

SCIENCE

8 April 1966

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

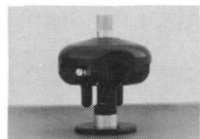


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Gallery system made by scolytid beetles in the phloem of the Douglas fir. The vertical, long gallery is made by the parent female; the numerous, horizontal galleries are made by the growing larvae. In constructing the galleries the insect interrupts the food lines or pores in the phloem, and the tree dies. See page 218. [Julius Rudinsky, Oregon State University]

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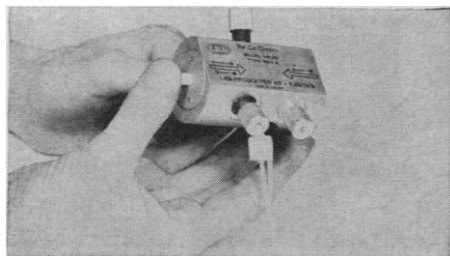
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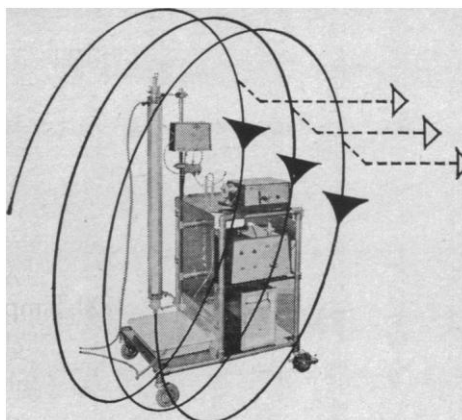
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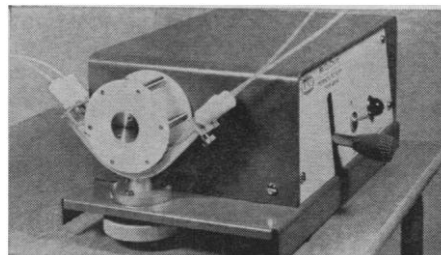
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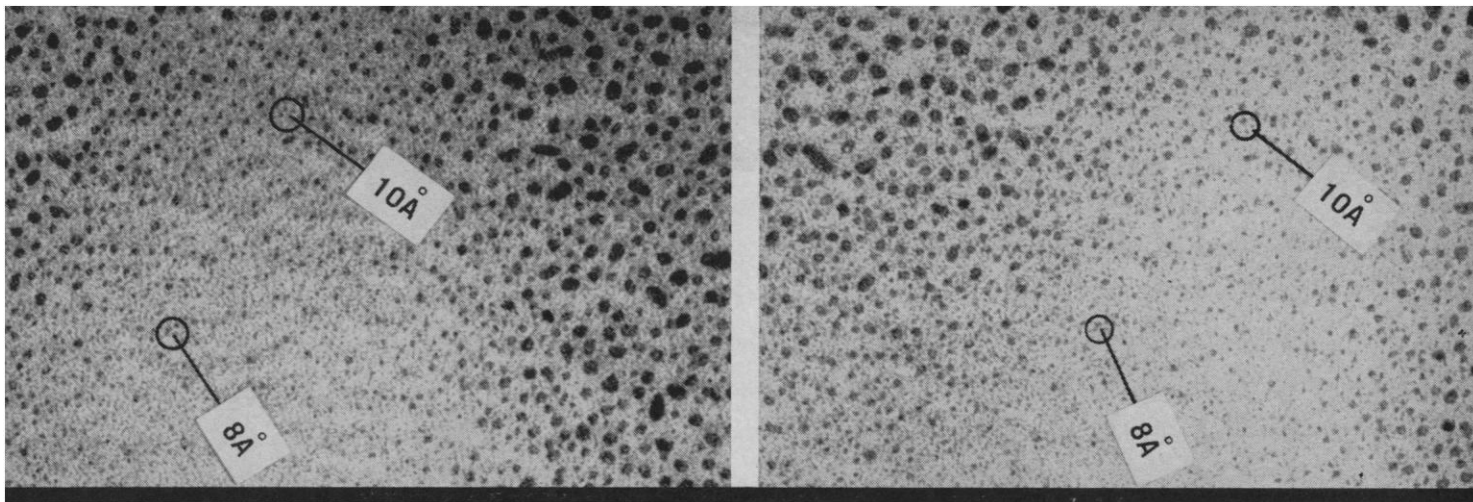
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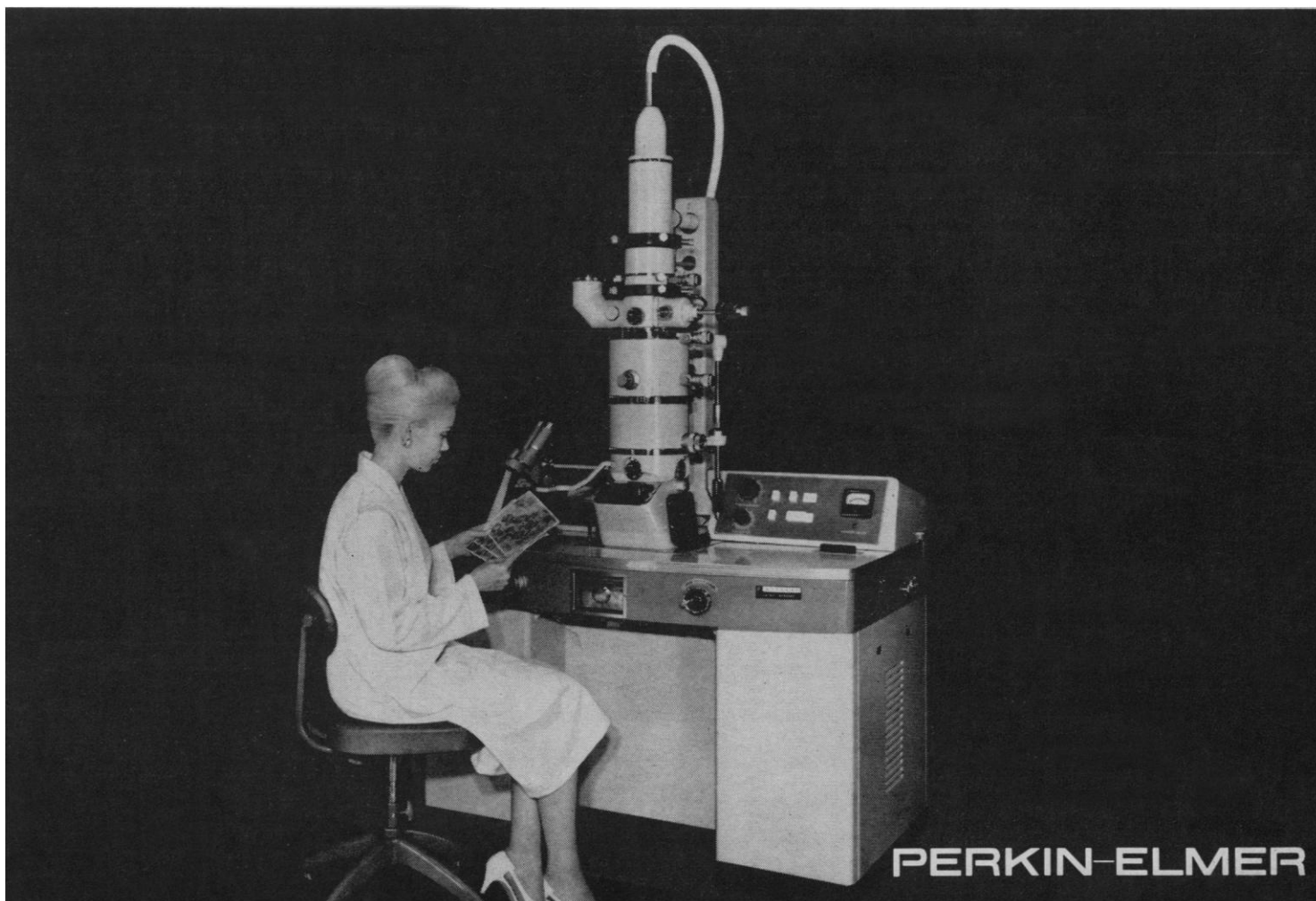
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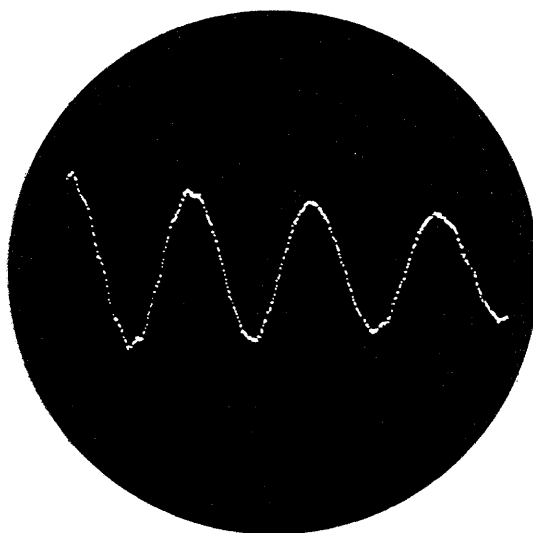
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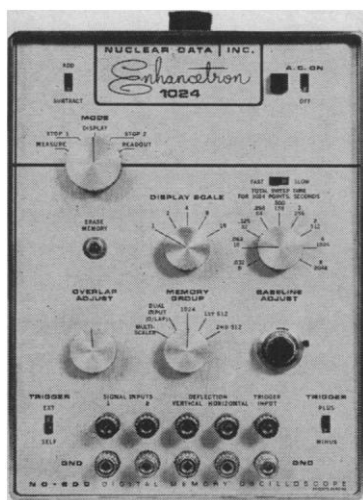


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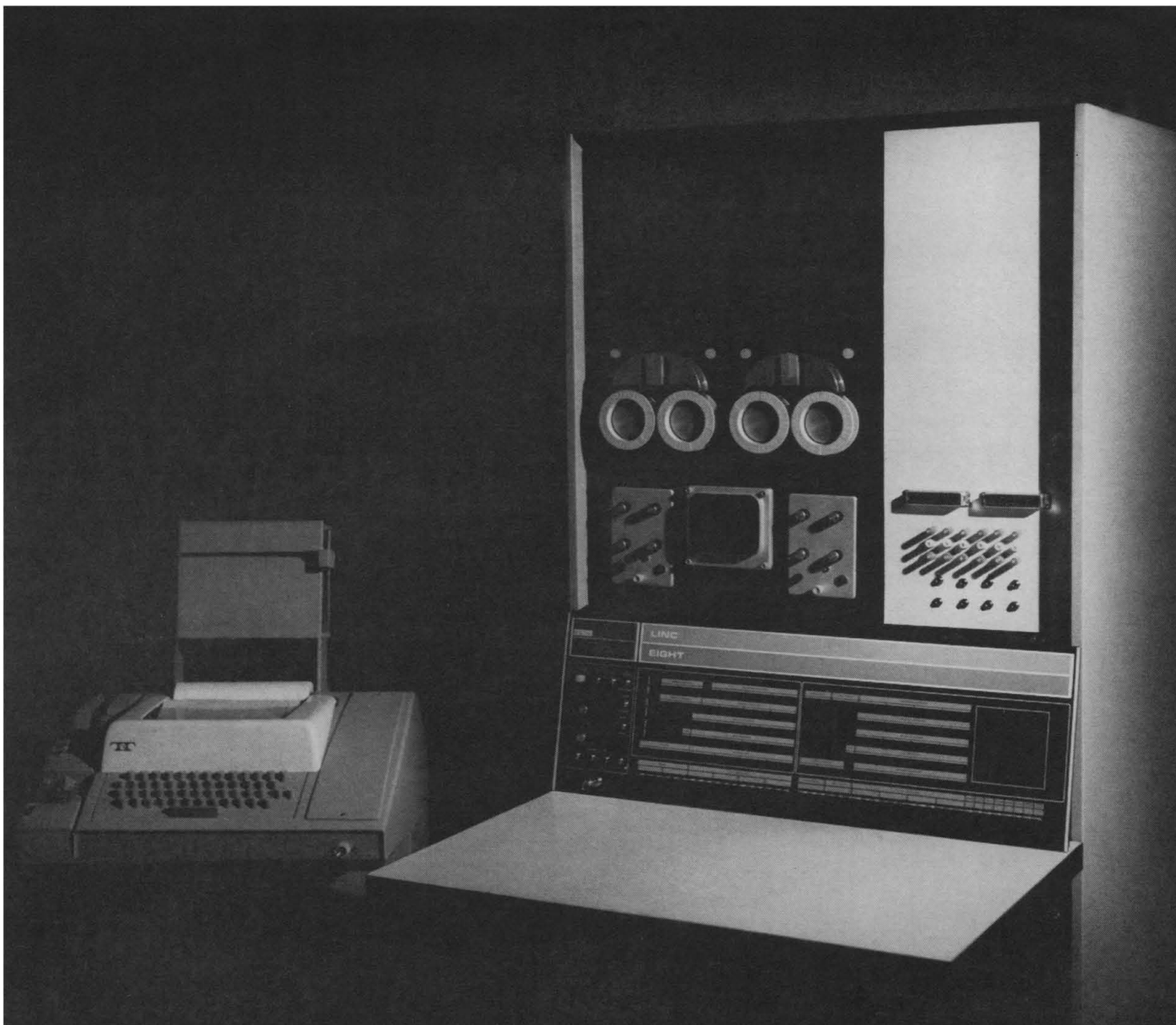
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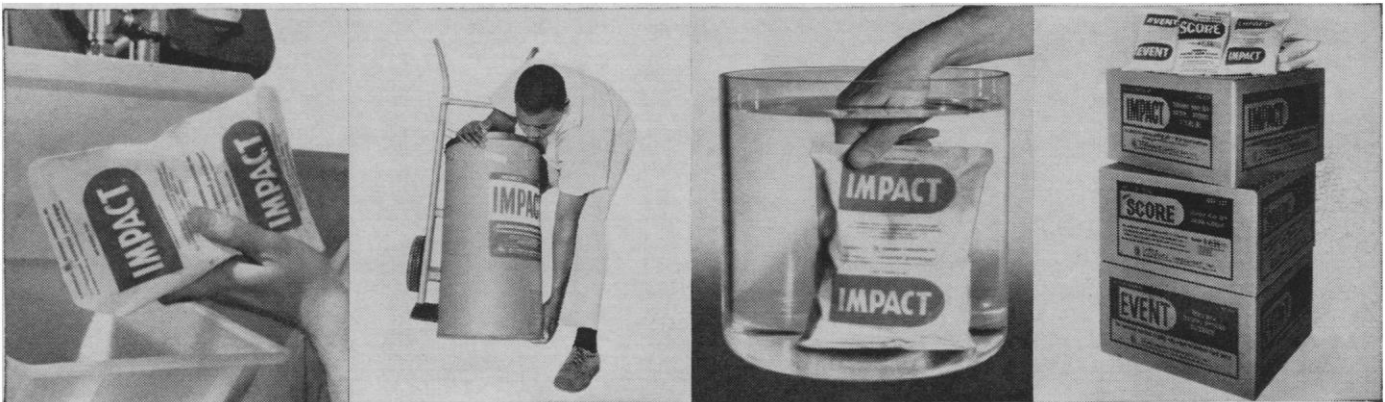
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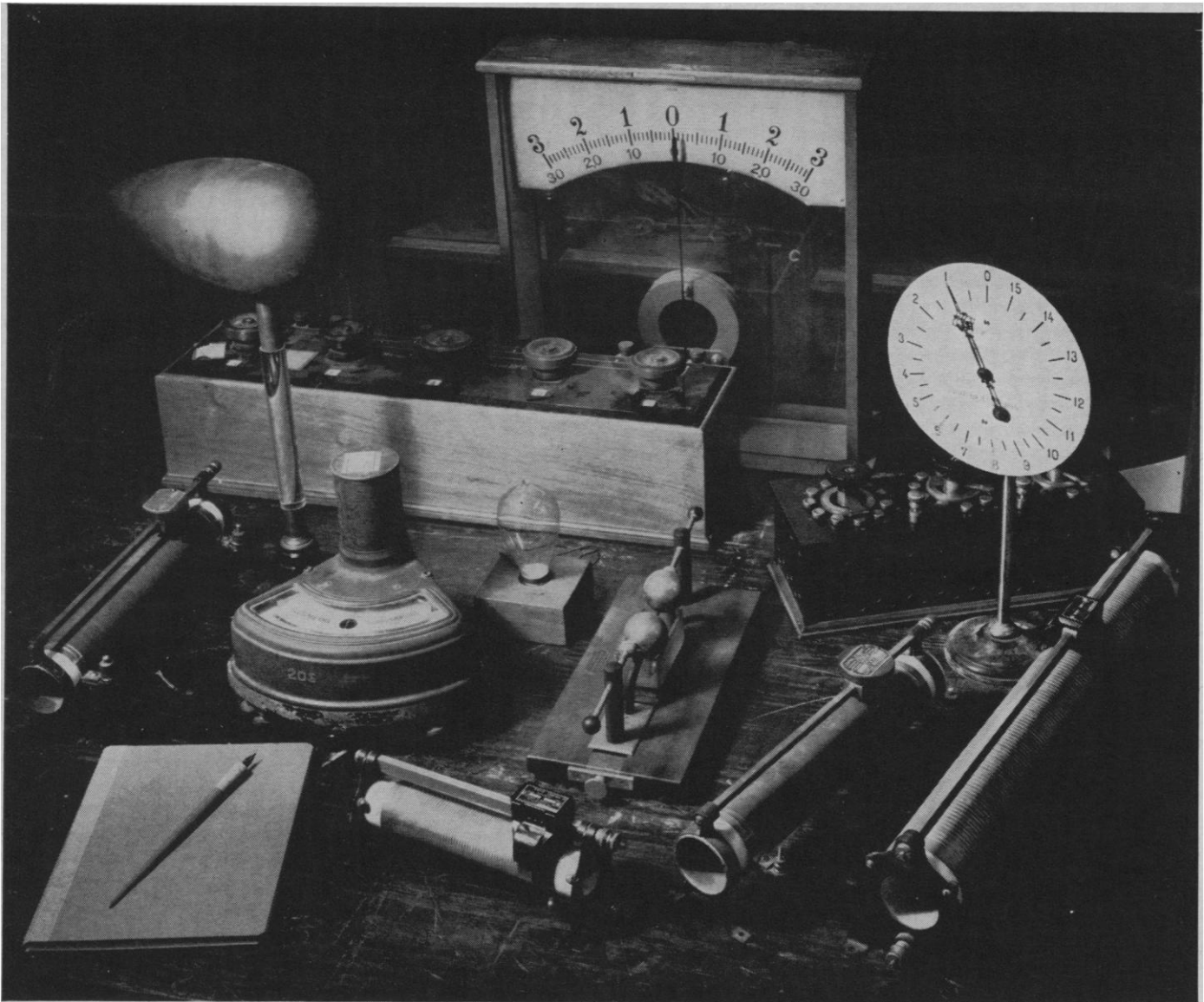
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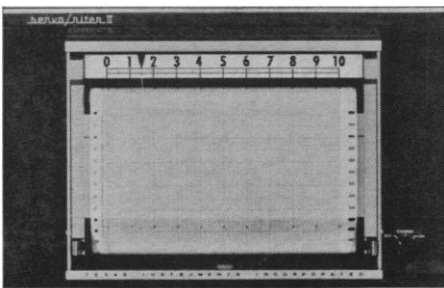
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top, Testing for toxicity (on WI-38's); left, conductivity; above, bacteria count of water.

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This book is divided into three parts. Part I summarizes the basic properties of series. Part II contains the expansions of frequently used functions. The sums of series are tabulated in Part III.

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Presents a comprehensive discussion of current practical and theoretical work on antennas whose characteristics in all respects, such as radiation pattern, polarization, and impedance, are practically constant for a ten- or hundred-fold change of frequency.

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Associate editor Russell L. Robinson

This book describes the many different methods for making spin and parity assignments. The newest methods and the increasing amount of available nuclear data which can be utilized in testing validity of these methods are considered.

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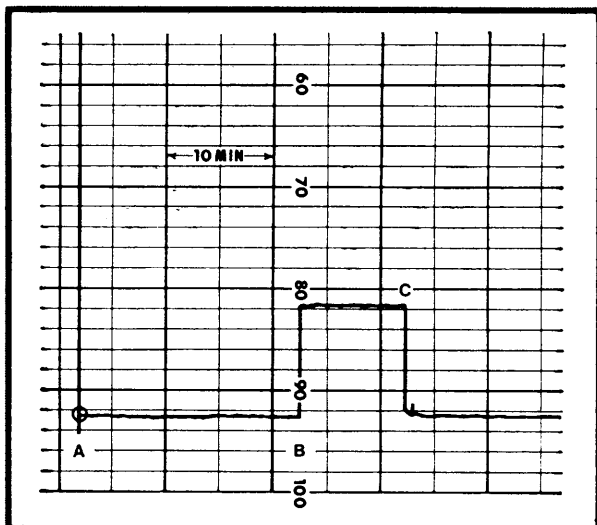
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edited by **P. Wegner**

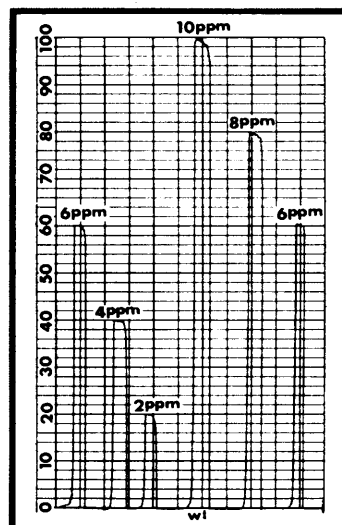
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Model 303 double-beam system eliminates the effects of drift in lamp, detector, and electronics. Here, Ca is run from a cold start. Burner is lighted at A, 1 ppm Ca inserted at B, withdrawn at C. Quiet, stable baseline commonly produces 5X improvement in detection limit and precision.

Model 290 readout in concentration requires no tedious calculations. Here, direct readings on an accessory linear recorder are obtained for 2, 4, 6, 8, and 10 ppm Calcium.



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The Model 303 double-beam system offers speed, precision and sensitivity: With built-in 10X scale expansion,

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The Model 290 Reads Directly in Concentration: The most time-consuming portion of conventional atomic absorption analysis is the conversion of linear transmittance readings to their logarithms, followed by curve plotting. With the 290, all this is eliminated. The 5-inch readout scale is linear in concentration.

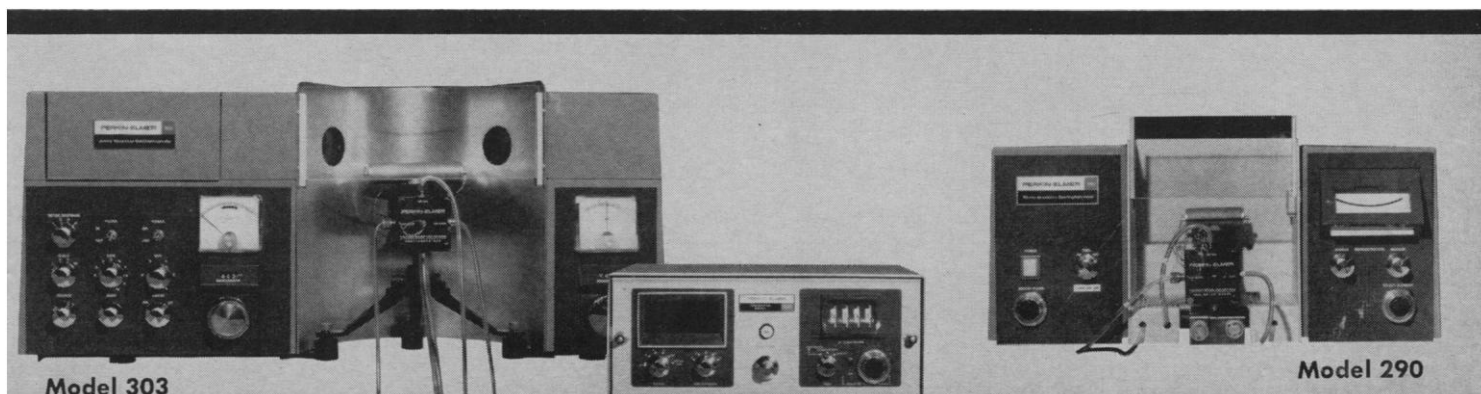
The Model 290 is a big instrument in a small container. A 50-inch optical path has been folded into a neat 25-inch package; detection limits are therefore equal to or better than those of much larger single-beam instruments. And the price for the complete instrument is only \$2900.

