documentation**, symp., Washington, D.C. (M. E. Stevens, Natl. Bureau of Standards, Washington, D.C. 20234)

17-20. Society of **Biological Chemistry**, Paris, France. (P. Malangeau, Executive Committee, 4, Avenue de l'Observatoire, Paris 6^e)

18-20. **Chemurgic Council**, 28th natl. conf., Philadelphia, Pa. (J. W. Ticknor,

Dissymmetries

Depolarization measurements on polymer solutions were mostly limited, until recently, to the determination of Cabannes factors for correcting molecular weights as measured by the light scattering technique. (In fact, this is the reason that the Brice-Phoenix Light Scattering Photometer has been equipped from the very first model with polarizer and analyzer Polaroids). However, several papers have appeared recently which deal with the application of depolarization measurements to the study of configuration and anisotropy of macromolecules in dilute solutions.

V. Kalpagam and M. R. Rao of the Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore, India, in two papers with the title "Depolarization Measurements of Polymer Solutions at High Dilutions" [Journal of Polymer Science, *A1*, 517, 921 (1963)], have described the results of their measurements of depolarization ratio at an angle of 90° for unpolarized and vertically and horizontally polarized incident light (ρ_u , ρ_v , and ρ_h) in solutions of poly(vinyl acetate) and poly(methyl methacrylate) in good, poor, and "ideal" (theta) solvents. In addition to depolarization ratios, they also report the intensities of both components of scattered light, H_v and V_v , with the incident light being vertically polarized. Quite dilute solutions were used, and very pronounced and characteristic dependence of every measured quantity on concentration was observed. The ρ -values as well as H_v and V_v were dependent also on the molecular weight of polymers and on the nature of the solvent. These results were discussed in terms of the size and geometry of polymer molecules, their configuration and anisotropy, and the solute-solute and solute-solvent interactions. Comparison with theoretical predictions was also attempted.

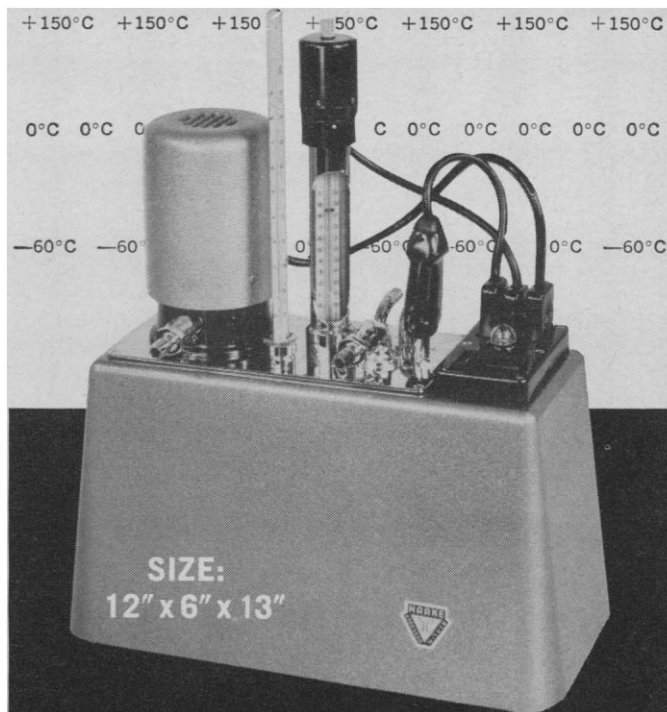
Depolarization of scattered light in solutions of linear and branched polysaccharides was investigated by V. S. R. Rao and J. F. Foster [Journal of Polymer Science, *A1*, 289 (1963)] at the Department of Chemistry, Purdue University, Lafayette, Indiana. Two dextran fractions (molecular weights, $M_w = 71,000$ and 131×10^6), one corn amylopectin ($M_w = 80 \times 10^6$) and beta-amylase limit dextrin of corn amylopectin ($M_w = 33 \times 10^6$), one corn amylose ($M_w = 42,000$), and three potato amylose fractions ($M_w = 2.4 \times 10^6$, 1.14×10^6 , and 0.27×10^6) were used in this investigation. Concentrations of solutions in aqueous KOH were as low as 1×10^{-4} g/ml, and for each concentration all components of the scattered light at 90° (H_u , V_u , H_v , V_v , H_h , and V_h) and the corresponding depolarization ratios (ρ_u , ρ_v , and ρ_h) were determined. For dextran fractions water was also used as the solvent. With the data obtained from these measurements, it was possible to discuss the observed depolarization ratios with respect to the branching and molecular weight of the polysaccharides, concentration of the solutions and the character of the solvents, and to make a comparison between the experimental results and theoretical predictions considering the intrinsic anisotropy of the segments and the form anisotropy of the molecules.