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Free training and literature: Subscriptions to the Atomic Absorption Newsletter, a bi-monthly technical journal, are available free on request. A summary of applications reprints can be obtained by writing for AA322. Instrument users receive free training courses in Chicago, Houston, Los Angeles, San Francisco, or Norwalk, Connecticut.

For details, including information on specific applications, write to the Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut.

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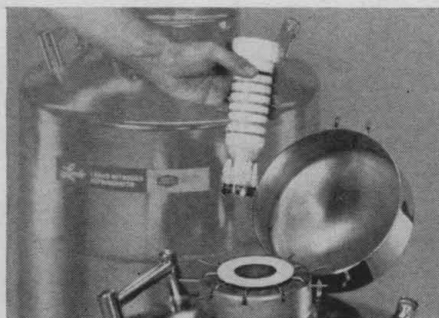
But specimen storage is only one function of the LR-35-9. Add a special necktube and freezer assembly, and you...

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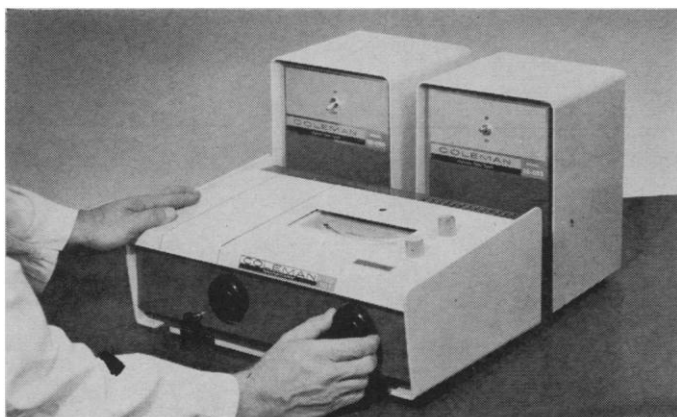
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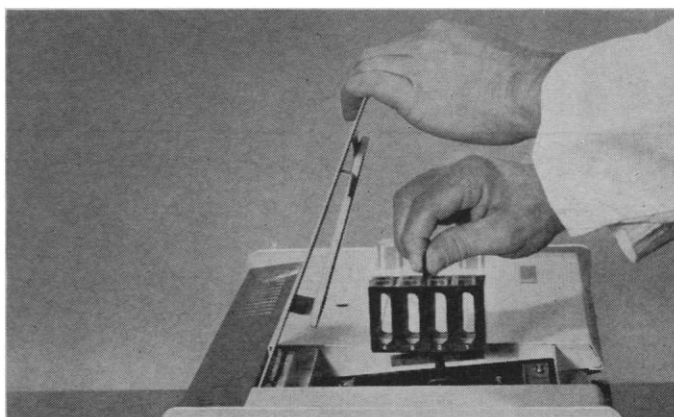
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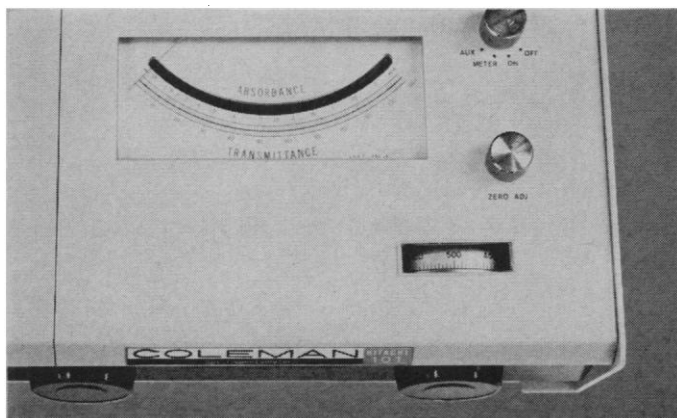
Coleman demonstrates an excellent instrument for barbiturate detection, enzyme analysis and a wide range of additional clinical and pharmaceutical applications.



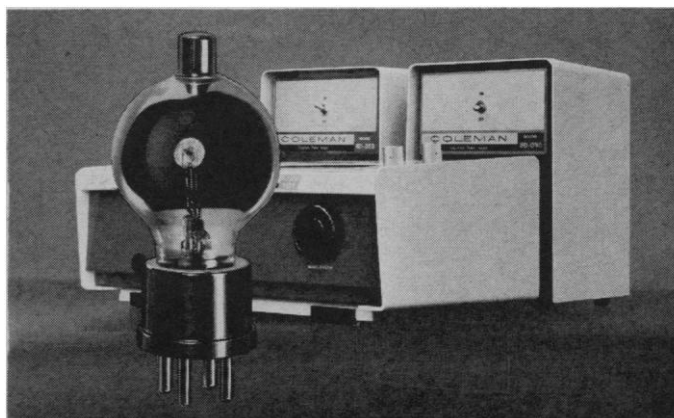
New Coleman Model 101 Hitachi Spectrophotometer covers the range from 220 to 900 $m\mu$, where 95% of all analytical spectrophotometric data is obtained. Its photometric accuracy and stray light characteristics are the equal of instruments costing twice as much.



Operation is simple. When you open the sample compartment, an interlock mechanism automatically protects the optical system. You insert the cell holder, containing reference and three sample cells, and adjust for zero without any further manipulations.



Then shut the compartment, set 100% T and run three determinations in rapid sequence without re-opening the sample compartment. Wavelength scale is linear. The digital wavelength readout is located right next to the transmittance/absorbance meter.



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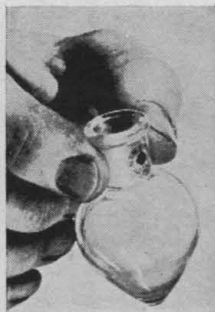
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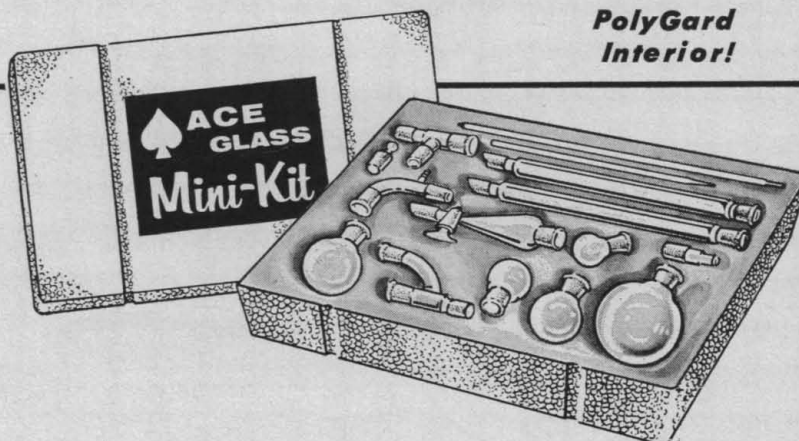
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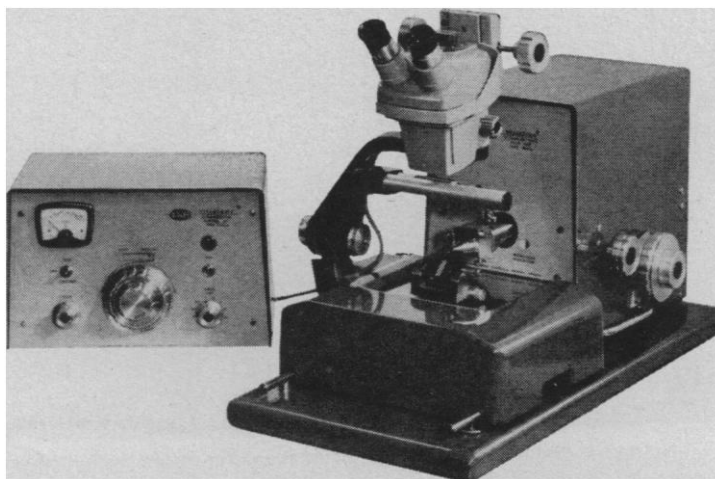
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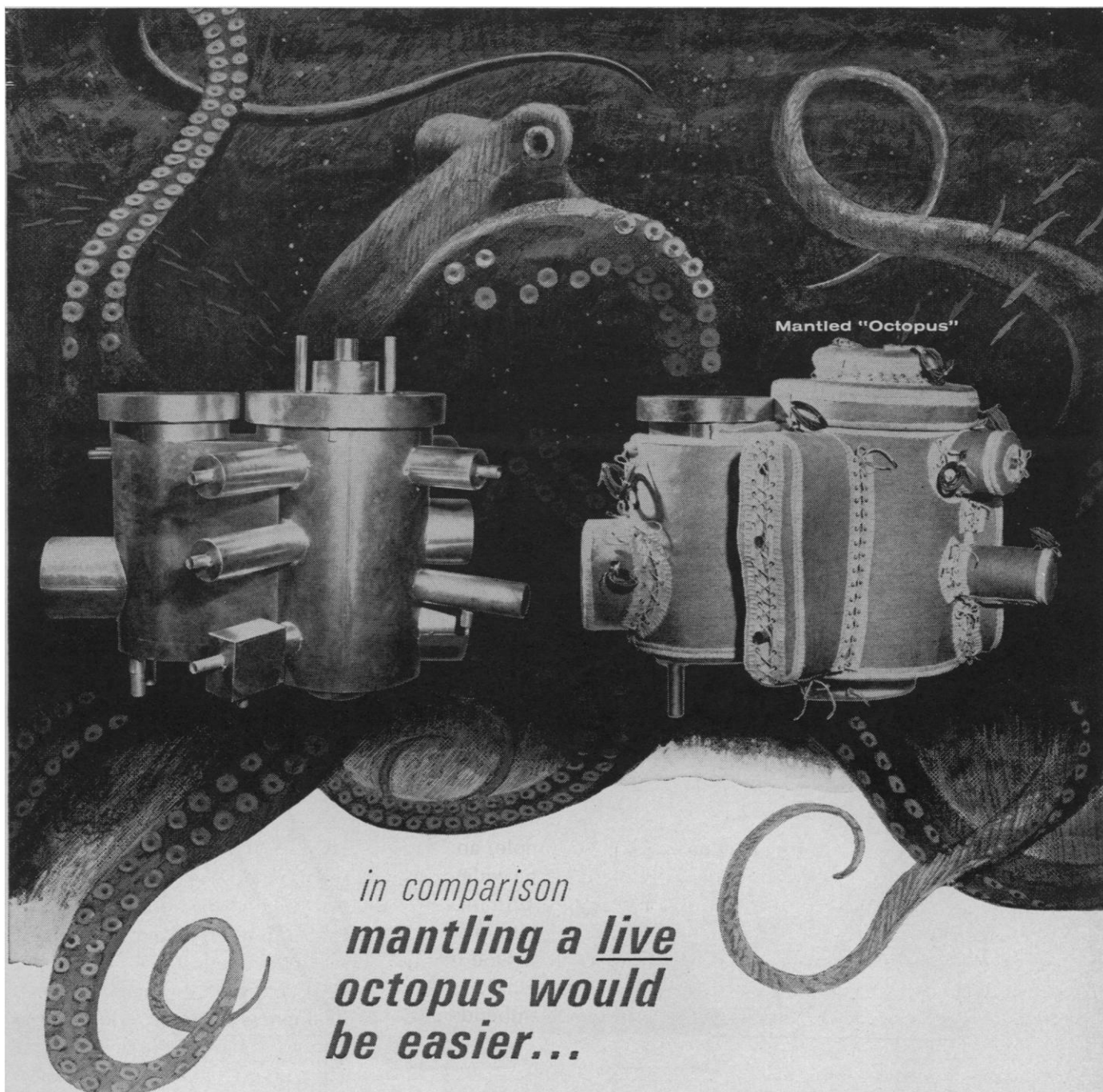
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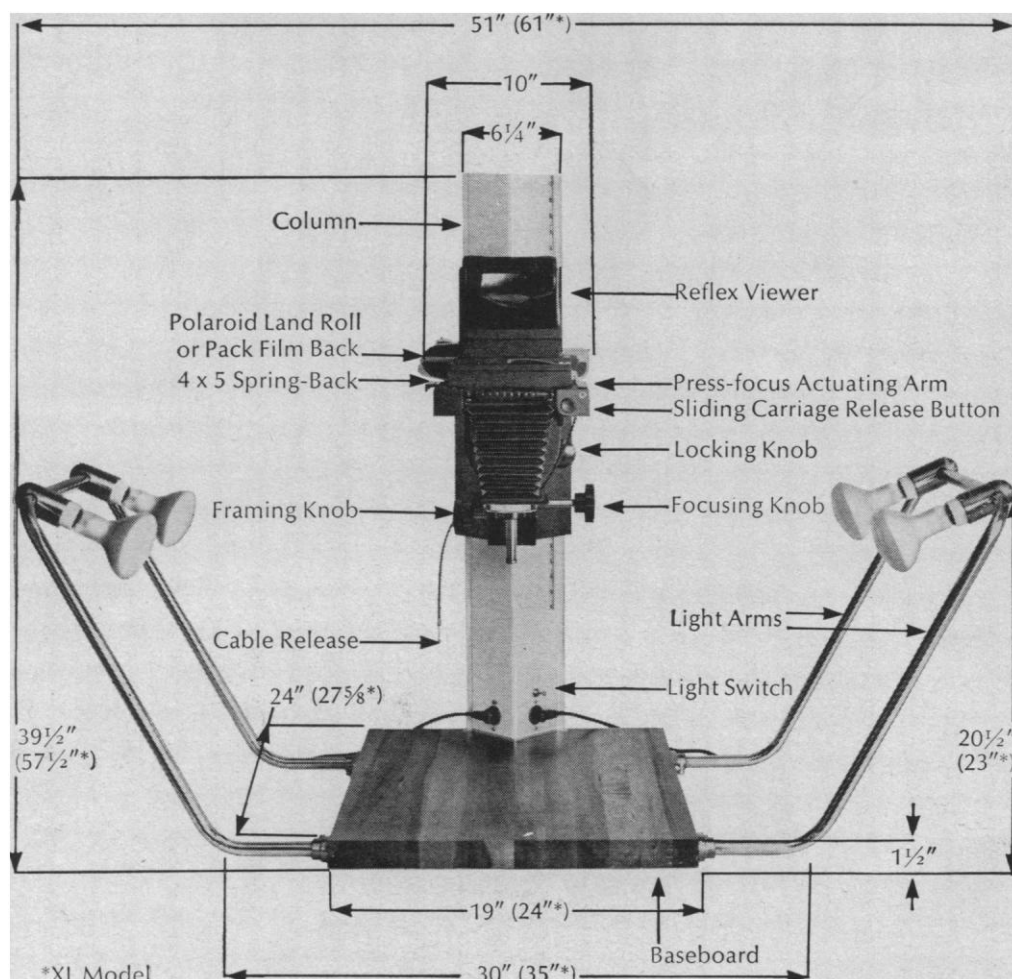
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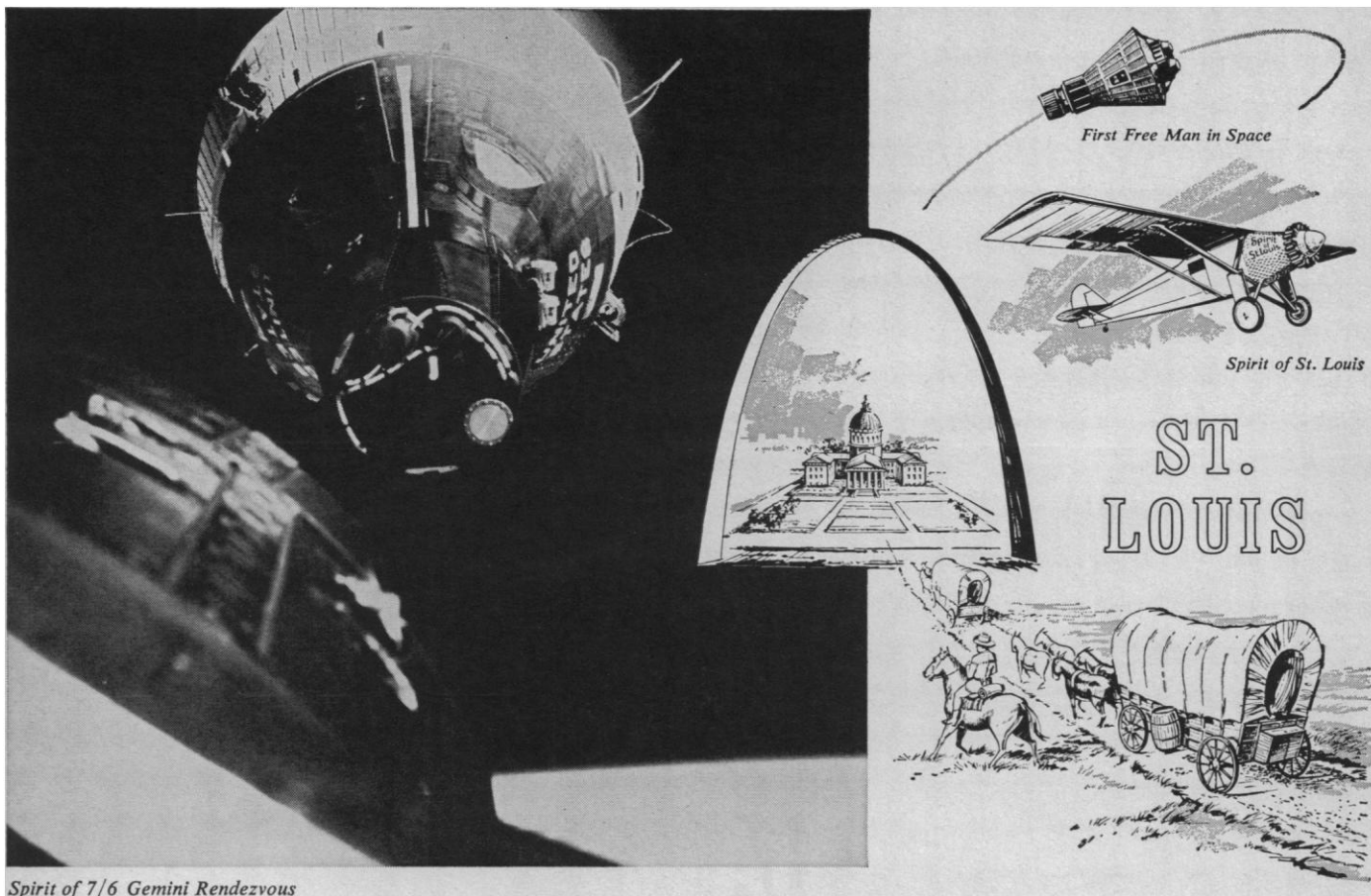


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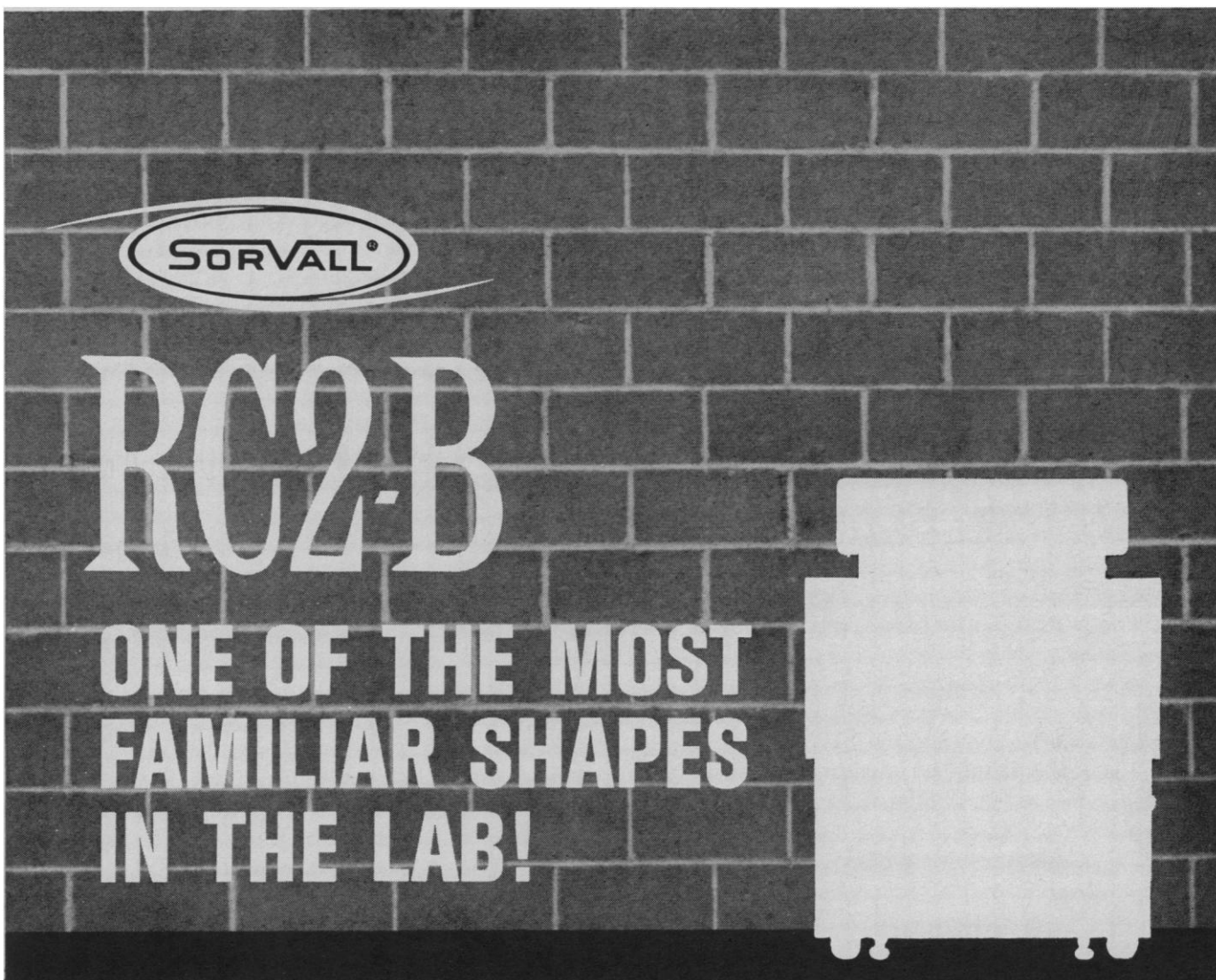
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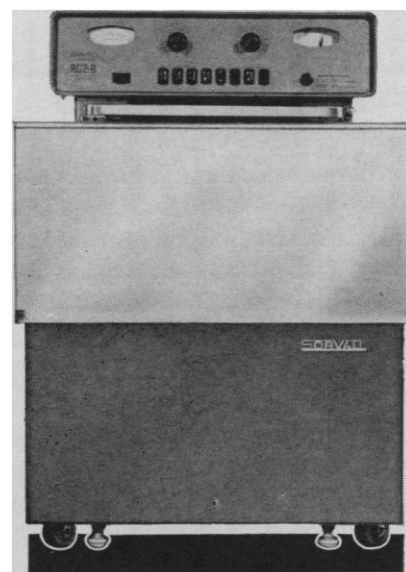


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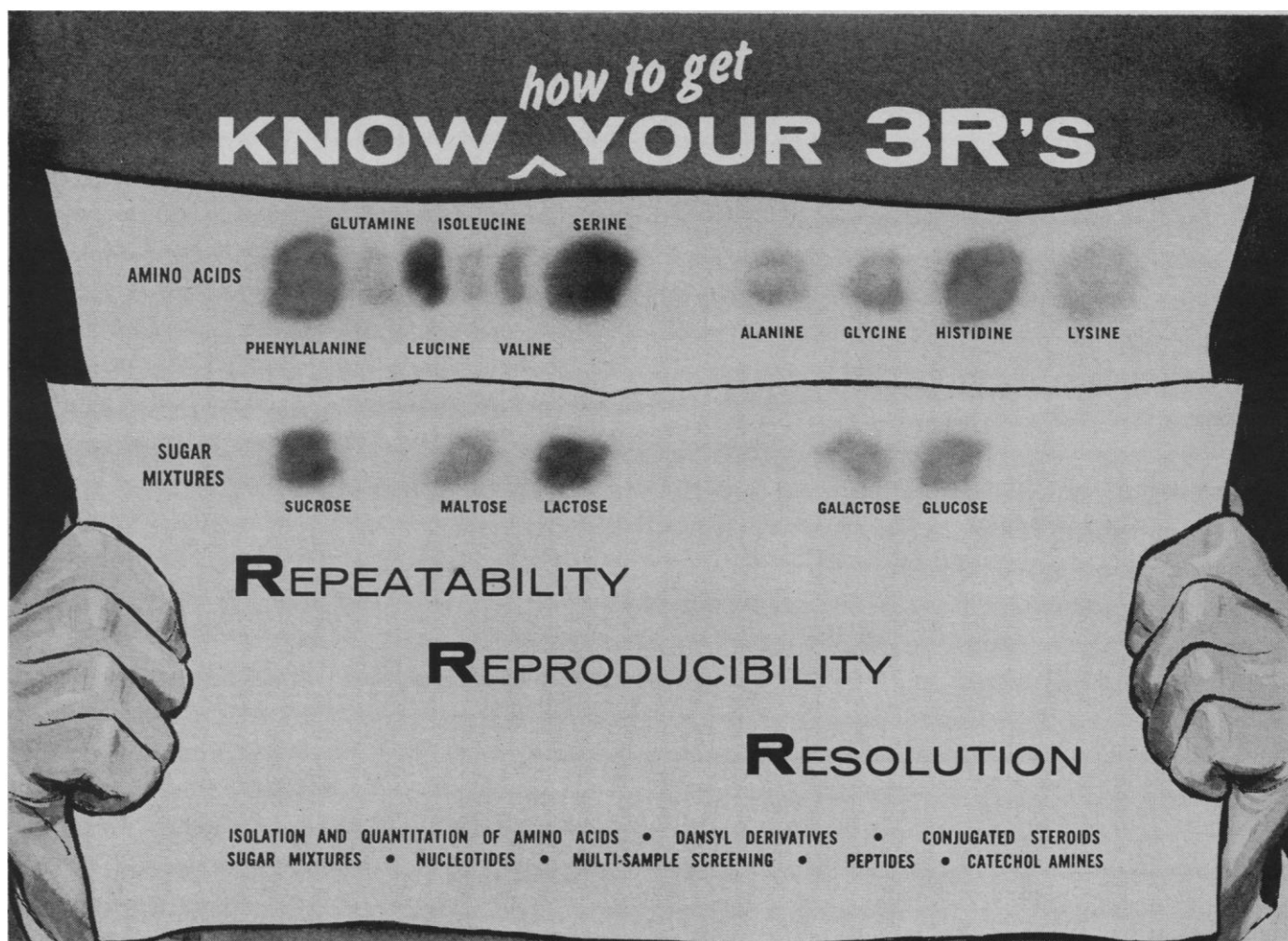
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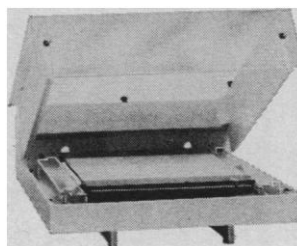


Research and Clinical **SAVANT STAINLESS STEEL CHANNEL FLAT PLATE ELECTROPHORESIS SYSTEM**

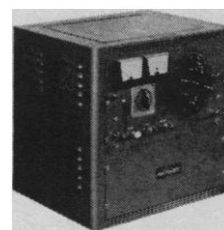
is an economical and time saving method for detailing large numbers of similar compounds. Recently a complete amino acid analysis was performed in an hour with a SAVANT SYSTEM using urine directly. A comparable method using other types of analyses would take at least 24 hours to run and interpret.

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MODEL FP-22A



MODEL HV-5000 POWER SUPPLY

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PAPER: 3MM — 10" Wide x 24" Long
VOLTAGE: 4000 Volts
CURRENT: Average 120 Milliampères
COOLING: 58°F Tap Water at One Gal. Per Min.
RUNNING TIME: 1 Hour
INSULATION: 5 Mil Mylar
PRESSURE: 3/8" Glass Pressure Plate

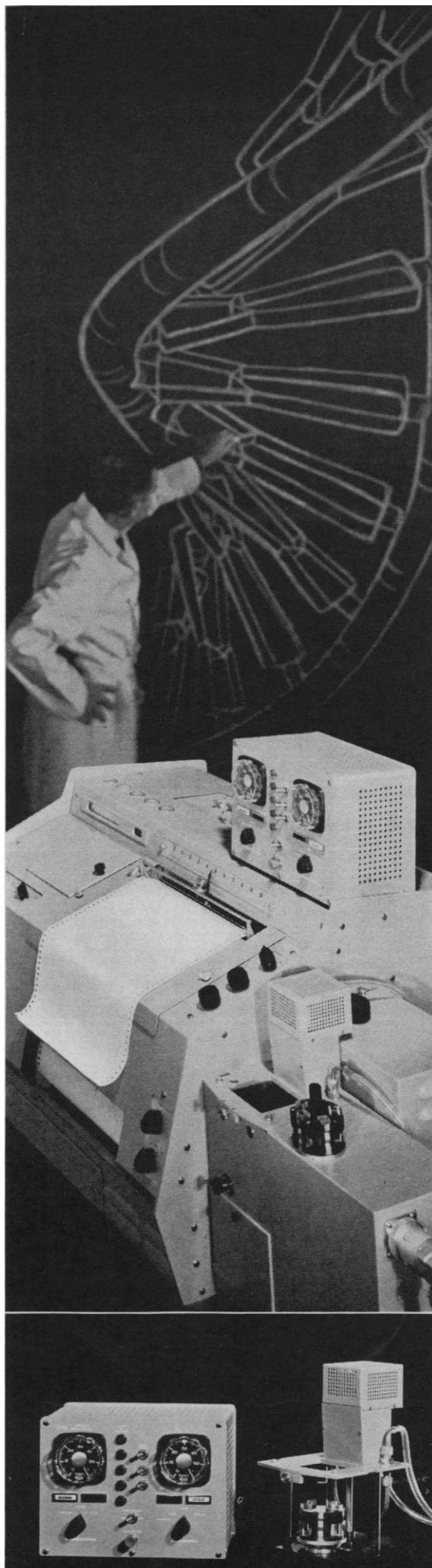
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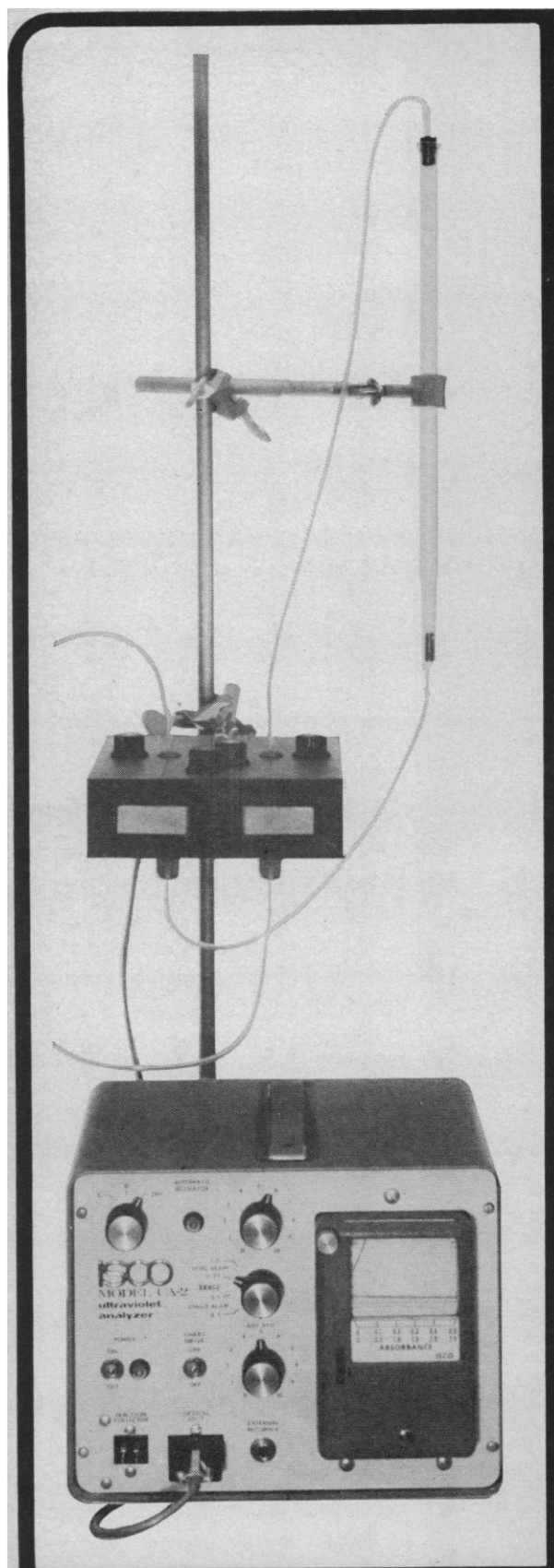
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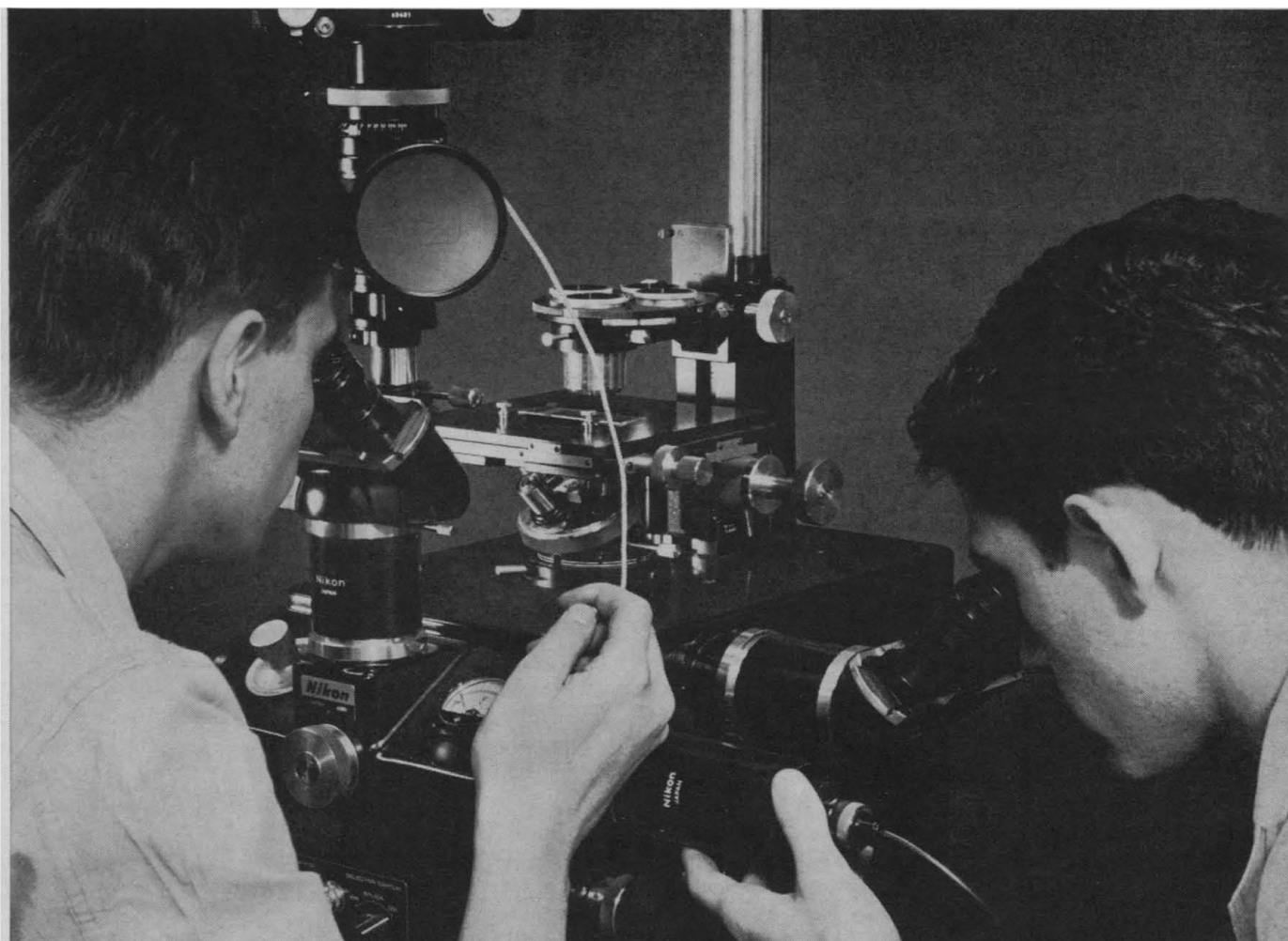
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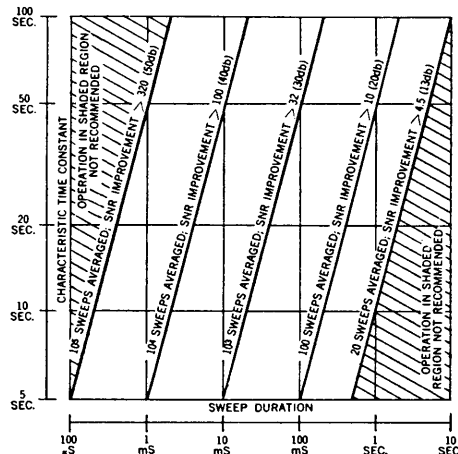
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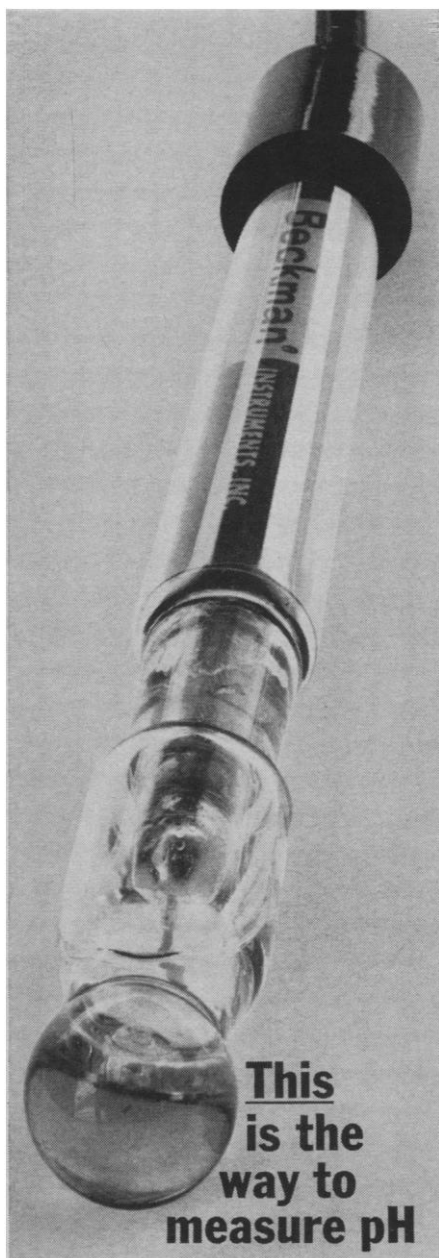
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References and Notes

1. *Ground-Based Astronomy, A Ten-Year Program* (National Acad. of Sciences, Washington, D.C., 1964).
2. See M. Hoskin, *Endeavour* **23**, 18 (1964).
3. G. Reber, *J. Geophys. Res.* **64**, 287 (1959).
4. H. Hoover, *The Memoirs of Herbert Hoover: Years of Adventure, 1874-1920* (Macmillan, New York, 1951), p. 132.
5. G. Reber, *J. Franklin Inst.* **281** (1966).
6. J. R. Oppenheimer, in *Symposium on Basic Research*, AAAS Publ. No. 56, D. Wolfe, Ed. (AAAS, Washington, D.C., 1959), p. 11.
7. G. Reber, *Castanea* **25**, 122 (1960).
8. R. Leighton, R. Howard, H. Zirin, *Science* **147**, 1087 (1965).
9. G. Reber, *IEEE Trans. Military Electron.* **8**, 257 (1964).

Conservation of What?

I heartily agree with P. T. Flawn ("Geology and the new conservation movement," 28 Jan., p. 409) that the absence of geologists from today's conservation groups is unfortunate. It is also unfortunate that the training of geologists, foresters, wildlife biologists, and others who can contribute to conservation is usually deficient in the humanities and the social sciences. . . . The conservation movement is severely handicapped by a shortage of men of broad vision. . . .

Flawn criticizes "preservationists" as being unrealistically "opposed to change." But preservation of non-economic values has its place along with sensible exploitation of natural resources. It is shortsighted to say, as Flawn does, "The preservation of an old building simply as an architectural and historical monument in the midst of a growing city where there is great demand for space can hardly be justified unless the building can be converted to serve a useful purpose as well as being a monument. This is multiple use." In this sweeping statement, the University of Texas professor says, in effect, that the Alamo in San Antonio is useless, that it should either be destroyed or converted into—for example—a shopping center. Can a dollar value be placed on the Alamo? It is a priceless shrine to patriots who died for the sake of Texas liberty. Texans unborn deserve the opportunity to visit the Alamo. As a citizen of Illinois, I would gladly pay taxes to preserve the Alamo. Illinois has some old buildings, too. How much is the Lincoln home in Springfield worth? The house is near the state capitol, and the site would be desirable for an office or an apartment building. Would its destruction be progress? Would the destruction of the Acropolis in Athens and the construction of a hotel on its site be

progress? How about Mount Vernon as the site of a sewage treatment plant, and Independence Hall as an office building? Wouldn't historians and architects be better qualified than geologists or economists to judge the importance of such buildings and sites?

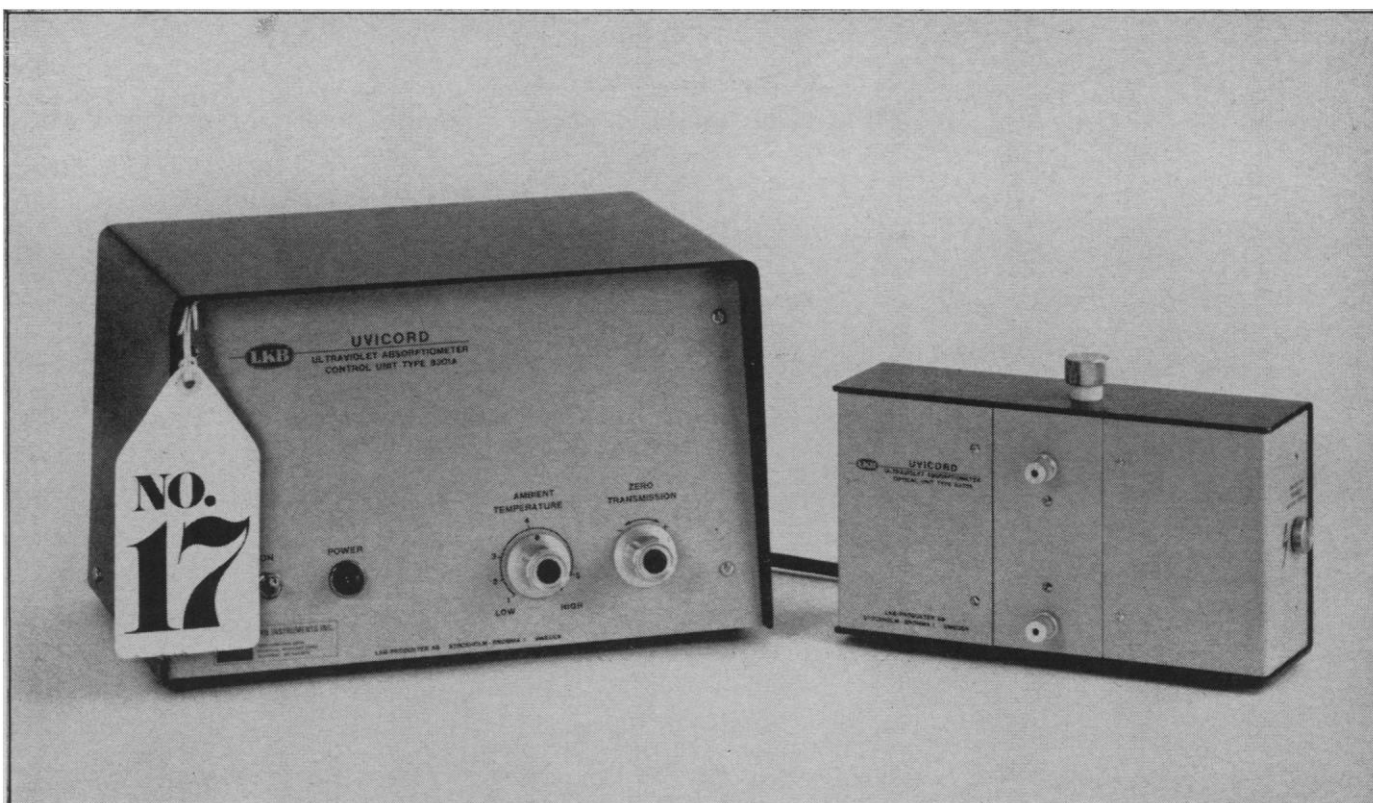
Flawn continues, "Likewise, preservation of a potential rock-quarry site as a woodland glade constitutes elimination of a valuable mineral resource and costs society a substantial amount of lost tax revenues and lost payroll." But doesn't the value of the glade depend also on its botanical and ecological significance? Who is better qualified to judge the importance of a particular woodland glade, petroleum geologists or a team of plant ecologists, plant taxonomists, landscape architects, and park planners? Gravel pits are needed, but so are woodland glades, especially near centers of population. Certainly the redwoods of California could be eliminated to someone's profit. Grand Canyon can be converted to Grand Lake and enhance the real estate market in Central Arizona. . . .

The starving and impoverished, to be sure, can have little interest in esthetics. In conservation, as in other large problems, there are no short cuts to wisdom. We need master planning for resource use on the international as well as a local scale. But man's future does not rest upon economic expediency alone. We need to define and practice what the late Aldo Leopold referred to as the land ethic. Both tangible and intangible values must be considered. Why shouldn't we be willing to pay a price for the preservation of beauty, of flora, fauna, and geological wonders, and of reminders of history, all of which enrich the quality of man's existence?