We mentioned above the high value of the molecular weight (131×10^6) of one of the dextran samples investigated by Rao and Foster. In this connection, it is interesting to note that the highest molecular weights that have been determined for any synthetic or natural polymer, employing the Brice-Phoenix Light Scattering Photometer, appear to be those of certain polysaccharides. Thus, H.-G. Elias [Makromolek. Chem., *27*, 192 (1958)], at the Institute for Chemical Technology, Technical University, Munich, Germany, studied light scattering by solutions of extremely large molecules of dextran and recorded molecular weights of 10^8 to 10^9 , the latter value corresponding to a radius of gyration of greater than 6000 Å. More recently, R. Laskov and E. Margoliash [Bull. Research Council Israel, Chem. Section, *A11*, 351 (1963)] of the Department of Experimental Medicine and Cancer Research, Hebrew University Hadassah Medical School, Jerusalem, Israel, reported on the properties of high molecular weight glycogen from rat liver. Glycogen was fractionated and the molecular weights of fractions ranged from 2×10^7 to 4×10^8 .

Resuming our discussion of depolarization, we should like to add that procedures for such measurements have been facilitated by several new optional accessories available with Brice-Phoenix Light Scattering Photometers. These include remotely controlled electric rotators which permit orientation of both the polarizer and analyzer in the vertical and horizontal planes without opening the lid of the light scattering cell compartment. Presently in development is a new amplifier designed specifically to increase the sensitivity of the photometer. This should be of particular value when the intensities of horizontally polarized components are measured, since these are often very low.

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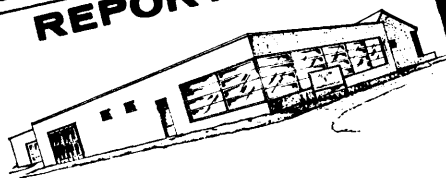
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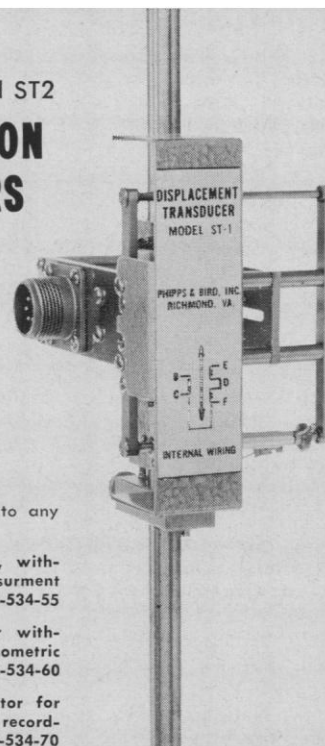
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18-21. Latin **Medical Union**, intern. Congr., Rome, Italy. (B. Urso, Policlinico Umberto I, Viale Policlinico, Rome)

18-21. American **Orthopsychiatric Assoc.**, Chicago, Ill. (M. F. Langer, 1790 Broadway, New York 19)

21-24. **Cybernetic Medicine**, 3rd intern. Congr., Naples, Italy. (A. DeChiara, 348, Via Roma, Naples)

23-24. Society for **Economic Botany**, 5th annual, Chapel Hill, N.C. (D. J. Rogers, New York Botanical Garden, Bronx Park, N.Y.)

23-25. Federation of European **Biochemical Societies**, 1st, London, England. (FEBS, Lister Inst., Chelsea Bridge Rd., London, S.W.1)

23-26. Institute of **Electrical and Electronics Engineers**, intern. conv., New York, N.Y. (IEEE, Box A, Lenox Hill Station, New York 21)

23-26. **Gas Chromatography**, 2nd intern. symp., Houston, Tex. (A. Zlatkis, Dept. of Chemistry, Univ. of Houston, Houston)

23-26. American **Physical Soc.**, Philadelphia, Pa. (K. K. Darrow, Columbia Univ., New York 27)

20-24. National Assoc. for **Research in Science Teaching**, Chicago, Ill. (G. G. Mallinson, Western Michigan Univ., Kalamazoo)

20-24. National **Science Teachers Assoc.**, Chicago, Ill. (R. H. Carleton, 1201 16th St., NW, Washington, D.C.)

21-3. British **Computer Soc.**, conf., Edinburgh, Scotland. (Secretariat, I.E.E., Savoy Pl., London, W.C.2, England)

21-23. Asian-Pacific **Dental Federation**, 4th Congr., Singapore and Malaya. (B. B. Eraña, Manila Doctors Hospital, Isaac Peral St., P.O. Box 373, Manila, Philippines)

22-25. American Assoc. of **Dental Schools**, 41st annual, Los Angeles, Calif. (AADS, 840 Lake Shore Dr., Chicago 11, Ill.)