H. E. WEAVER

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. . . Flawn picks a questionable example to illustrate what he refers to as "the multiple-use concept." Discussing the choice between preservation of a woodland glade and operation of a rock quarry, he writes: "In line with the multiple-use concept, the rock could be quarried over the economic life of the deposit and thereafter the area could be landscaped and restored for other uses." What he proposes is not multiple use; it is one kind of use followed by another kind of use, and



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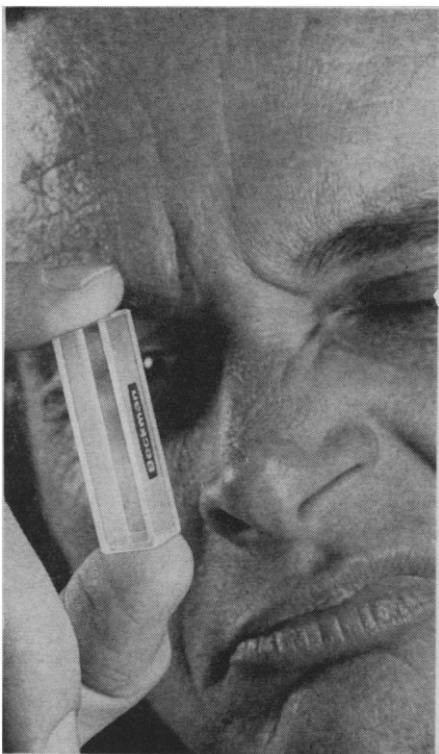
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in the process the original woodland glade would be destroyed.

The criticism may seem carping and picayunish, but it has a most serious purpose. In this hypothetical case, as in most actual cases, a selection must be made from among conflicting uses. By no stretching of the imagination can the choice of one at the expense of others be made to constitute "multiple" use. The so-called "preservationist" point of view rests pretty strongly on this basic fact. Supporters of the multiple-use idea promise something for everyone; "preservationists" are only too well aware that this is an impossible goal.

CHESTER B. BEATY

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. . . While on some points Flawn questions the continued serviceability of our private-property system, he seems to me too orthodox in uncritically accepting much of the economic mythology of valuation and growth. For example, the objection to "locking up" space in the face of economic demand by preserving an old building (it is easy to stretch this outlook to local parks, bird sanctuaries, and the like), and the complaint about "lost tax revenues and lost payroll," should be extended to the speculative holding of land, which keeps much more acreage out of use. And in an age when a single 4- by 6-foot Rembrandt seems worth \$2,300,000 to the trustees of an art museum (all of them hard-headed businessmen), who is to say how much we can or cannot afford for open space?

Flawn says, "Although conservation is frequently defined as effecting a harmony or balance between man and his environment, such a goal can never be achieved in an industrial environment. . . ." I challenge this notion. Our consumption of raw materials, as Flawn recognizes, need not disfigure the landscape. Government can, without assuming "complete authority" in planning, foster better use of the land than our "accidental century" (see Michael Harrington's 1965 book of the same name) has so far produced. The government's role is to set limits. The mining of Texas of oyster-shell reefs which Flawn describes is an excellent example of why more far-sighted policy by industry, the states, and the federal government is needed. The uses to which the shell is now being put—

chemicals, aggregate, and road base—are all lower uses; the highest use, now being disregarded, is biological productivity. These shallow Gulf Coast bays are indispensable as producers of shrimp, finfish, and shellfish; great colonies of colorful birds depend on them; and these resources, whether labeled business, sport, tourism, or pleasure, are worth more to society in the long run than whatever return the liquidation of the shell banks is bringing to a few politicians and a small segment of the industry. If the dredges are allowed to finish excavating, these bays will become sterile sinks, because deep water is relatively unproductive. The tragedy of shortsightedness is that we could have both kinds of products from the bays; not, however, if the cost of mammoth dredges has to be amortized within a few months!

ROLAND C. CLEMENT

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1130 Fifth Avenue, New York 10028*

. . . A major obstacle to conservation is the lack of understanding by the general public and by political leaders of the nature of economic growth. It is generally assumed that economic growth is always good and that a decreasing rate of growth is bad. . . . Progress is measured largely by the rate at which physical goods increase. This assumption may have been valid in the past for the major industrial nations, and may still be valid for the underdeveloped nations. But it needs more careful scrutiny in the light of what we know about the nature of the growth process. . . . If we blindly insist upon maintaining a constant rate of economic growth and use of natural resources on the present basis, we practically guarantee an "explosive" situation. Not only does a constant rate of growth of production entail consumption of raw materials and energy at an explosive rate, but along with that go production of pollutants and other adverse alterations of the environment at explosive rates. The situation is even worse if population also grows explosively—that is, at a constant rate.

Thus, in a broad sense conservation implies reexamination of some long-cherished goals and values of our society. Some activities, such as producing and riding in two-ton cars, are enormously wasteful of probably irreplaceable raw materials and energy. Other activities, such as reading books, watching plays, dancing, art, music, en-

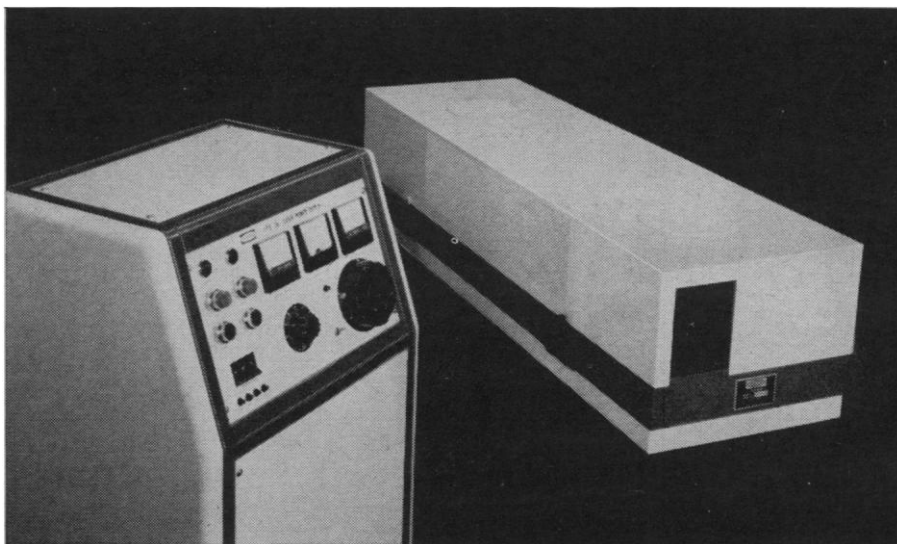
tail very small use of matter and energy. Perhaps we should begin to designate a conservation index for various activities—high indices for activities that imply little use of resources, and low indices for those that are wasteful of matter and energy. Increased efficiency of production and use will help, obviously, but we must also begin to encourage participation by consumers in those activities that have a high conservation index. Certain economic activities—production of food, water, and shelter—should, obviously, have high priorities. War and production for war are, of course, the most wasteful of all activities, since they consume raw materials and energy without any basic contribution to human welfare. . . . Some may believe, as a matter of faith, that scientists can solve any problems that arise, so long as they are given enough money. Many scientists are becoming increasingly uncertain that they can fill the bill. The world is finite and its resources are finite.

HY RUCHLIS

160 Parkside Avenue,
Brooklyn, New York 11226

. . . I commend Flawn for presenting many important conservation ideas in his addresses before organizations made up of individuals who may have relatively little understanding of the concepts. But he errs in saying that the rape of the Appalachian coal fields, which conservationists criticize today, all took place 50 years ago. Conservationists are rightly protesting the very recent forms of exploitation based on the use of large, modern earth-moving equipment.

I would like to point out a few ways that geologists might actually aid in conservation of man's environment. Our profession can and should point out the lack of judgment often exhibited by state and federal agencies in locating and building dams on sites chosen for political motives. We should advise on proper watershed management as a means of permanent flood control that would eliminate dependence on temporary check-dams and reservoirs. Local, state, and federal planning agencies are badly in need of scientific advice on land use, and geologists can make a major contribution to this. They can counsel against extensive construction on unstable substrates or areas subject to rare but devastating flooding. Existing forest practices, carried out without regard for



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the long-term effects of soil-cover destruction and concomitant flooding, are seriously in need of revision in the state of California and other areas; geological opinions and facts are needed to help formulate effective legislation. In short, the geologist should have the ability to see the temporal position of mankind and his fellow organisms in the total environment of the surface of this planet, and he, above all, should advise his fellow men of their role in this evolving, dynamic interplay.

I am pleased to learn that the theme of the AAAS meeting in Washington this year will be conservation. Before that meeting, let us at least try to agree on a definition of that term.

ROBERT R. CURRY

*Department of Geology and Geophysics,
University of California, Berkeley*

Flawn has done a service both to geologists and to conservation in pointing out that "geologists are conspicuous by their absence from today's natural-resource planning groups, local, state, and federal . . . [perhaps because] geologists are regarded in government circles as champions of the mineral industry, rather than as conservationists." The same could be said of mining and petroleum engineers, probably because, as Flawn notes, "There is a disturbing aspect of the new conservation movement in that the extractive industries and the mineral industries in particular are regarded as rapacious despoilers and looters of the nation's resources." The use of this vituperative vocabulary to disparage the development of resources by American private enterprise for the use of the American people, and thereby to promote government control, has been going on for a long time. The intention to use the conservation movement to bring about what most dictionaries call socialism was clearly stated in Gifford Pinchot's article "Breaking new ground," published some 40 years after the famous 1908 White House Conference on Conservation (and reprinted as "What it all means" in *Readings in Resource Management and Conservation*, I. Burton and R. W. Kates, Eds., Univ. of Chicago Press, 1965). Pinchot said: "Conservation is the application of common sense to the common problems for the common good. Since its objective is the ownership, control, development, processing, distribution, and use [emphasis mine] of natural resources for the benefit of the

people, it is by its very nature the antithesis of monopoly." Many sound and sincere conservationists, including geologists and engineers, want no part of the scheme to use the conservation movement to socialize natural resources.

Geologists and engineers have done a spectacularly effective job, without publicity in conservation literature. It is no coincidence that there have been adequate oil and other mineral supplies for the 20th-century wars and for the maintenance of the economy in the meanwhile. It has been due to the operation of the scientific, engineering, executive, and technological talents and skills of the most capable discovery and development personnel in the world—almost all in private industry. Transfer of access to undiscovered mineral resources from this capable body to "resource managers" or government agencies by wholesale segregation of land under the mining and leasing laws could be a national catastrophe.

The Multiple Use Act (Public Law 88-607, 19 Sept. 1964) might be interpreted to do just that. Parts of section 1 provide for the Secretary of the Interior to determine which lands "shall be retained . . . in Federal ownership and managed for . . . mineral production." Section 4 provides that classification for retention "shall have the effect of segregating such land from . . . disposal under . . . the mining and mineral leasing laws. . . ." The Multiple Use Act is temporary, enacted "pending the implementation of recommendations to be made by the Public Land Law Review Commission." Flawn's alert regarding the absence of mineral exploration and development experts from high conservation councils is most timely. The portents of government management are indeed ominous. Geologists, engineers, and everybody else, including the Public Land Law Review Commission, need to be aware of this potential for nullifying the most successful land policy in all history.

WILLIAM W. PORTER II

*244 South Gramercy Place,
Los Angeles 4, California*

Linear Algebra: Teacher's Problem

I am a physicist with the usual sort of background in mathematics and am teaching mathematics to high school students. It has been my observation

that to many high school and beginning college students, too intelligent to be ignored, "pure mathematics is to applied mathematics as crossword puzzles are to literature." These potential users of mathematics need to see mathematics work, in order to appreciate it and be excited by it.

In group theory and in linear algebra, which are now beginning to come into high school math, and particularly in the teaching of matrices, I have been able to find very few significant applications which do not require extensive training in other disciplines in order to be understood. One tells the student that matrices, for example, are indispensable in many fields in order to avoid a quagmire of symbols. Can this be demonstrated in applications that are reasonably easy to understand?

I should be grateful for suggestions in whatever field of application, showing the significance and use of change of basis, matrices, linear transformations, and group theory. Details, please.

R. K. JARVIS

*Groton School,
Groton, Massachusetts*

AAAS Election System

The news (18 Feb., p. 843) that the Council of AAAS defeated a constitutional amendment which would have given all Fellows the privilege of electing officers of the association will surely be greeted by many with surprise and disappointment. It has sometimes been claimed that the association is a democratic organization, but terms must be carefully scrutinized when it is realized that the members of the council, who now retain all elective power in addition to their legislative power, are usually appointed.

It is a remarkable feature of the contemporary scene that in a country whose institutions offer many notable examples of democracy, the one scientific organization which seemingly has the potentiality of becoming an authentic representative of American science, by the criterion of popular election by a qualified constituency, chooses to reject that opportunity. If we knew the reasons for this action, we might have significant clues to the contemporary scientist's approach to the problems of power and responsibility.

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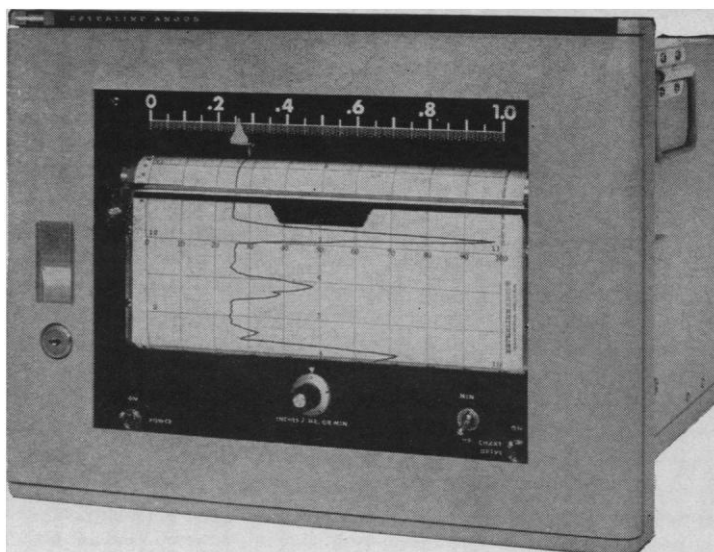
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Peaceful Uses of the Earth's Atmosphere

An experiment for observing the world's weather—continuously, in three dimensions, all over the globe—has recently been proposed in a report of a National Academy of Sciences panel headed by Jule Charney of M.I.T.* The development of such a system, for experimental and operational purposes, is now being vigorously explored by the Environmental Science Services Administration and the World Meteorological Organization. The system is to be called the World Weather Watch. Charney and his associates are cautiously optimistic that, given adequate worldwide data and improved computers, weather forecasting can be upgraded in quality and extended in range. They envision 2-week forecasts of the accuracy now possible for 2- to 3-day predictions. The report gives substance to an old and shining dream of John von Neumann, who saw in applications to the atmosphere the full justification of the science of modern computers.

There are three critical elements needed to satisfy the dream: (i) repeated global weather observations at various atmospheric levels; (ii) a fast, worldwide, high-capacity communication system; and (iii) a computer of enormous capacity and great speed, containing an adequately realistic "numerical model" of the atmosphere. Some of the more modest components are already being tested.

There would be enormous rewards from even a few months of pilot operation of such a global weather system. It would almost surely bring progress toward more accurate, longer-range forecasting and toward understanding the interactions of atmospheric motions and processes on many scales. With such high stakes, an IGY-like international effort is clearly justified.

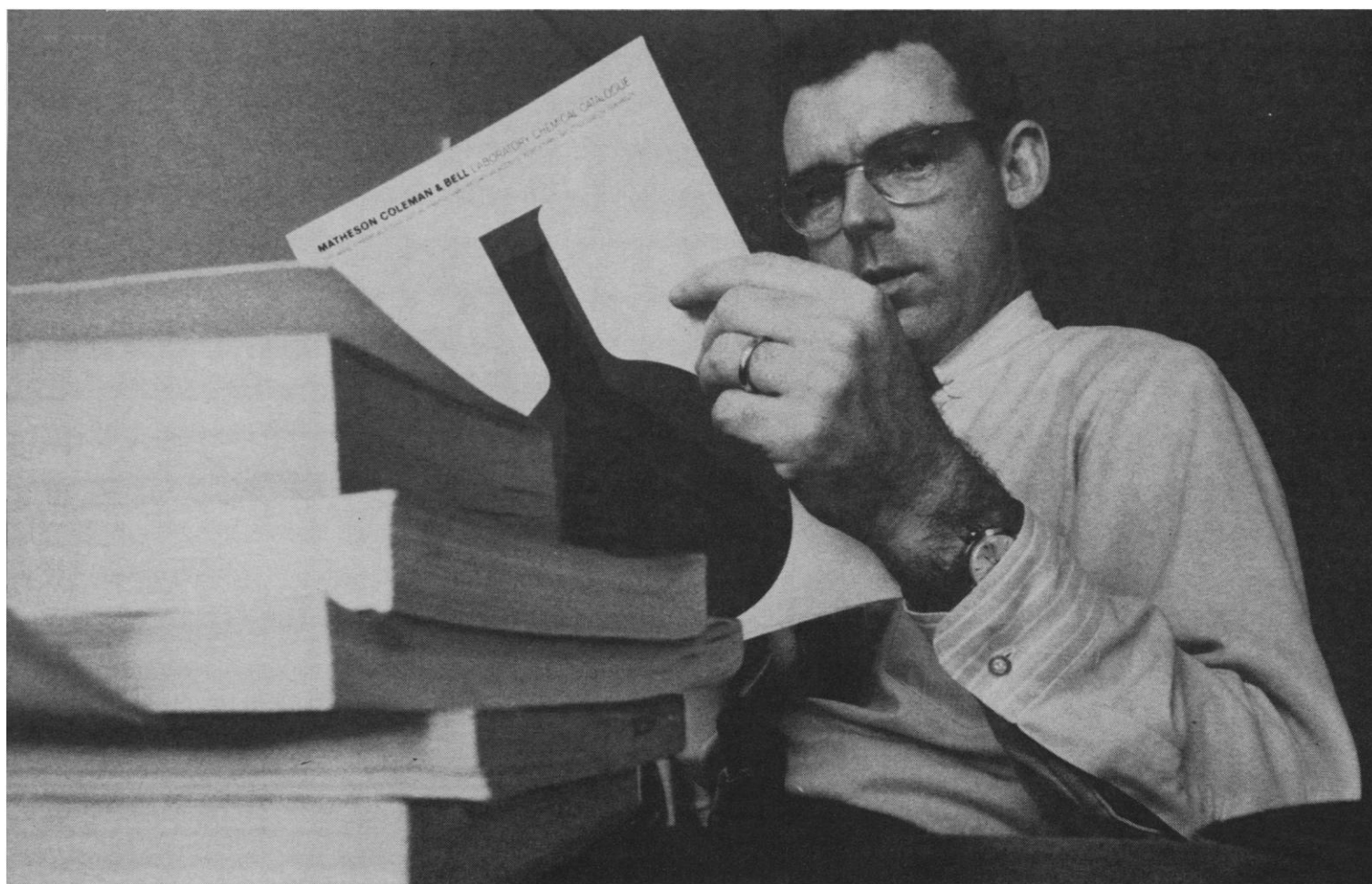
But there is a dimension to the World Weather Watch that is far more sweeping in potential. It is also far more speculative, and it is only vaguely hinted at in the report. With the World Weather Watch data, and with an adequate computer and a global mathematical model, a vast array of experiments on weather and climate modification can be "performed" by numerical computation rather than in nature. The beneficial consequences can be evaluated and compared to the expected costs. The full effect and the potential hazards can be determined without risk to life and property. For example, a dam can be "built" across the Bering Strait for an infinitesimal fraction of its real-life cost, and we can evaluate its effect on the Kamchatka or Canada wheat-growing season without actually taking the risk of unforeseen adverse effect, or of no effect at all. We can model a megalopolis and its atmospheric cesspool, examine the extent to which it acts as an inadvertent weather modifier, then "clean up" the atmosphere and see the difference. We can do this without taxes, political strife, vast engineering expense—in a computer.

Weather and climate modification, if achieved, will surely have effects that transcend international boundaries. For this reason, research on them should be conducted under international auspices. When we come to understand the extent of public benefit or hazard involved, the nations of the world will then be in a far better position to exploit or control both. Global weather modification is, in potential for benefit or destruction, the analog of atomic energy; if we can develop it under cooperative international sponsorship and with participation of scientists of many nations, then perhaps we can guarantee that it will be used solely under international sanction and exclusively for beneficial, peaceful uses. No lesser goal should guide our nation's participation in the World Weather Watch.—WALTER ORR ROBERTS, Director, National Center for Atmospheric Research, Boulder, Colorado

* "The Feasibility of a Global Observation and Analysis Experiment," *Nat. Acad. Sci.-Nat. Res. Council Publ.* 1290 (1966). \$4.

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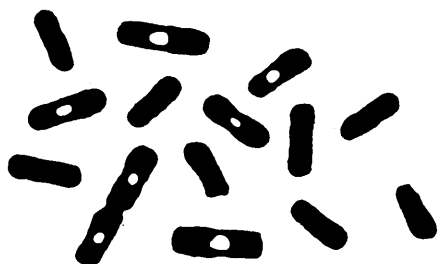
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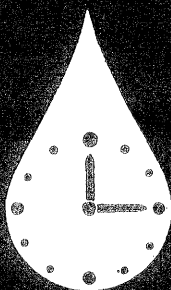
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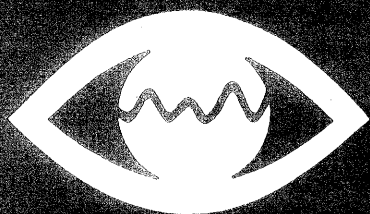
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were similarly prepared. After 4 days, precipitates were found in capillaries containing the fraction from glial cells but not in tubes containing the neuron fraction.

Using fluorescent-antibody technique with frozen cell samples, Hydén found S100 localized in the nuclei of glial cells and in scattered spots of the membrane system. By this means he also found S100 in the nuclei of nerve cells. Because the nucleus amounts to only about 3.5 percent of the mass of this nerve cell, nuclear concentration of S100 did not show up in precipitation analysis.

Does S100 move from glial nuclei to the nuclei of nerve cells? If so, this unidentified protein might be an inducer substance (1).

Acetylcholine Esterase Studied

Some workers have reported that norepinephrine is a transmitter in the reticular formation of the brain stem. Others have reported that acetylcholine is the transmitter in reticular pathways. Most of these reports have come from electrophysiologists; few biochemical studies have been made.

Rudi Pavlin, Ljubljana University, Yugoslavia, told the symposium that he used a new magnetic microdiver technique (2) to study choline esterase activity in single nerve cells and in clumps of glial cells dissected from reticular nuclei of rat. The dissection was made according to the method of Hydén, with whom Pavlin had worked earlier. In most experiments the giant cells from the nucleus reticularis pontis caudalis were used. Certain nerve fibers descending from the cortex and the corpus striatum terminate in this nucleus. The microdiver technique was described at the symposium by one of its inventors, Miro Brzin, also of Ljubljana University (2).

Pavlin said he found evidence of active choline esterase in all cells examined. Enzyme activity of single cells from the same nucleus varied widely, but he found no correlation of activity with either cell volume or cell surface.

Acetylcholine and three higher choline esters are known to occur in rat brain. Selective esterase inhibitors were used to measure, differentially, enzyme activity specific for each choline ester.

In young rats, acetylcholine esterase activity is higher in glial cells than in neurons, Pavlin said. After 80 days of

life, acetylcholine esterase activity had increased by 300 percent in neurons and by only 10 percent in glial cells.

In other experiments Pavlin studied LSD as a possible inhibitor of acetylcholine esterase. While LSD in low concentration inhibited hydrolysis of acetylcholine in homogenates of brain stem tissue, inhibition in single nerve cells was found only at concentrations higher than 20 micromoles per liter. Since concentrations used to produce the LSD effect in humans are much lower, inhibition of acetylcholine esterase in the brain stem can probably be ruled out as the mechanism of LSD effect.

Pavlin said he will develop the microdiver technique to study the action of several enzymes operating simultaneously in a single nerve cell. Further work by this and other techniques, he said, might lead to the "recognition that both cholinergic and adrenergic fibers terminate in the same neuron."

The above is only a sampling of a rich program. The full report of the symposium will be published by the Foundation.

T. L. CAMPBELL

AAAS

References and Notes

1. For a full report of this work, see H. Hydén and B. McEwen, *Proc. Nat. Acad. Sci. U.S.* **55**, 354 (1966).
2. The magnetic microdiver is described in Brzin, Dettbarn, Rosenberg and Nachmansorn, *J. Cell Biology* **26**, 353 (1965).

Forthcoming Events

April

15-16. Iowa Acad. of Science, Pella. (G. W. Peglar, Dept. of Mathematics, Iowa State Univ., Ames)

15-16. Minnesota Acad. of Science, annual mtg., Macalester College, St. Paul. (W. Larson, The Academy, 3100 38th Ave. S., Minneapolis 55406)

15-16. Montana Acad. of Sciences, Missoula. (L. H. Harvey, Univ. of Montana, Missoula 59801)

15-17. American Soc. of Internal Medicine, New York, N.Y. (A. O. Whitehall, 3410 Geary Blvd., San Francisco, Calif.)

16-18. Lateral Line Detectors, intern. conf., New York, N.Y. (P. H. Cahn, Stern College, Yeshiva Univ., 253 Lexington Ave., New York 10016)

17-20. Electron and Ion Beam Science and Technology, 2nd intern. conf., American Inst. of Mining, Metallurgical, and Petroleum Engineers, New York, N.Y. (H. N. Appleton, 345 E. 47 St., New York 10017)

18-19. American Otological Soc., San Juan, P.R. (W. H. Bradley, 1100 E. Genesee St., Syracuse, N.Y.)

18-20. Thermodynamics of Ceramic



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Systems, mtg., London, England. (J. P. Roberts, British Ceramics Soc., Houldsworth School of Applied Science, Univ. of Leeds, Leeds 2, England)

18-20. **Technical Microbiology**, symp., Berlin, Germany. (S. Windisch, Inst. für Gärungsgewerbe, Seestrasse, 13, 1 Berlin 65)

18-20. **Structures and Materials**, 7th conf., Cocoa Beach, Fla. (R. W. Leonard, NASA-Langley Research Center, Mail Stop 188C, Langley Station, Hampton, Va.)

18-21. **Aerospace Medical Assoc.**, 37th annual scientific mtg., Las Vegas, Nev. (C. A. Berry, Chief of Center Medical Programs, NASA-Manned Spacecraft Center, Houston, Tex. 77058)

18-21. **International Scientific Radio Union**, U.S. natl. committee, mtg., Washington, D.C. (USNC-URSI, 2101 Constitution Ave, NW, Washington, D.C.)

18-21. **Tectonic Levels in the Earth's Crust**, intern. symp., Neuchatel, Switzerland. (J.-P. Schaer, Dept. of Geology, University, 11 rue Emile Argand, 200 Neuchatel)

18-22. **American Assoc. of Corrosion Engineers**, 22nd annual mtg., Miami Beach, Fla. (N. E. Hamner, The Association, 980 M&M Bldg., Houston, Tex.)

18-22. **Applications of Liquid Fuels**, conf., Torquay, England. (Inst. of Fuel, 18 Devonshire St., Portland Pl., London, W.1, England)

18-22. **American College of Physicians**, New York, N.Y. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia 4, Pa.)

19-22. **American Geophysical Union**, 47th annual mtg., Washington, D.C. (W. E. Smith, AGU, 1145 19th St., NW, Washington, 20036)

18-23. **International Soc. for Photogrammetry**, technical commissions, Munich, Germany. (G. Krauss, Deutsche Gesellschaft für Photogrammetrie, Waase-
mstr. 19-21, Bad Godesberg, Germany)

19-21. **Frequency Control**, 20th annual symp., U.S. Army Electronics Command, Atlantic City, N.J. [Director, Electronics Components Laboratory, U.S. Army Electronics Command, Attn: AMSEL-KT-ST (M. F. Timm), Fort Monmouth, N.J. 07703]

19-22. **Microwave Communications**, 3rd colloquium, Budapest, Hungary. (Valko Peterne, Szabadsag ter 17, Budapest)

19-23. **Scientific and Technical Books and Journals**, 2nd intern. exhibition, Paris, France. (F. Retailiau, Intern. Exhibition of Scientific and Technical Books and Journals, 117 Blvd. St. Germain, Paris 6)

20-22. **Institute of Electrical and Electronics Engineers**, southwestern conf., Dallas, Tex. (R. Carrel, Collins Radio Co., Dallas 75207)

20-22. **American Laryngological, Rhinological, and Otological Assoc.**, San Juan, P.R. (V. R. Alfaro, 917 20th St., NW, Washington, D.C. 20006)

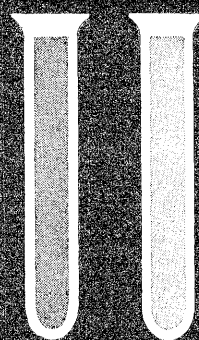
20-22. **Magnetics**, 4th intern. conf. (INTERMAG), Stuttgart, Germany. (E. W. Pugh, I.B.M. Corp., 1000 Westchester Ave., White Plains, N.Y.)

20-23. **Application of Physicochemical Methods in Chemical Analysis**, conf., Budapest, Hungary. (M. K. Egyesülete, Szabadsag ter 17, Budapest 5)

20-23. **Solar Energy Soc.**, 2nd annual mtg., Boston, Mass. (F. Edlin, Solar En-

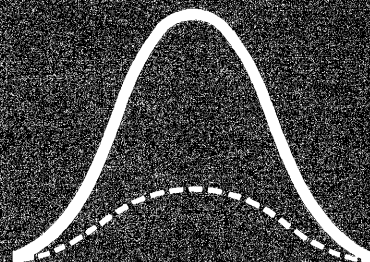
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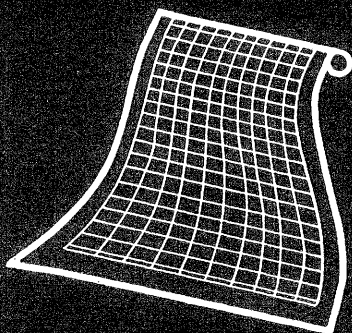


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ergy Soc., Arizona State Univ., Tempe 85281)

21-22. **Space Navigation**, natl. mtg., Boston, Mass. (E. S. Keats, Westinghouse Electric Corp., Box 1897, Baltimore, Md. 21203)

21-23. **Ohio Acad. of Science**, 75th annual mtg., Columbus. (J. H. Melvin, 505 King Ave., Columbus 43201)

21-23. **Southwestern Psychological Assoc.**, 13th annual conv., Arlington, Tex. (C. Cleland, 2104 Meadowbrook Dr., Austin, Tex.)

21-23. **West Virginia Acad. of Science**, Institute. (J. B. Hickman, West Virginia Univ., Morgantown 26506)

22. **Computer Aided Basic Research**, symp., Hoboken, N.J. (I. Flores, Electrical Engineering Dept., Stevens Inst., Hoboken 07030)

22. **Illinois Acad. of Science**, Illinois State Univ., Normal. (N. D. Levine, Univ. of Illinois, Urbana)

22-23. **National Council of Teachers of Mathematics**, Greeley, Colo. (J. D. Gates, 1201 16th St., NW, Washington, D.C. 20036)

23-24. **American Laryngological Assoc.**, San Juan, P.R. (L. Richards, 12 Clovelly Rd., Wellesley Hills, Mass.)

24. **Society for Clinical Ecology**, 1st annual mtg., Chicago, Ill. (T. G. Randolph, Human Ecology Research Foundation, 720 N. Michigan Ave., Chicago 11, Ill.)

24-26. **American Assoc. of Colleges of Pharmacy**, Dallas, Tex. (C. W. Bliven, 1507 M St., NW, Washington, D.C. 20005)

24-27. **American Soc. of Abdominal Surgeons**, Chicago, Ill. (B. F. Alfano, 663 Main St., Melrose 76, Mass.)

24-27. **American Oil Chemists' Soc.**, Los Angeles, Calif. (C. H. Hauber, The Society, 35 E. Wacker Dr., Chicago, Ill. 60601)

24-28. **Infectious Pathology**, 4th intern. congr., Stuttgart, Germany. (G. Hoffman, Hugstetterstr. 55, 78 Frieberg im Briesgau, Germany)

24-29. **American College of Allergists**, 22nd annual congr., Chicago, Ill. (J. D. Gillespie, 2141 14th St., Boulder, Colo. 80302)

24-29. **American Soc. of Hospital Pharmacists**, annual mtg., Dallas, Tex. (J. A. Oddis, 2215 Constitution Ave., NW, Washington, D.C. 20037)

24-29. **American Pharmaceutical Assoc.**, Dallas, Tex. (W. S. Apple, 2215 Constitution Ave., NW, Washington, D.C. 20037)

25-27. **Antidepressant Drugs**, symp., Milan, Italy. (S. Garattini, Inst. di Ricerche Farmacologiche "Mario Negri," Via Eritrea, 62, Milan)

25-27. **National Acad. of Sciences**, 103rd annual mtg., Washington, D.C. (Home Secretary, NAS, 2101 Constitution Ave., NW, Washington, D.C. 20418)

25-27. **American Acad. of Pediatrics**, Montreal, P.Q., Canada. (E. H. Christopher, 1801 Hinman Ave., Evanston, Ill. 60204)

25-27. **Academy of Religion and Mental Health**, annual mtg., Chicago, Ill. (G. C. Anderson, 16 E. 34 St., New York, N.Y.)

25-28. **Society of Economic Paleontologists and Mineralogists**, St. Louis, Mo. (R. Tener, The Society, Box 979, Tulsa, Okla.)

25-28. **American Assoc. of Petroleum Geologists**, St. Louis, Mo. (N. C. Smith, Box 979, Tulsa, Okla.)

25-28. **Improving Effectiveness in Research and Development Administration**, 11th annual inst., American Univ., Washington, D.C. (P. W. Howerton, Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C. 20006)

25-29. **Radioecological Concentration Processes**, intern. symp., Stockholm, Sweden. (Inst. of Radiophysics, Stockholm 60)

25-30. **American Acad. of Neurology**, Philadelphia, Pa. (T. D. Swedien, 7100 France Ave., Minneapolis, Minn.)

25-7. **Psychotherapy**, 16th Lindauer week, Lindauer, Germany. (H. Stolze, Adalbert-Stifterstr. 31, 8 München 27, Germany)

26. **National Cystic Fibrosis Research Foundation**, Atlantic City, N.J. (The Foundation, Medical Dept., 521 Fifth Ave., New York, N.Y. 10017)

26-27. **Electromagnetic Relays**, 14th annual natl. conf., Oklahoma State Univ., Stillwater. (D. D. Lingelbach, Dept. of Electrical Engineering, Oklahoma State Univ., Stillwater 74075)

26-28. **Joint Computer Conf.**, Boston, Mass. (J. L. Mitchell, P.O. Box 460, Lexington, Mass. 02173)

26-28. **Institute of Electrical and Electronics Engineers**, region 6, annual conf., Tucson, Ariz. (L. P. Huelsman, Dept. of Electrical Engineering, Univ. of Arizona, Tucson 85721)

26-28. **National Acad. of Engineering**, 2nd annual mtg., Washington, D.C. (Secretary, NAE, 2101 Constitution Ave., NW, Washington, D.C. 20418)

27-29. **Institute of Mathematical Statistics**, Upton, L.I., N.Y. (G. E. Nicholson, Jr., Univ. of North Carolina, Chapel Hill)

27-29. **American Pediatric Soc.**, Atlantic City, N.J. (C. D. Cook, 333 Cedar St., New Haven, Conn. 06510)

27-1. **Technical Union of Italian Pharmacists**, 9th natl. congr., Naples, Italy. (UTI. Far. Secretariat, Via Balbi 29/4, Genoa)

28-1. **Southwestern Assoc. of Naturalists**, 13th annual mtg., Texas College of Arts and Industries, Kingsville. (J. T. Peacock, Dept. of Biology, Texas College of Arts and Industries, Kingsville, 78363)

28-29. **Electrical Conduction Properties of Polymers**, symp., Pasadena, Calif. (A. Rembaum, Jet Propulsion Laboratory, California Inst. of Technology, 4800 Oak Grove Dr., Pasadena)

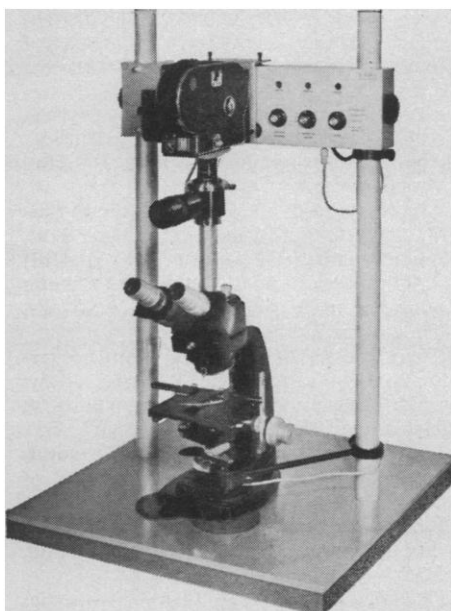
28-30. **Central States Anthropological Soc.**, annual mtg., St. Louis, Mo. (G. H. Fathauer, Dept. of Sociology and Anthropology, Miami Univ., Oxford, Ohio 45056)

28-30. **Economic and Social Aspects of Technological Transfer**, conf., Airlie House, Warrenton, Va. (D. L. Spencer, Dept. of Economics, Howard Univ., Washington, D.C. 20001)

28-30. **Wildflower Pilgrimage**, 16th annual, Gatlinburg, Tenn., and Great Smoky Mountain Natl. Park. (A. J. Sharp, Dept. of Botany, Univ. of Tennessee, Knoxville)

29-30. **Georgia Acad. of Science**, Georgia Southern College, Statesboro. (J. T. May, School of Forestry, Univ. of Georgia, Athens)

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29-30. Mississippi Acad. of Sciences, Mississippi State Univ., State College. (C. Q. Sheeley, Box 574, State College 39762)

29-30. Population Assoc. of America, New York, N.Y. (A. S. Lunde, Natl. Center for Health Statistics, U.S. Public Health Service, Washington, D.C. 20201)

29-30. American Assoc. of University Professors, Atlanta, Ga. (W. P. Fidler, The Association, 1785 Massachusetts Ave., NW, Washington, D.C.)

29-1. Association of Clinical Scientists, Chicago, Ill. (R. P. MacFate, 300 N. State St., Chicago, Ill. 60610)

29-1. American Soc. for the Study of Sterility, Chicago, Ill. (H. H. Thomas, 944 S. 18 St., Birmingham, Ala.)

May

1. American Federation for Clinical Research, Atlantic City, N.J. (J. F. Bryan, 2000 P St., NW, Washington, D.C. 20036)

1-4. AAAS, Southwestern and Rocky Mountain Div., Las Cruces, N.M. (M. G. Anderson, P.O. Box AF, University Park, N.M. 88070)

1-4. American Soc. for Clinical Investigation, Atlantic City, N.J. (G. W. Liddle, School of Medicine, Vanderbilt Univ., Nashville, Tenn.)

1-4. American College of Obstetricians and Gynecologists, Chicago, Ill. (R. A. Kimbrough, 79 W. Monroe, Chicago 60603)

1-5. American Soc. for Microbiology, annual mtg., Los Angeles, Calif. (R. W. Sarber, The Society, 115 Huron View Blvd., Ann Arbor, Mich. 48103)

1-6. Electrochemical Soc., annual spring mtg., Cleveland, Ohio. (The Society, 30 E. 42 St., New York 10017)

1-6. International College of Surgeons, North American Federation, congr., Houston, Tex. (S. E. Henwood, 1516 Lake Shore Dr., Chicago, Ill. 60610)

2-3. Canadian Aeronautics and Space Inst., annual mtg., Ottawa, Ontario. (The Institute, 77 Metcalfe St., Ottawa 4)

2-3. Bioengineering, 3rd annual Rocky Mountain symp., University of Colorado, Boulder. (J. C. Daniel, Dept. of Biology, Univ. of Colorado, Boulder 80304)

2-3. American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inst. of Petroleum Engineers, Wichita Falls, Tex. (Executive Secretary, 345 E. 47 St., New York 10017)

2-4. Council of Biology Editors, Univ. of Notre Dame, Notre Dame, Ind. (R. E. Gordon, Dept. of Biology, Univ. of Notre Dame, Notre Dame)

2-4. Communications Satellite Systems, conf., American Inst. of Aeronautics and Astronautics, Washington, D.C. (W. J. Brunke, AIAA, 1290 Sixth Ave., New York 10019)

2-5. Isochronous Cyclotrons, intern. conf., Gatlinburg, Tenn. (R. S. Livingston, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 37831)

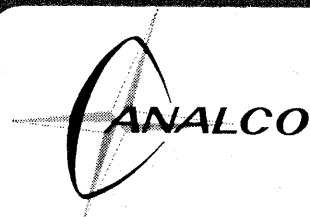
2-7. International Inst. of Optics, conf., Paris, France. (Conference Secretariat, Inst. for Optics, 3, blvd. Pasteur, Paris 15)

3-5. British Joint Computer Conf., Eastbourne, England. (Secretariat, Inst. of Electrical Engineers, Savoy Place, London W.C.2, England)

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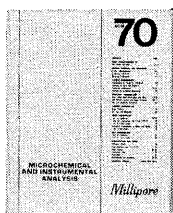
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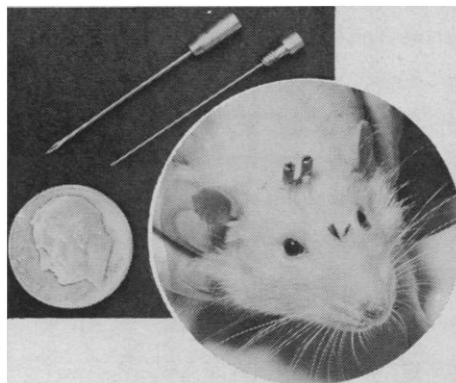
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3-5. **Industrial Waste**, 21st conf., Purdue Univ., Lafayette, Ind. (D. E. Bloodgood, School of Civil Engineering, Purdue Univ., Lafayette 47907)

3-6. American Chemical Soc., Div. of **Rubber Chemistry**, San Francisco, Calif. (G. N. Vacca, Bell Telephone Laboratories, Murray Hill, N.J.)

3-8. Mechanism of Action of **Fungicides and Antibiotics**, intern. symp., Biological Soc. of the GDR, Reinhardtbrunn, East Germany. (H. Lyr, Inst. für Forstwissenschaften, Alfred-Möllerstr., 13 Eberswalde die Berlin)

4. Society for **Analytical Chemistry**, mtg., Bristol, England. (The Society, 14 Belgrave Sq., London, England)

4-6. **Genetics** Soc. of Canada, 11th annual mtg., Banff, Alberta. (C. O. Person, Dept. of Genetics, Univ. of Alberta, Edmonton, Canada)

4-6. Society for Experimental **Stress Analysis**, spring mtg., Detroit, Mich. (B. E. Rossi, 21 Bridge Sq., Westport, Conn. 06882)

4-7. **Virginia Acad. of Science**, Madison College, Harrisonburg. (R. C. Berry, Virginia Acad. of Science, P.O. Box 8203, Richmond 23226)

4-8. **Laboratory Medicine**, 12th congr., Bad Kissengen, West Germany. (W. Altbath, Katharinengasse 3, 87 Würzburg, Germany)

4-11. **Instability Phenomena in Galaxies**, symp., Armenian SSR. (A. N. Hakopian, Acad. of Sciences of the Armenian SSR, Erevan)

5-6. **Human Factors in Electronics**, 7th symp., Minneapolis, Minn. (C. A. Baker, Honeywell, Inc., 2700 Ridgeway Rd., Minneapolis)

5-6. **Rabies**, natl. symp., Atlanta, Ga. (J. R. Ray, American Veterinary Medical Assoc., Chicago, Ill.)

5-6. **Strontium Metabolism**, intern. symp., Annan, Scotland. (J. H. Martin, United Kingdom Atomic Energy Agency, Chapelcross Works, Annan, Dumfriesshire, Scotland)

5-7. Society for American **Archaeology**, 31st annual mtg., Univ. of Nevada, Reno. (D. D. Fowler, Dept. of Anthropology, Univ. of Nevada, Reno 89507)

5-7. New Jersey Soc. of **Professional Engineers**, 42nd annual conf. and exhibition, Atlantic City. (K. G. Stanley, The Society, 495 West State St., Trenton 08618)

5-7. **Midwestern Psychological Assoc.**, Chicago, Ill. (F. A. Mote, Psychology Dept., Univ. of Wisconsin, Madison)

5-8. **Protides of the Biological Fluids**, 14th annual colloquium, Bruges, Belgium. (P.O. Box 71, Bruges)

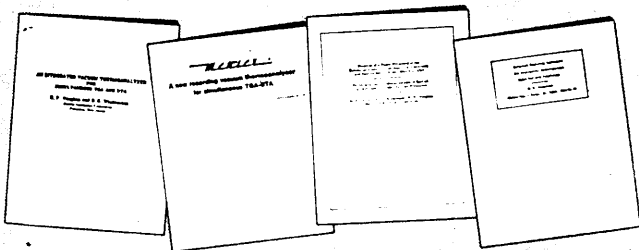
6-7. Institute on **Lake Superior Geology/Mineralogical Soc. of America/Soc. of Economic Geologists**, mtg., Michigan Technological Univ., Saulte Ste. Marie. (A. K. Snelgrove, Michigan Technological Univ., Houghton 49931)

6-7. **North Carolina Acad. of Science**, Catawba College, Salisbury. (J. A. Yarbrough, Meredith College, Raleigh, N.C.)

6-7. **North Dakota Acad. of Science**, North Dakota State Univ., Fargo. (B. G. Gustafson, Univ. of North Dakota, Grand Forks)

6-8. Society for Applied **Anthropology**, 25th annual mtg., Milwaukee, Wis. (The

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1. Universal Measuring Instrument for Gravimetric Investigations Under Variable Conditions, H. G. Wiedemann, Chem.-Ing. Techn. 36. Jahrg. 1964/Nr. 11.
2. A New Recording Vacuum Thermoanalyzer for Simultaneous TGA/DTA, Technical Bulletin No. T101, Mettler Instrument Corporation.
3. Thermogravimetric Measurements in Special Gas Atmospheres Under Various Pressures, H. Jucker, H. G. Wiedemann and H. P. Vaughan, Presented at Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, March 2, 1965.
4. An Integrated Vacuum Thermoanalyzer for Simultaneous TGA/DTA, H. P. Vaughan and H. G. Wiedemann, Vacuum Microbalance Techniques, Volume IV, Plenum Press.