24-26. Physics and Dynamics of **Clouds**, conf., American Meteorological Soc., Chicago, Ill. (Miss D. L. Bradbury, Dept. of Geophysical Sciences, Univ. of Chicago, Chicago)

25-27. **Aerospace Bearings**, USAF-Southwest Research Inst. conf., unclassified, San Antonio, Tex. (P. M. Ku, SwRI, 8500 Culebra Rd., San Antonio)

25-27. **Entomological Soc. of America**, Northcentral branch, Omaha, Neb. (G. E. Guyer, Dept. of Entomology, Michigan State Univ., East Lansing)

26-28. **Michigan Acad. of Science, Arts and Letters**, East Lansing (G. G. Mallinson, Western Michigan Univ., Kalamazoo)

26-28. Southern Soc. for **Philosophy and Psychology**, 56th annual, Lexington, Ky. (D. Calvin, Psychology Dept., Univ. of Kentucky, Lexington)

26-29. International Assoc. for **Dental Research**, 42nd, Los Angeles, Calif. (J. C. Muhler, 1120 W. Michigan St., Indianapolis, Ind. 46202)

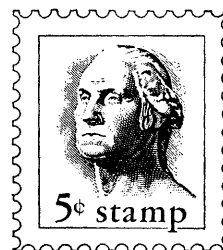
27-28. American **Ethnological Soc.**, Pittsburgh, Pa. (N. F. S. Woodbury, U.S. National Museum, Smithsonian Institution, Washington, D.C.)

27-28. **Seismological Soc. of America**, annual, Seattle, Wash. (K. V. Steinbrugge,

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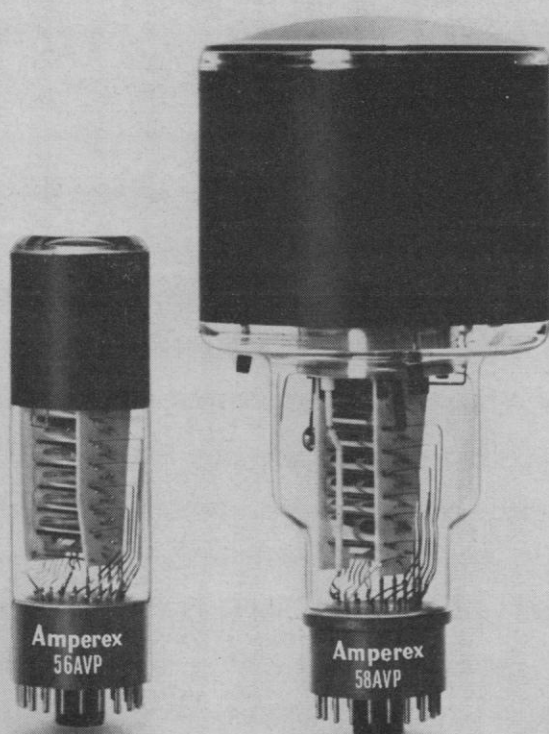
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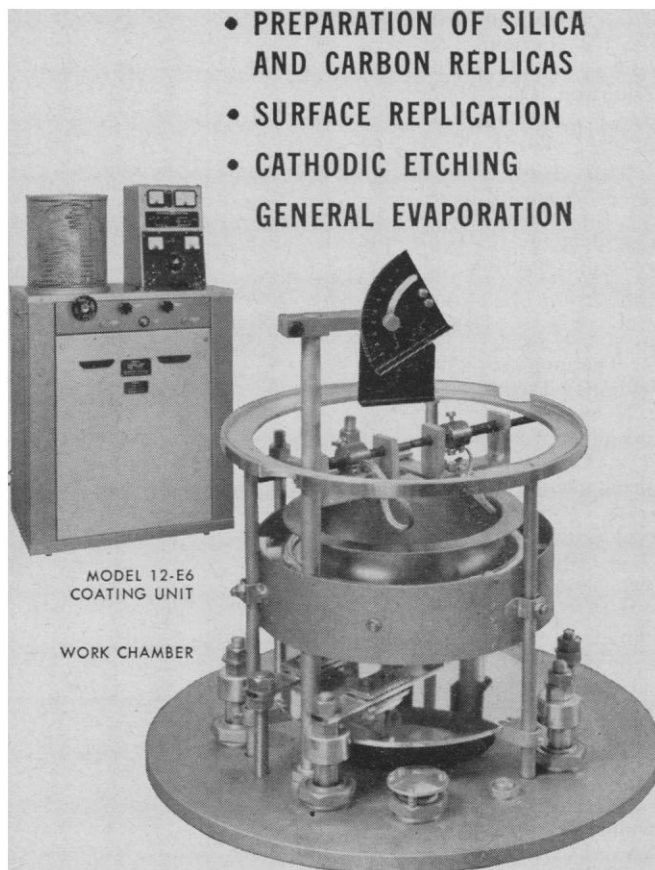
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