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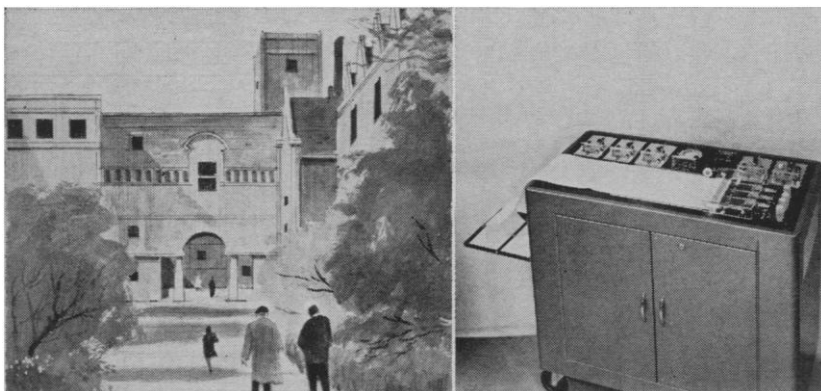
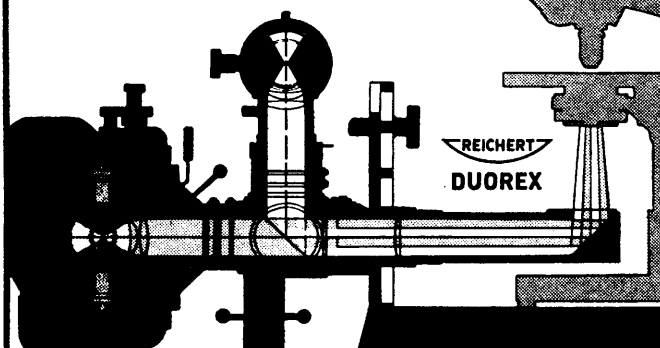
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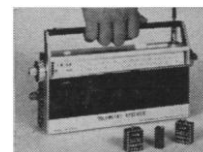
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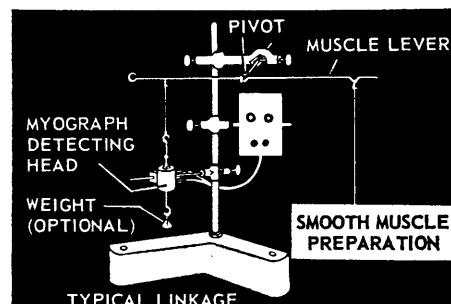
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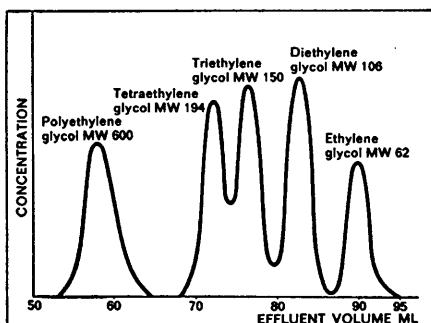
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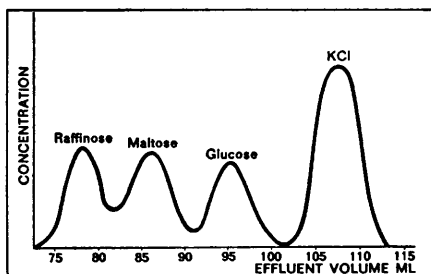
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Society, Rand Hall, Cornell Univ., Ithaca, N.Y.)

6-8. **Wisconsin Acad. of Sciences, Arts, and Letters**, Lawrence Univ., Appleton, Wis. (D. J. Behling, 720 Wisconsin Ave., Milwaukee 53202)

6-9. **American Psychoanalytic Assoc.**, Atlantic City, N.J. (H. Fischer, 1 E. 57th St., New York, N.Y.)

7-8. **Academy of Psychoanalysis**, Atlantic City, N.J. (A. H. Rifkin, 125 E. 65 St., New York 10021)

7-12. **American Ceramic Soc.**, 68th annual mtg., Washington, D.C. (The Society, 4055 N. High St., Columbus, Ohio 43214)

8-10. **Society of the Plastics Industry**, Canadian section, 24th annual mtg., Montreal, P.Q. (The Society, 250 Park Ave., New York 10017)

8-11. **Administrative Management Soc.**, 47th intern. conf., Boston, Mass. (W. H. Latham, Willow Grove, Pa. 19090)

8-12. **Association of American State Geologists**, annual mtg., Univ. of Indiana, Bloomington. (W. C. Hayes, Missouri Geological Survey, P.O. Box 250, Rolla 65401)

8-12. **Organic Sulphur Compounds**, symp., Univ. of Groningen, Groningen, Netherlands. (M. J. Janssen, Dept. of Organic Chemistry, Univ. of Groningen, Groningen)

8-15. **Stereochemistry**, conf., Bürgenstock, Switzerland. (D. Arigoni, Dept. of Organic Chemistry, Univ. of Zurich, Zurich, Switzerland)

9-10. **Circuit Theory**, 9th midwestern symp., Oklahoma State Univ., Stillwater. (D. R. Wilson, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74045)

9-11. **Nuclear Applications of Non-Fissile Ceramics**, conf., Washington, D.C. (A. Boltax, Westinghouse Astronuclear Laboratory, P.O. Box 10864, Pittsburgh, Pa. 15236)

9-11. **Numerical Solution of Nonlinear Differential Equations**, symp., Madison, Wis. (D. Greenspan, Mathematics Research Center, U.S. Army, Univ. of Wisconsin, Madison 53706)

9-12. **Cell Nucleus Functions and Radio-Sensitivity**, symp., Rijswijk, Netherlands. (H. M. Klouwen, Radiobiological Inst., Organization for Health Research, T.N.O., 151 Lang Kleigweg, Rijswijk)

9-12. **Standards Laboratory conf.**, Natl. Bureau of Standards, Gaithersburg, Md. (W. R. Tilley, NBS, Washington, D.C. 20234)

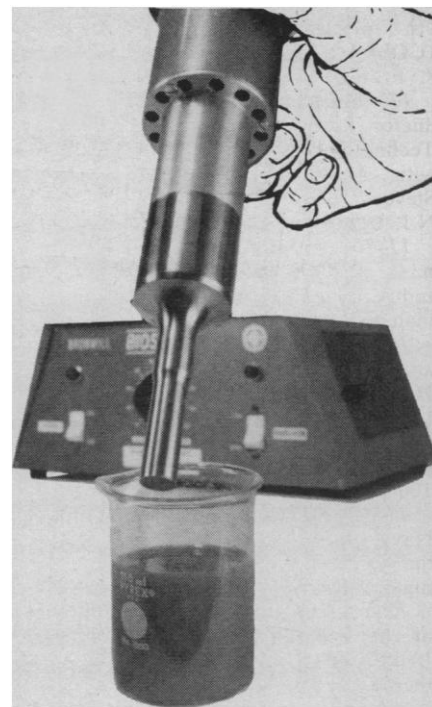
9-13. **Society of Photographic Scientists and Engineers**, annual conf., San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco, Calif.)

9-13. **American Psychiatric Assoc.**, annual mtg., Atlantic City, N.J. (P. Woodward, 1700 18th St., NW, Washington, D.C. 20009)

9-14. **Condensation Nuclei**, 6th intern. symp., Albany, N.Y. (D. G. Barry, Atmospheric Sciences Research Center, State Univ. of New York, P.O. Box 7185, Albany 12224)

10-12. **Telemetering**, natl. conf., Boston, Mass. (F. Nieman, NASA Electronics Research Center, 575 Technology Sq., Cambridge, Mass. 02139)

10-14. **American Assoc. of Mental Deficiency**, Chicago, Ill. (G. E. Milligan, 1601 Broad St., Columbus, Ohio)



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10-19. Committee on **Space Research**, 9th plenary mtg., Vienna, Austria. (COSPAR, 55, blvd. Malesherbes, Paris 8, France)

11. **Electroluminescence and Semiconductor Lasers**, seminar, Stevens Inst. of Technology, Hoboken, N.J. (G. J. Herskowitz, Dept. of Electrical Engineering, Stevens Inst. of Technology, Hoboken, N.J. 07030)

11-13. **Analysis Instrumentation**, 12th natl. symp., Houston, Tex. (G. I. Doering, Industrial Nucleonics Corp., 650 Ackerman Rd., Columbus, Ohio 43202)

11-13. American Inst. of **Chemists**, 43rd annual mtg., New Orleans, La. (C. L. Hoffpauir, Southern Regional Research Laboratory, New Orleans 70119)

11-13. **Industrial Research Inst.**, spring mtg., Buck Hill Falls, Pa. (The Institute, 100 Park Ave., New York 10017)

11-13. **Military Oceanography**, 3rd U.S. Navy symp., San Diego, Calif. (Office of the Oceanographer of the Navy, Washington, D.C.)

11-14. American Assoc. for the **History of Medicine**, Rochester, Minn. (J. B. Blake, Natl. Library of Medicine, Bethesda, Md.)

11-14. Society for **Industrial and Applied Mathematics**, natl. mtg., Univ. of Iowa, Iowa City. (J. B. Rosser, Mathematics Research Center, Univ. of Wisconsin, Madison)

11-14. **Plant Disease Epidemics**, Analysis and Implications, workshop, Pennsylvania State Univ., University Park. (P. J. Wuest, Dept. of Plant Pathology, Pennsylvania State Univ., University Park 16802)

11-14. Society of Technical **Writers and Publishers**, 13th annual mtg., Fort Worth, Tex. (N. J. Kennedy, Box 3706, Columbus, Ohio 43214)

11-21. **Photographic Systems** for Engineers, seminar, San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco)

12-13. **Information Retrieval**, 3rd natl. colloquium, Univ. of Pennsylvania, Philadelphia. (A. W. Speakman, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

12-14. **Diabetology**, 7th annual mtg., Paris, France. (M. Rathery, Hotel-Dieu, 1, pl. du Parvis-Notre Dame, Paris 4)

12-14. Czechoslovak Soc. of **Urology**, congr., Brno. (M. Jerabek, Clinique Urologique, 53, Pekarska, Brno)

13. **Desert Environment**, mtg., Fullerton Junior College, Fullerton, Calif. (M. D. Brown, Div. of Life Sciences, Fullerton Junior College, Fullerton)

14. **Reliability**, 7th annual West Coast symp., Univ. of Southern California, Los Angeles. (R. J. Guarino, TRW Systems, One Space Park, Redondo Beach, Calif.)

15-18. American Inst. of **Chemical Engineers**, 59th annual mtg., Columbus, Ohio. (The Institute, 345 E. 47 St., New York 10017)

15-18. **Kinetics and Catalysis**, intern. symp., Columbus, Ohio. (P. B. Weisz, Socony Mobil Research and Development Labs., Paulsboro, N.J. 08066)

15-19. **Radiation Chemistry**, 2nd symp., Tihany, Hungary. (A. Somogyi, Research Inst. for the Plastics Industry, Hungaria krt. 114, Budapest 14, Hungary)

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Constituents in Plant-Parasite Interaction, U.S.—Japan seminar, Gamagori, Japan. (C. J. Mirocha, Dept. of Plant Pathology and Physiology, Univ. of Minnesota, St. Paul)

16-17. **Plant Growth**, conf., New York, N.Y. (J. F. Frederick, Dodge Chemical Co., Research Labs., 3425 Boston Rd., Bronx, N.Y. 10469)

16-18. **Aerospace Electronics**, 18th natl. conf., Dayton, Ohio. (J. M. Mayer, 4525 Fernbrook St., Kettering, Ohio 45440)

16-18. Society of German **Engineers**, conf., Berlin. (The Society, Postfach 10 250, 4 Düsseldorf 10, Germany)

16-18. Institute of Electrical and Electronics Engineers, Group on **Microwave Theory and Technique**, symp., Palo Alto, Calif. (L. Young, Stanford Research Inst., Menlo Park, Calif. 94025)

16-18. **Power Instrumentation**, 9th natl. symp., Detroit, Mich. (R. C. Austin, Detroit Edison Co., 2000 Second Ave., Detroit 48226)

16-18. American Assoc. for **Thoracic Surgery**, Vancouver, B.C., Canada. (A. Henvey, 311 Carondelet Bldg., 7730 Carondelet Ave., St. Louis, Mo.)

16-19. **Biomedical Sciences Instrumentation**, 4th natl. symp., Anaheim, Calif. (T. B. Weber, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif.)

16-20. American Soc. of **Civil Engineers**, Denver, Colo. (W. H. Wisley, 345 E. 47 St., New York, N.Y. 10017)

16-20. **Disposal of Radioactive Wastes** into the Seas, Oceans, and Surface Waters, symp., Intern. Atomic Energy Agency, Vienna, Austria. (IAEA, 11 Kärntnerring, Vienna 1)

16-20. American **Industrial Hygiene** Assoc., Pittsburgh, Pa. (A. D. Hosey, 1014 Broadway, Cincinnati, Ohio 45202)

16-20. **Water Resources Engineering**, conf., American Soc. of Civil Engineers, Denver, Colo. (W. H. Wisley, The Society, 345 E. 47 St., New York 10017)

17-19. **Fast Breeder Reactors**, intern. conf., London, England. (H. C. Dunn, British Nuclear Energy Soc., Risley, Warrington, Lancashire, England)

18-20. **Operations Research** Soc. of America, 29th natl. mtg., Santa Monica, Calif. (J. E. Walsh, System Development Corp., 2500 Colorado Ave., Santa Monica 90406)

18-25. **Warm-Water Pond Fish Culture**, world symp., U.N. Food and Agriculture Organization, Rome, Italy. (T. V. R. Pillay, FAO, Via delle Terme di Caracalla, Rome)

19-20. **Membrane Processes** for Industry, symp., Southern Research Inst., Birmingham, Ala. (J. H. Strickland, SRI, 2000 Ninth Ave. S., Birmingham 35205)

19-21. **Organellogenesis**, regional conf., Soc. for Developmental Biology, Ames, Iowa. (J. M. Arnold, Dept. of Biochemistry and Biophysics, Iowa State Univ., Ames 50010)

19-22. **Exfoliative Cytology**, intern. congr., Rio de Janeiro, Brazil. (E. von Haam, Ohio State Univ., Columbus)

19-22. German Bunsen Soc. for **Physical Chemistry**, 65th general assembly, Freudenstadt. (The Society, Varrentrappstr. 40-42, 6 Frankfurt am Main, West Germany)

20-21. **Surface Physics**, 4th symp.,

Washington State Univ., Pullman. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman 99163)

20-22. Royal **Astronomical** Soc. of Canada, general assembly, Univ. of Manitoba, Winnipeg. (R. J. Lockhart, Dept. of Mathematics, Univ. of Manitoba, Winnipeg)

20-22. Society for **Experimental Medicine** of the German Democratic Republic, 3rd general conf., Leipzig, East Germany. (Secretariat, The Society, Friedrichstr. 129, Block F, 104 Berlin, East Germany)

21. **Southern Calif. Acad.** of Sciences, annual mtg., California State College, San Diego. (C. Rozaire, The Academy, Los Angeles Museum, Exposition Park, Los Angeles, Calif.)

22-26. Institute of **Food Technologists**, 26th annual mtg., Portland, Ore. (C. L. Willey, 176 W. Adams St., Chicago, Ill. 60603)

22-26. American **Orthopedic** Assoc., Colorado Springs, Colo. (S. W. Banks, 29 E. Madison St., Chicago, Ill.)

23-24. **High Temperature Reactors** and the Dragon Project, symp., London, England. (Secretary, British Nuclear Energy Soc., Inst. of Civil Engineers, 1-7 Great George St., London S.W.1)

23-25. American **Astronautical** Soc., 12th annual mtg., Los Angeles and Anaheim, Calif. (L. Larmore, Douglas Aircraft, 3000 Ocean Park Blvd., Santa Monica, Calif.)

23-25. **Chemical and Petroleum Instrumentation**, 7th natl. symp., San Francisco, Calif. (J. T. Ward, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

23-25. Dynamics of **Chemical Reactions**, intern. symp., Padua, Italy. (Direzione Istituto di Impianti Chimici, Univ. degli Studi, Padua)

23-26. Association for Research into **Periodontal Disease**, 18th mtg., West Berlin, Germany. (M. J. Matthey, 2 rue Bartholini, Geneva, Switzerland)

23-26. **Spaceflight**, 6th European symp., Brighton, England. (British Interplanetary Soc., 12 Bessborough Gardens, S.W., London, S.W.1, England)

23-28. International Assoc. for the Study of the **Bronchi**, 16th congr., Athens, Greece. (The Association, 189 Blvd. St.-Germain, Paris 7, France)

23-28. **Hormonal Steroids**, intern. congr., Milan, Italy. (L. Martini, Inst. di Farmacologia, Via Andrea del Sarto 21, Milan)

24-26. **Solid Propulsion**, conf., Chicago, Ill. (Chemical Propulsion Information Agency, 8621 Georgia Ave., Silver Spring, Md.)

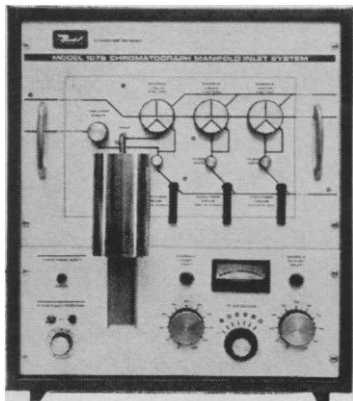
24-26. **Ultrasonic Testing** of Materials, 2nd intern. symp., Berlin, Germany. (Kammer der Technik FV "Maschinenbau," Clara-Zetkinstr. 115-117, 108 Berlin)

25. American Soc. for **Gastrointestinal Endoscopy**, Chicago, Ill. (B. H. Sullivan, Jr., 2020 E. 93 St., Cleveland, Ohio 44106)

25-27. Society of **Radiographers**, 20th annual conf., Brighton, England. (The Society, 32 Welbeck St., London, W.1, England)

25-27. **Sulfamic Acid** and Its Electrometallurgical Applications, symp., Milan, Italy. (R. Piontelli, Laboratorio di Elettrochimica, Clinica-Fisica e Metallurgia del Politecnico di Milano, 32 Piazza Leonardo da Vinci, Milan)

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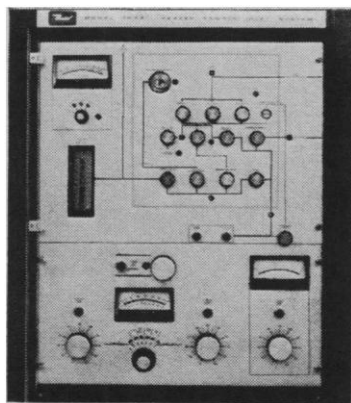


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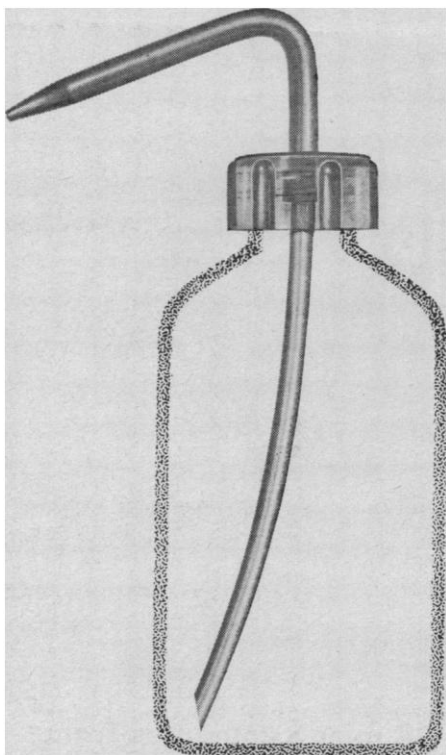
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NEW BOOKS

(Continued from page 195)

Organization. Warren G. Bennis. McGraw-Hill, New York, 1966. 235 pp. Illus. \$6.95.

Cheese and Fermented Milk Foods. Frank Kosikowski. The Author, Cornell Univ., Ithaca, N.Y., 1966. 445 pp. Illus. \$15.

Chemicals Used in Food Processing. Compiled by the Food Technology Subcommittee, Food Protection Committee, Natl. Acad. of Sciences—Natl. Research Council, Natl. Acad. of Sciences—Natl. Research Council, Washington, D.C., 1965. 310 pp. Illus. Paper, \$6.50.

Community Mental Health Services in Northern Europe: Great Britain, Netherlands, Denmark, and Sweden. Sylvan S. Furman. U.S. Department of Health, Education, and Welfare, Washington, D.C., 1966 (order from Superintendent of Documents, Washington, D.C.). 229 pp. \$1.75.

The Cooperative Extension Service. H. C. Sanders, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1966. 448 pp. Illus. \$11.35. Thirty-eight papers; the sections are Foundations (4 papers); Some Contributions of the Behavioral Sciences (2 papers); Program Development (2 papers); Planning for and Effecting Change (26 papers); Reporting and Public Relations (2 papers); Personnel Training and Development (1 paper); and A Look to the Future (1 paper).

Desert Life. J. L. Cloudsley-Thompson. Pergamon, New York, 1965. 96 pp. Illus. Paper, \$1.95.

Dictionary of Astronomical Terms. Åke Wallenquist. Translated from the Swedish edition (1962) by Sune Engelbrektson. Published for the American Museum of Natural History by Natural History Press, Garden City, N.Y., 1966. 275 pp. Illus. Paper, \$1.75.

Dictionary of Mathematics. C. C. T. Baker. Hart, New York, 1966. 346 pp. Illus. Paper, \$2.65; cloth, \$6.95.

The Discipline of the Cave. J. N. Findlay. Allen and Unwin, London; Humanities Press, New York, 1966. 227 pp. \$5.50. Ten lectures given as the Gifford Lectures at the University of St. Andrews (St. Andrews, Fife, Scotland), December 1964–February 1965. Muirhead Library of Philosophy, edited by H. D. Lewis.

Electronic Brains: How Computers Work. Rolf Lohberg and Theo Lutz. Translated from the German edition (Stuttgart, 1963) by Kenneth T. Outfield. Oak Tree Press, London; Sterling, New York, 1966. 221 pp. Illus. \$4.95.

Employment and Earnings Statistics for the United States, 1909–65. U.S. Department of Labor, Washington, D.C., 1966 (order from Superintendent of Documents, Washington, D.C.). 768 pp. Paper, \$4.25.

Equality and Beyond: Housing Segregation and the Goals of the Great Society. George Grier and Eunice Grier. Quadrangle Books, Chicago, 1966. 125 pp. \$3.50.

The Evolution of the Nuclear Atom. G. K. T. Conn and H. D. Turner. Iliffe, London; Elsevier, New York, 1966. 226 pp. Illus. \$10.

Excursions in Number Theory. C. Stanley Ogilvy and John T. Anderson. Oxford

Univ. Press, New York, 1966. 176 pp. Illus. \$5.

Eye and Brain: The Psychology of Seeing. R. L. Gregory. McGraw-Hill, New York, 1966. 254 pp. Illus. Paper, \$2.45. World University Library Series.

Fertility and Family Planning in the United States. Pascal K. Whelpton, Arthur A. Campbell, and John E. Patterson. Princeton Univ. Press, Princeton, N.J., 1966. 479 pp. Illus. \$12.50.

Fossil Birds. W. E. Swinton. British Museum (Natural History), London, ed. 2, 1965. 71 pp. Illus. Paper, 7s. 6d.

Handbook of Middle American Indians. vols. 2 and 3. Robert Wauchope, Ed. *Archaeology of Southern Mesoamerica*. Pts. 1 and 2 (1102 pp.). Gordon R. Willey, Ed. Univ. of Texas Press, Austin, 1966. Illus. \$15 each. Thirty-nine papers.

The History of Psychiatry: An Evaluation of Psychiatric Thought and Practice from Prehistoric Times to the Present. Franz G. Alexander and Sheldon T. Selesnick. Harper and Row, New York, 1966. 487 pp. Illus. \$11.95.

Hospital Policy Decisions: Process and Action. Arthur B. Moss, Wayne G. Broehl, Jr., Robert H. Guest, and John W. Hennessey, Jr. Putnam, New York, 1966. 358 pp. \$8.50.

The Identity of Man. J. Bronowski. Published for the American Museum of Natural History by Natural History Press, Garden City, N.Y., 1965. 119 pp. \$3.95.

Industrialization in Two Systems: Essays in Honor of Alexander Gerschenkron. Henry Rosovsky, Ed. Wiley, New York, 1966. 299 pp. Illus. \$6.95. Ten papers: "The mechanization of reaping in the ante-bellum midwest" by Paul A. David; "The common school revival: Fact or fancy" by Albert Fishlow; "No safety in numbers: Some pitfalls of historical statistics" by Goran Ohlin; "Japan's transition to modern economic growth, 1868-1885" by Henry Rosovsky; "The relative decline of the British steel industry, 1880-1913" by Peter Temin; "The economics of overtaking and surpassing" by Joseph S. Berliner; "On the theory of economic administration" by Robert W. Campbell; "Gold and the sword: Money in the Soviet command economy" by Gregory Grossman; "Foreign trade behavior of centrally planned economies" by Franklyn D. Holzman; and "Pressure and planning in the Soviet economy" by Herbert S. Levine.

Insects. Ross E. Hutchins. Prentice-Hall, Englewood Cliffs, N.J., 1966. 336 pp. Illus. \$6.95. Prentice-Hall Series in Nature and Natural History.

Locational Analysis in Human Geography. Peter Haggett. St. Martin's Press, New York, 1966. 351 pp. Illus. \$8.

The Machinery of Life. Dean E. Wooldridge. McGraw-Hill, New York, 1966. 222 pp. Illus. \$7.95.

The Medical Formulary or Aqrābād-hīn of al-Kindī. Translated with a study of its "Materia Medica" by Martin Levey. Univ. of Wisconsin Press, Madison, 1966. 424 pp. Illus. \$8.50.

Memory. Brian Smith. Allen and Unwin, London; Humanities Press, New York, 1966. 214 pp. Illus. \$6.50. Muirhead Library of Philosophy, edited by H. D. Lewis.

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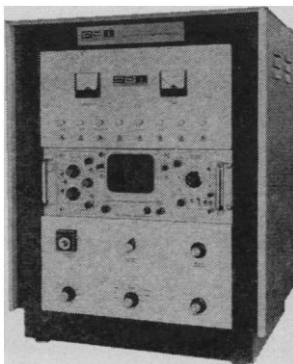
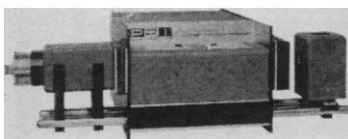
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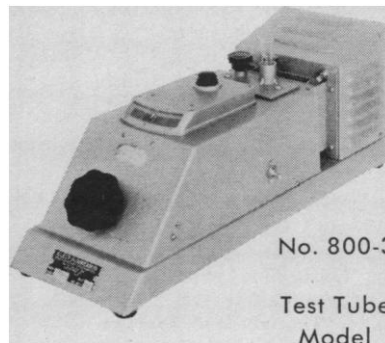
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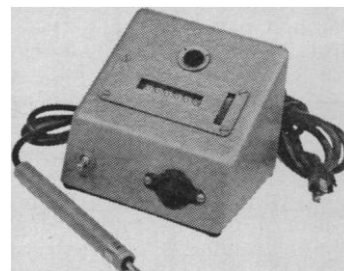


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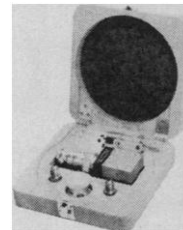
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Nobel Lectures in Chemistry. vol. 2, 1922-1941. Published for the Nobel Foundation by Elsevier, New York, 1966. 518 pp. Illus. \$85, set of 3 volumes.

Origins of American Conservation. Henry Clepper, Ed. Ronald, New York, 1966. 203 pp. Illus. \$4.50. Ten papers: "The conservation movement: Birth and infancy" by Henry Clepper; "Wildlife regulation and restoration" by James B. Treffethen; "Forests and forestry" by Arthur B. Meyer; "Fisheries and aquatic resources: Lakes, streams, and other inland waters: Coastal and marine waters" by Richard H. Stroud and Clarence P. Idyll; "Soil conservation" by H. Wayne Pritchard; "Water conservation: Watershed management: Water supply and pollution control" by William E. Sopper and Maurice K. Goddard; "Range and forage resources" by David G. Wilson; "Parks and wilderness" by Conrad L. Wirth; "Scenic, historic, and natural sites" by Michael Nadel; and "Next steps for resources" by Joseph L. Fisher.

Plant Diversification. Theodore Delevoryas. Holt, Rinehart, and Winston, New York, 1966. 157 pp. Illus. Paper, \$2.25. Modern Biology Series.

Political Power and Social Change. Peter H. Odegard. Rutgers Univ. Press, New Brunswick, N.J., 1966. 111 pp. \$3.50.

Professional Services Directory. American Translators Assoc., New York, 1965. 245 pp. Paper, \$5. Information on 239 members of the American Translators Association, who cover a total of 30 languages.

Rebuilding Cities. Percy Johnson-Marshall. Aldine, Chicago, 1966. 398 pp. Illus. \$15.

Science Policy and Organization of Scientific Research in the Czechoslovak Socialist Republic. UNESCO, Paris, 1965 (order from Unesco Publications Center, New York). 88 pp. Illus. Paper, \$1.

Scientific and Engineering Manpower in Communist China, 1949-1963. Chuyuan Cheng. Natl. Science Foundation, Washington, D.C., 1965 (order from Superintendent of Documents, Washington, D.C.). 608 pp. Paper, \$2.

Selected Bibliography on Algae. vol. 6. Nova Scotia Research Foundation, Halifax, 1965. 217 pp. Paper, \$5. The references included are mainly from the years 1959 to 1964.

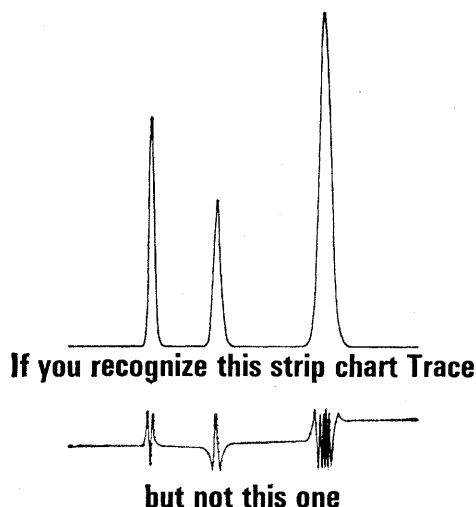
Six Lectures on Modern Natural Philosophy. C. Truesdell. Springer-Verlag, New York, 1966 125 pp. Illus. \$4.50.

Sleep. Ian Oswald. Penguin Books, Baltimore, 1966. 141 pp. Illus. Paper, 95¢.

Smithsonian Year, 1965. Annual report of the Secretary. Smithsonian Institution, Washington, D.C., 1965. 449 pp. Illus. Paper.

Social Insect Populations. M. V. Brian. Academic Press, New York, 1965. 143 pp. \$6.

Spectrochemical Abstracts. vol. 10, 1963-64. Ernest H. S. van Someren, F. Lachman, and F. T. Birks. Hilger and



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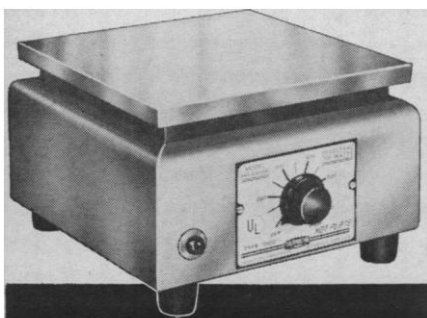


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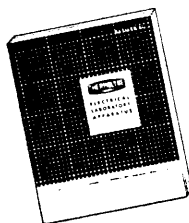
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Water in Industry. A survey of water use in industry. Natl. Assoc. of Manufacturers, New York; Chamber of Commerce of the U.S., Washington, D.C., 1965. 87 pp. Illus. Paper, \$2.

We Are Not Alone: The Search for Intelligent Life on Other Worlds. Walter Sullivan. McGraw-Hill, New York, ed. 2, 1966. 337 pp. Illus. \$7.50.

The Year Book of the Royal Society of London. Royal Society, London, 1966. 351 pp. \$3.15.

Biological and Medical Sciences

Annual Review of Entomology. vol. 11. Ray F. Smith and Thomas E. Mittler, Eds. Annual Reviews, Palo Alto, Calif., 1966. 404 pp. Illus. \$8.50. Twenty papers.

The Autonomic Nervous System: For Students of Physiology and of Pharmacology. J. Harold Burn. Davis, Philadelphia, ed. 2, 1965. 142 pp. Illus. \$3.50.

Chemical Aspects of the Autonomic Nervous System. D. J. Triggle. Academic Press, New York, 1965. 339 pp. Illus. \$11.50. Theoretical and Experimental Biology Series.

Culture de l'Épiderme de Mammifère Adulte. M. Pruniéras. S.P.E.I., Paris, 1965. 149 pp. Illus. Paper, F. 40.

Field Biology and Ecology. Allen H. Benton and William E. Werner, Jr. McGraw-Hill, New York, ed. 2, 1966. 509 pp. Illus. \$9.50.

Genetic Polymorphism. E. B. Ford. M.I.T. Press, Cambridge, Mass., 1965. 101 pp. \$4.75.

Introduction to Animal Neurology. A. C. Palmer. Davis, Philadelphia, 1965. 153 pp. Illus. \$5.

Laboratory Exercises in Animal Biology. Dale C. Braungart. Mosby, St. Louis, Mo., ed. 6, 1966. 252 pp. Illus. Paper, \$4.

Life into Space: An Introduction to Space Biology. Charles C. Wunder. Davis, Philadelphia, 1966. 338 pp. Illus. \$9.50.

Meeresbiologie: Eine Einführung in die Probleme und Ergebnisse. Hermann Friedrich. Borntraeger, Berlin, 1965. 442 pp. Illus. DM. 88.

A Monograph of Lemnaceae. Edwin Horace Daubs. Univ. of Illinois Press, Urbana, 1965. 126 pp. Illus. Paper, \$3.50; cloth, \$4.50. Illinois Biological Monographs, No. 34.

The Morphology of Gymnosperms: The Structure and Evolution of Primitive Seed-Plants. K. R. Sporne. Hillary House, New York, 1965. 216 pp. Illus. \$3.

Nitrogen Fixation in Plants. William D. P. Stewart. Univ. of London Press, London, 1966. 180 pp. Illus. 25s.

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son and Ronald D. Hunt. Thomas, Springfield, Ill., 1966. 1679 pp. Illus. \$65.

Techniques for Electron Microscopy. Desmond H. Kay, Ed. Davis, Philadelphia, ed. 2, 1965. 574 pp. Illus. \$15. Sixteen papers.

**Mathematics, Physical Sciences,
and Engineering**

Alloy Phase Equilibria. A. Prince. Elsevier, New York, 1966. 302 pp. Illus. \$30.

Applied Infrared Spectroscopy. David N. Kendall. Reinhold, New York; Chapman and Hall, London, 1966. 576 pp. Illus. \$23. Eighteen papers.

An Approach to Chemical Analysis: Its Development and Practice. H. N. Wilson. Pergamon, New York, 1966. 383 pp. Illus. Paper, \$4.95.

Aqueous Solutions and Body Fluids: Their Concentrative Properties and Conversion Tables. A. V. Wolf. Harper and Row, New York, 1966. 182 pp. Illus. \$7.50.

Automatic Digital Calculators. Andrew D. Booth and Kathleen H. V. Booth. Butterworth, Washington, D.C., ed. 3, 1965. 275 pp. Illus. \$9.95.

The Chemistry of Rhenium and Technetium. R. Colton. Interscience (Wiley), New York, 1965. 195 pp. Illus. \$8.50. Interscience Monographs on Chemistry, edited by F. Albert Cotton and G. Wilkinson.

The Chemistry of Selenium, Tellurium and Polonium. K. W. Bagnall. Elsevier, New York, 1966. 208 pp. Illus. \$13. Topics in Inorganic and General Chemistry Series, edited by P. L. Robinson.

A Concise Encyclopedia of Heat Transfer. S. S. Kutateladze and V. M. Borishanskii. Translated from the Russian edition by J. B. Arthur. Henry Cohen, Translation Editor. Pergamon, New York, 1966. 505 pp. Illus. \$18.50.

The Continuous Maximum Principle: A Study of Complex Systems Optimization. Liang-Tseng Fan. Wiley, New York, 1966. 425 pp. Illus. \$16. Contributors are T. C. Chen, S. J. Chen, Y. K. Ahn, C. L. Hwang, C. S. Wang, Y. C. Ko, L. E. Erickson, and L. S. Fan.

Dielectrics, Intermolecular Forces, Optical Rotation. John Gamble Kirkwood. R. H. Cole, Ed. Gordon and Breach, New York, 1965. 281 pp. Illus. Paper, \$4.95; cloth, \$8.50. Documents on Modern Physics Series, edited by Elliott W. Montroll, George H. Vineyard, and Maurice Lévy.

Diffraction Methods in Materials Science. J. B. Cohen. Macmillan, New York, 1966. 367 pp. Illus. Paper, \$4.95; cloth, \$8.95. Macmillan Series in Materials Science, edited by Morris E. Fine, Johannes Weertman, and Julia R. Weertman.

Diffusional Separation Processes: Theory, Design, and Evaluation. Earl D. Oliver. Wiley, New York, 1966. 460 pp. Illus. \$14.

The Earth Tides. Paul Melchior. Pergamon, New York, 1966. 472 pp. Illus. \$17.50.

Electromagnetic and Quantum Properties of Materials. Allen Nussbaum. Prentice-Hall, Englewood Cliffs, N.J., 1966. 440 pp. Illus. \$15. Solid State Physical Electronics Series, edited by Nick Holonyak, Jr.

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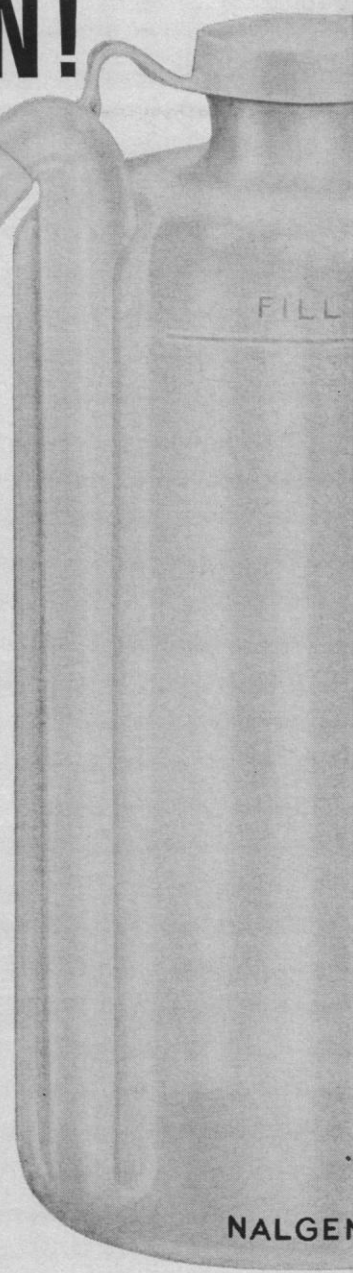
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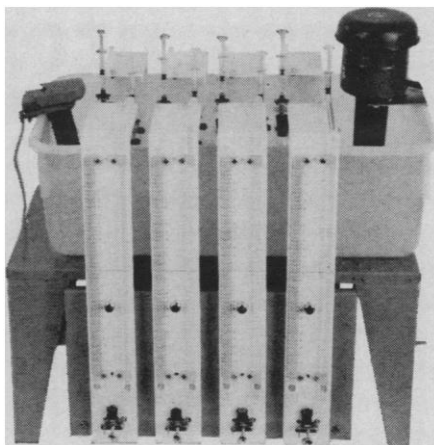
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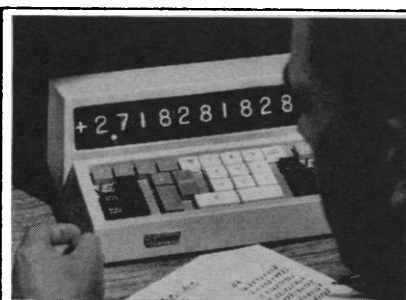
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Electronics for Experimenters in Chemistry, Physics and Biology. Leon F. Phillips. Wiley, New York, 1966. 280 pp. Illus. Paper, \$3.95.

Encyclopedia of Industrial Chemical Analysis. vol. 1, *General Techniques, A-E*. Foster Dee Snell and Clifford L. Hilton, Eds. Interscience (Wiley), New York, 1966. 779 pp. Illus. \$45.

Fundamentals of Corrosion. J. C. Scully. Pergamon, New York, 1966. 206 pp. Illus. Paper, \$3.95. The Commonwealth and International Library.

Interstellar Gas Dynamics. S. A. Kaplan. F. D. Kahn, Ed. Pergamon, New York, ed. 2, 1966. 138 pp. Illus. \$6.50. International Series of Monographs in Natural Philosophy, vol. 3.

Introduction to Dislocations. Derek Hull. Pergamon, New York, 1965. 271 pp. Illus. Paper, \$4.95. The Commonwealth and International Library.

Ionic Equilibria. J. E. Prue. Pergamon, New York, 1966. 129 pp. Illus. \$5.50. The International Encyclopedia of Physical Chemistry and Chemical Physics Series.

The Kinetics of Phase Transformations in Metals. J. Burke. Pergamon, New York, 1965. 234 pp. Illus. Paper, \$4.95. The Commonwealth and International Library.

Linear Programming. D. B. Yudin and E. G. Gol'shtein. Translated from the Russian edition (Moscow, 1963) by Z. Lerman. Israel Program for Scientific Translations, Jerusalem, 1965; Davey, New York, 1966. 519 pp. Illus. \$25.25.

The MAA Problem Book II. Compiled by Charles T. Salkind. Random House, New York, 1966. 118 pp. Illus. Paper, \$1.95. New Mathematical Library, No. 17. Annual high school contests of the Mathematical Association of America, 1961 to 1965.

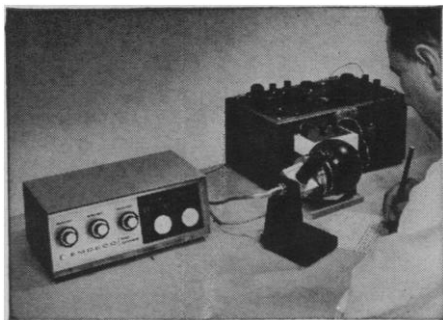
Mathematical Methods in Chemical Engineering: Matrices and Their Application. Neal R. Amundson. Prentice-Hall, Englewood Cliffs, N.J., 1966. 282 pp. Illus. \$14. Prentice-Hall International Series in the Physical and Chemical Engineering Sciences, edited by Neal R. Amundson.

Mathematics for Quantum Chemistry. Jay Martin Anderson. Benjamin, New York, 1966. 164 pp. Illus. Paper, \$3.95; cloth, \$8.50.

Modern Quantum Chemistry. Istanbul Lectures. vol. 1, *Orbitals*. Oktay Sinanoglu, Ed. Academic Press, New York, 1965. 258 pp. Illus. \$10. Contributors are A. T. Amos, R. Daudel, Inga Fischer-Hjalmars, Kenichi Fukui, Richard L. Hummel, Joshua Jortner, J. Koutecky, R. Lefebvre, L. J. Oosterhoff, M. K. Orloff, Robert G. Parr, Stuart A. Rice, Klaus Ruedenberg, and O. Sinanoglu.

Modern Quantum Chemistry. Istanbul Lectures. Pt. 2, *Interactions*. Oktay Sinanoglu, Ed. Academic Press, New York, 1965. 327 pp. Illus. \$12. Contributors are A. Bellemans, O. Chalvet, Morrel H. Cohen, R. Daudel, Ph. Durand, Cavid Erginsoy, C. Hollister, Zdeněk Horák, I. Jano, Laurens Jansen, Joshua Jortner, Neil R. Kestner, Wolfgang Liptay, V. McKoy, Jeremy I. Musher, Lars Onsager,

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Molecular Beams. John Ross, Ed. Interscience (Wiley), New York, 1966. 429 pp. Illus. \$15. Nine papers: "Beam measurements of atomic polarizabilities" by Benjamin Bederson and Edward J. Robinson; "Elastic scattering of high-energy beams: Repulsive forces" by I. Amdur and J. E. Jordan; "Quantum effects in elastic molecular scattering" by Richard B. Bernstein; "Elastic scattering in chemically reactive systems" by E. F. Greene, A. L. Mour-sund, and J. Ross; "Collisions of electronically excited atoms and molecules" by E. E. Muschlitz, Jr.; "Charge transfer" by R. F. Stebbings; "Ion-neutral reactions" by C. F. Giese; "Supersonic nozzle beams" by J. B. Anderson, R. P. Andres, and J. B. Fenn; and "Reactive scattering in molecular beams" by D. R. Herschbach.

The Movement of Beach Sand. An analysis using fluorescent grains. James C. Ingle, Jr. Elsevier, New York, 1966. 231 pp. Illus. \$14.50. Developments in Sedimentology Series, No. 5.

Organic Electronic Spectral Data. vol. 3, 1956-1957. Owen H. Wheeler and Lloyd A. Kaplan, Eds. Interscience (Wiley), New York, 1966. 1222 pp. \$25.

Photochemistry. Jack G. Calvert and James N. Pitts, Jr. Wiley, New York, 1966. 917 pp. Illus. \$19.50.

Plant and Machinery for the Separation of Air by Low Temperature Methods: Design Atlas. I. P. Usyukin, I. G. Aver'-yanov, V. S. Gorokhov, A. M. Gorshkov, A. V. Zakharov, and N. K. Yelukhin. I. P. Usyukin, Ed. Translated from the Russian edition by S. S. Akerib and A. D. Norris, M. Ruhemann, Translation Ed. Pergamon, New York, 1965. 193 pp. Plates, \$45.

Polymer Handbook. J. Brandrup and E. H. Immergut, Eds. Interscience (Wiley), New York, 1966. Unpagged. Illus. \$19.50.

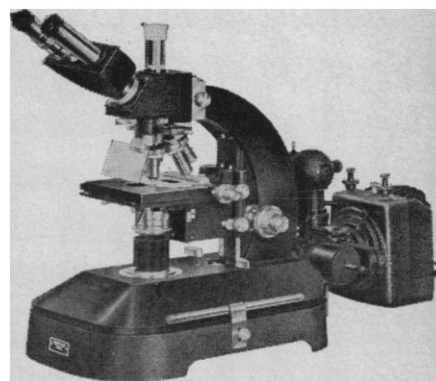
Prelude to Analysis. Paul C. Rosenbloom and Seymour Schuster. Prentice-Hall, Englewood Cliffs, N.J., 1966. 495 pp. Illus. \$11. Prentice-Hall Mathematics Series.

Principles of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light. Max Born and Emil Wolf. Pergamon, New York, ed. 3, 1966. 836 pp. Illus. \$17.50. Contributions by A. B. Bhatia, P. C. Clemmow, D. Gabor, A. R. Stokes, A. M. Taylor, P. A. Wayman, and W. L. Wilcock.

Problems in Inorganic Chemistry. B. J. Ayllett and B. C. Smith. Elsevier, New York, 1966. 160 pp. Illus. \$5.75.

Production Technology and Properties of Heat-Resisting Cast Iron. N. N. Aleksandrov and N. I. Klochev. Translated from the Russian edition (Moscow, 1964) by Adolph Wald. Israel Program for Scientific Translations, Jerusalem, 1965; Davey, New York, 1966. 152 pp. Illus. \$7.50.

Progress in Aeronautical Sciences. vol. 6. D. Küchemann and L. H. G. Sterne, Eds. Pergamon, New York, 1965. 378 pp. Illus. \$20. Five papers: "The evolution of



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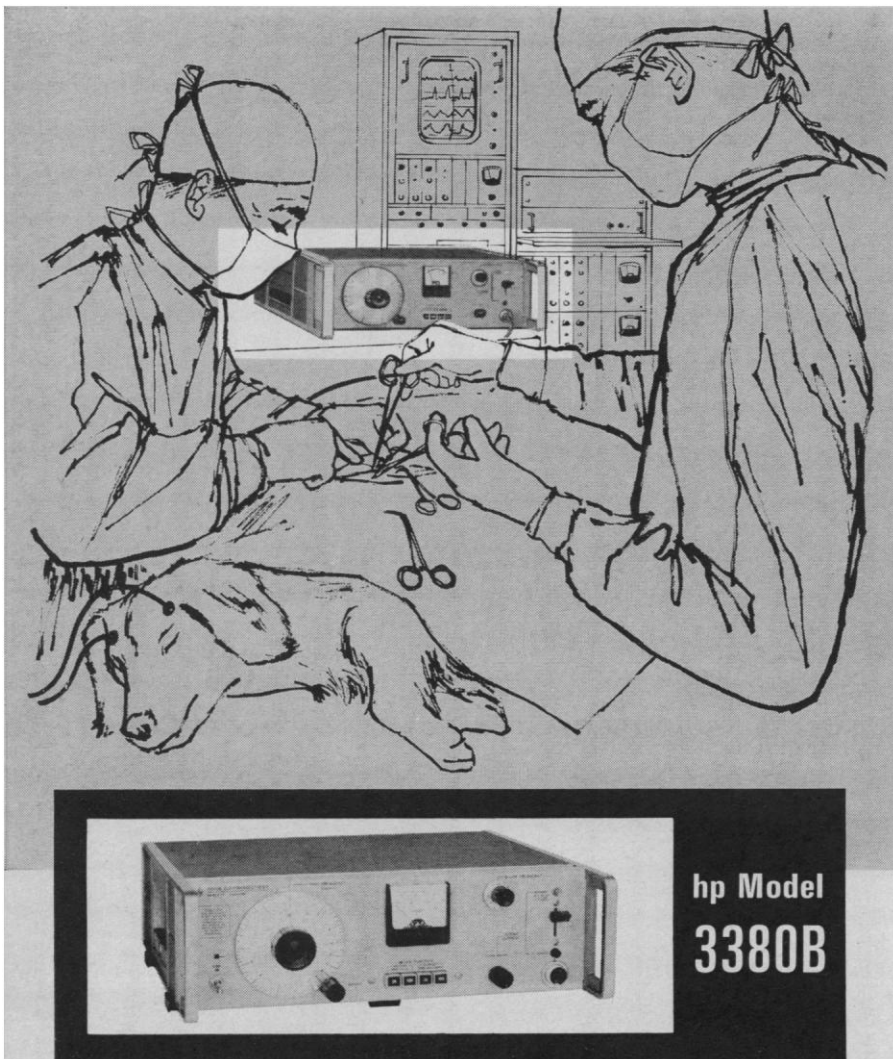
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Pseudopotentials in the Theory of Metals. Walter A. Harrison. Benjamin, New York, 1966. 352 pp. Illus. Paper, \$7.95; cloth, \$13.

Quantum Statistics and Cooperative Phenomena. John Gamble Kirkwood. F. H. Stillinger, Jr., Ed. Gordon and Breach, New York, 1965. 192 pp. Illus. Paper, \$4.95; cloth, \$8. Documents on Modern Physics Series, edited by Elliott W. Montroll and George H. Vineyard.

Random-Process Simulation and Measurements. Granino A. Korn. McGraw-Hill, New York, 1966. 252 pp. Illus. \$12.50.

Reflectance Spectroscopy. Wesley Wm. Wendlandt and Harry G. Hecht. Interscience (Wiley), New York, 1966. 306 pp. Illus. \$12. Chemical Analysis Series, vol. 21, edited by P. J. Elving and I. M. Kolthoff.

Remote Handling of Mobile Nuclear Systems. D. C. Layman and G. Thornton. U.S. Atomic Energy Commission, Oak Ridge, Tenn., 1966 (available from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). 657 pp. Illus. Paper, \$4.50.

Research on the Nature of Mineral-forming Solutions. With special reference to Data from Fluid Inclusions. N. P. Yermakov and others. Translated from the Russians by V. P. Sokoloff. Edwin Roedder, Translation Ed. Pergamon, New York, 1965. 747 pp. Illus. \$25. International Series of Monographs in Earth Sciences, edited by Dean Earl Ingerson.

Reviews of Plasma Physics. vol. 4. M. A. Leontovich, Ed. Translated from the Russian edition (Moscow, 1964) by Herbert Lashinky. Consultants Bureau, New York, 1966. 249 pp. Illus. \$12.50. Three papers: "Hydrodynamic description of a collisionless plasma" by T. F. Volkov; "Cooperative phenomena and shock waves in collisionless plasmas" by R. Z. Sagdeev; and "Coulomb collisions in a fully ionized plasma" by D. V. Sivukhin.

Second Law of Thermodynamics. S. R. Montgomery. Pergamon, New York, 1966. 126 pp. Illus. Paper, \$3.50. The Commonwealth and International Library.

Solar Radiation. N. Robinson, Ed. Elsevier, New York, 1966. 359 pp. Illus. \$24.50. Contributors are U. Becker, M. Y. Ben-Sira, S. Fritz, F. Möller, W. Schüepp, and G. Yamamoto.

Strength and Structure of Engineering Materials. N. H. Polakowski and E. J. Ripling. Prentice-Hall, Englewood Cliffs, N.J., 1966. 553 pp. Illus. \$17.35.

Stroboscopes for Industry and Research. J. Rutkowski. Translated from the Polish edition (Warsaw, 1961) by E. Lepa. Pergamon, New York; Wydawnictwa Naukowo-Techniczne, Warsaw, 1966. 278 pp. Illus. \$12.50.

Structural Mechanics: Classical and Matrix Methods. S. O. Asplund. Prentice-

Hall, Englewood Cliffs, N.J., 1966. 490 pp. Illus. \$18.65. Prentice-Hall Series in Structural Analysis and Design, edited by William J. Hall.

Structure of Arithmetic. John H. Minnick and Raymond C. Strauss. Harper and Row, New York, 1966. 528 pp. Illus. Paper, \$6.95.

Superconductivity of Metals and Alloys. P. G. de Gennes. Translated from the French by P. A. Pincus. Benjamin, New York, 1966. 288 pp. Illus. \$12.50.

Surface Interactions Between Metals and Gases. V. I. Arkharov and K. M. Gorbunova, Eds. Translated from the Russian (Moscow, 1964). Consultants Bureau, New York, 1966. 171 pp. Illus. Paper, \$25. Twenty-seven papers on topics considered at a conference (May 1963) honoring P. D. Dankov on his 60th birthday.

Les théories unitaires de l'électromagnétisme et de la gravitation. Marie-Antoinette Tonnelat. Gauthier-Villars, Paris, 1965. 546 pp. Illus. Paper, \$30.

Thermal Stresses in a Composite Cylinder: With an Arbitrary Temperature Distribution Along Its Length. V. S. Nikishin. Translated from the Russian edition (Moscow, 1964). Plenum Press Data Division (Consultants Bureau), New York, 1966. 123 pp. Illus. \$22.50.

Thermodynamics. J. T. Vanderslice, H. W. Schamp, Jr., and E. A. Mason. Prentice-Hall, Englewood Cliffs, N.J., 1966. 256 pp. Illus. \$7.95.

Visual Methods of Emission Spectroscopy. N. S. Sventitskii. Translated from the Russian edition (Moscow, 1961) by IPST Staff. P. Vardin, Scientific Editor. Israel Program for Scientific Translations, Jerusalem, 1965; Davey, New York, 1966. 352 pp. Illus. \$15.25.

Economics and the Social Sciences

The Common Wealth in Ocean Fisheries: Some Problems of Growth and Economic Allocation. Francis T. Christy, Jr., and Anthony Scott. Published for Resources for the Future by Johns Hopkins Press, Baltimore, 1965. 295 pp. Illus. \$6.

Early Formative Period of Coastal Ecuador: The Valdivia and Machalilla Phases. Betty J. Meggers, Clifford Evans, and Emilio Estrada. Smithsonian Institution, Washington, D.C., 1965. 452 pp. Illus. Plates. \$6.75.

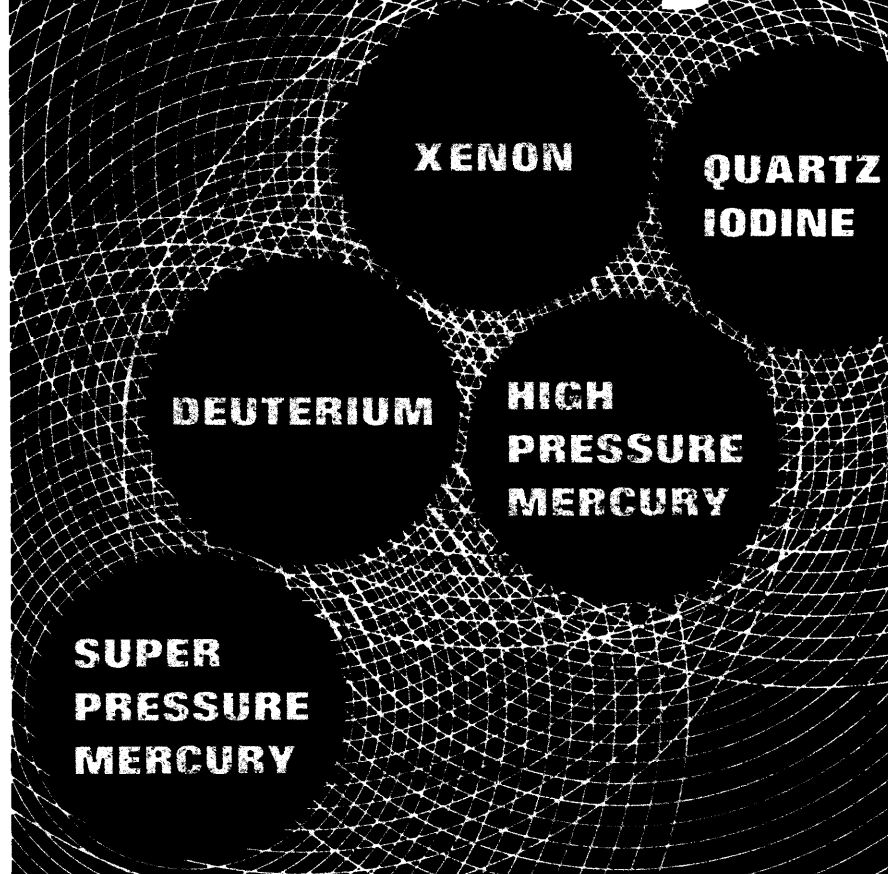
Economics of the Property Tax. Dick Netzer. Brookings Institution, Washington, D.C., 1966. 344 pp. Illus. \$6.75.

Elements of Psychophysics. vol. 1, *Gustav Fechner*. Translated from the German edition (1860) by Helmut E. Adler. Davis H. Howes and Edwin G. Boring, Translation Eds. Holt, Rinehart, and Winston, New York, 1966. 320 pp. Illus. \$6.

Logik der Sozialwissenschaften. Ernst Topitsch. Kiepenheuer and Witsch, Köln, Germany, 1965. 568 pp. Paper. Neue Wissenschaftliche Bibliothek Soziologie, No. 6, edited by Jürgen Habermas.

New Perspectives of Brazil. Eric N. Baklanoff, Ed. Vanderbilt Univ. Press, Nashville, Tenn., 1966. 344 pp. Illus. \$7.50. Ten papers: "Post-dictatorship Brazil, 1945-1965" by John W. F. Dulles; "Some basic developments in Brazilian

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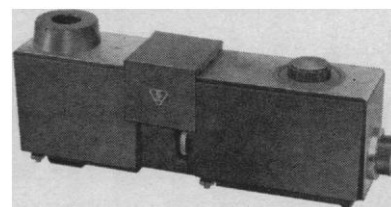
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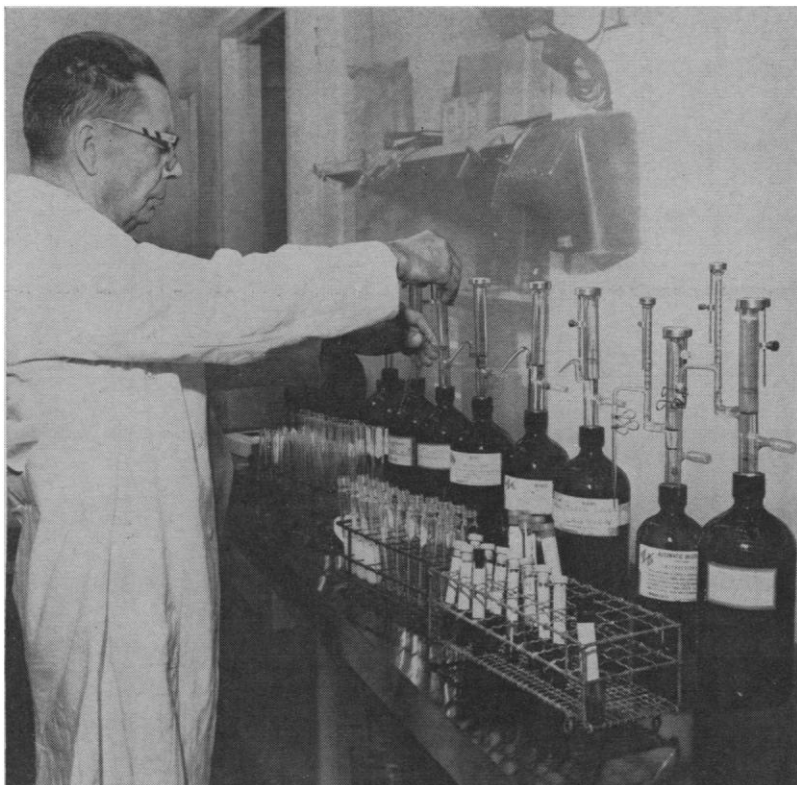
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On Political Economy and Econometrics: Essays in Honour of Oskar Lange. Pergamon, New York; Państwowe Wydawnictwo Naukowe, Warsaw, 1965. 669 pp. Illus. \$18.50. Forty-two papers in honour of Professor Lange's 60th birthday.

Origins of Man: Physical Anthropology. John Buettner-Janusch. Wiley, New York, 1966. 702 pp. Illus. \$9.45.

Peasants. Eric R. Wolf. Prentice-Hall, Englewood Cliffs, N.J., 1966. 128 pp. Illus. Paper, \$1.75; cloth, \$4.50. Foundations of Modern Anthropology Series, edited by Marshall D. Sahlins.

A Preface to Economic Geography. Harold H. McCarty and James B. Lindberg. Prentice-Hall, Englewood Cliffs, N.J., 1966. 271 pp. Illus. Paper, \$5.25.

Psychology: The Fundamentals of Human Adjustment. Norman L. Munn. Houghton Mifflin, Boston, ed. 5, 1966. 732 pp. Illus. \$8.50.

Readings in Physical Anthropology. Thomas W. McKern. Prentice-Hall, Englewood Cliffs, N.J., 1966. 207 pp. Illus. Paper, \$4.95. Eighteen papers and an introduction by S. L. Washburn.

The Two Worlds of the Washo: An Indian Tribe of California and Nevada. James F. Downs. Holt, Rinehart, and Winston, New York, 1966. 125 pp. Illus. Paper, \$1.50. Case Studies in Cultural Anthropology, edited by George Spindler and Louise Spindler.

Conference and Symposium Reports

Acta Imeko, 1964. vol. 4. Proceedings of the Third International Measurement Conference (Stockholm), September 1964. Hungarian Scientific Soc. for Measurement and Automation, Budapest, 1965. 740 pp. Illus. The papers are in Russian, English, or German.

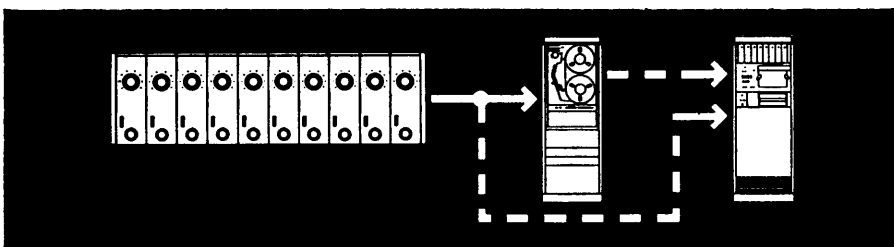
Advances in Biology of Skin. vol. 6. *Aging.* Proceedings of a symposium (Portland, Ore.), May 1964. William Montagna, Ed. Pergamon, New York, 1965. 289 pp. Illus. \$15. Seventeen papers: "Morphology of the aging skin: The cutaneous appendages" by William Montagna; "Effects of aging on the papillary body of the hair follicles and on the eccrine sweat glands" by H. Oberste-Lehn; "Age changes in the human melanocyte system" by Thomas B. Fitzpatrick; George Szabó, and Ruth E. Mitchell; "Nerve changes in aging skin" by R. K. Winkelmann; "The effects of aging on the receptor organs of the human dermis" by Nikolajs Cauna; "The anatomy of

the human scalp" by Luigi Giacometti; "The effect of aging on the activity of the sebaceous gland in man" by Peter E. Pochi and John S. Strauss; "The effect of age on human eccrine sweating" by Alene F. Silver, William Montagna, and Ismet Karacan; "Effect of aging on human dermis: Studies of thermal shrinkage and tension" by D. M. Rasmussen, Khalil G. Wakim, and R. K. Winkelmann; "Per-cutaneous absorption in aged skin" by Enno Christophers and Albert M. Kligman; "The effect of topical steroids on the aged human axilla" by Christopher M. Papa and Albert M. Kligman; "Alterations in human dermal fibrous connective tissue with age and chronic sun damage" by W. Mitchell Sams, Jr., and J. Graham Smith, Jr.; "Human cutaneous acid mucopolysaccharides: The effects of age and chronic sun damage" by J. Graham Smith, Jr., Eugene A. Davidson, and Ralph W. Taylor; "Temporal changes in collagen—aging or essential maturation?" by D. S. Jackson; "Biophysical aspects of aging in connective tissue" by Harry R. Elden; "The chemistry of elastin and its relationship to structure" by Karl A. Piez, Edward J. Miller, and George R. Martin; and "Structure and metabolism of skin polysaccharides" by E. A. Davidson.

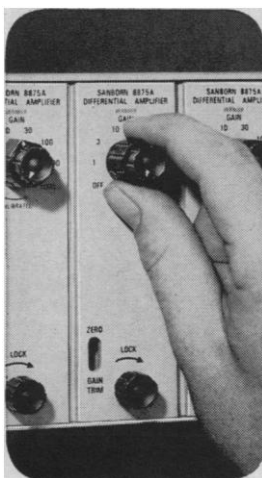
Advances in Enzyme Regulation. vol. 3. Proceedings of the third symposium (Indianapolis, Ind.), October 1964. George Weber, Ed. Pergamon, New York, 1965. 479 pp. Illus. \$17. Twenty-six papers on the following topics: Mechanism of Effect of Corticosteroids on Enzyme-Forming Systems (4 papers); Regulation of Enzyme Activity and Synthesis in Various Mammalian Organs (2 papers); Behavior of Enzyme Forming Systems in Slices and Isolated Organs (4 papers); Development of Enzymes (4 papers); Effects of Actinomycin and Puromycin (2 papers); Problems in Enzyme Regulation (1 paper); Enzyme Regulation in Hepatomas (7 papers); and Concepts in Enzyme Regulation (2 papers).

Biosynthetic Pathways in Higher Plants. Proceedings, Plant Phenolics Group Symposium (Leeds), April 1964. J. B. Pridham and T. Swain. Eds. Academic Press, New York, 1965. 224 pp. Illus. \$12. Eleven papers and two summaries: "Biological aspects of chemical reactions in higher plants" by N. A. Burges and H. M. Hurst; "Methods used in the study of biosynthesis" by T. Swain; "The biosynthesis of carotenoids" by T. W. Goodwin; "Regulation of terpenoid synthesis in higher plants" by T. W. Goodwin; "Amino acid biosynthesis" by L. Fowden; "Protein biosynthesis in higher plants" by D. Boulter; "Nucleotides and carbohydrate metabolism: A summary" by G. A. Barber; "The biosynthesis of cellulose" by R. D. Preston; "Biosynthesis of lignin" by F. A. Isherwood; "The biogenesis of the piperidine alkaloids" by B. T. Cromwell; "Anthocyanidins and flavonoids: A summary" by H. Grisebach; "The biosynthesis of chlorophyll" by June Lascelles; and "Plant acids" by S. L. Ranson.

Chemistry and Physics of Interfaces. Based on a symposium sponsored by Industrial and Engineering Chemistry and the Division of Industrial and Engineering Chemistry of the American Chemical



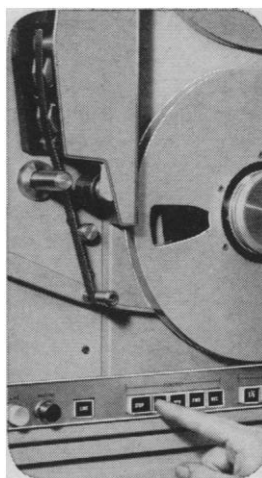
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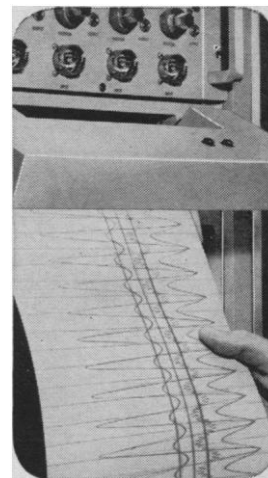
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Society (Washington, D.C.), June 1964. David E. Gushee, Ed. American Chemical Soc., Washington, D.C., 1965. 187 pp. Illus. \$7.50. Fourteen papers.

Dolomitization and Limestone Diagenesis. A symposium (Toronto, Canada), May 1964. Lloyd C. Pray and Raymond C. Murray, Eds. Soc. of Economic Paleontologists and Mineralogists, Tulsa, Okla., 1965. 186 pp. Illus. Paper, \$5.50; members, \$4. Seven papers, two abstracts of papers, and an introduction by R. C. Murray and L. C. Pray.

Exchange Reactions. Proceedings of a symposium (Upton, N.Y.), May-June 1965. International Atomic Energy Agency, Vienna, 1965 (order from Natl. Agency for International Publications, New York). 427 pp. Illus. \$9. Twenty-eight papers and one abstract; most of the papers are in English, the others in French. An abstract of each paper is given in English, French, Russian, and Spanish.

Film in Higher Education and Research. Proceedings of a conference (Birmingham, England), September 1964. Peter D. Groves, Ed. Pergamon, New York, 1966. 344 pp. Illus. Paper, \$4.95. The Commonwealth and International Library. The conference was organized by the College Film and Television Advisory Panel, University of Aston. The sections are: The Film and the University; The Supply of Films; Films in Teaching; Films in Research; and The Production of Films.

Fluorescence and Phosphorescence Analysis: Principles and Applications. David M. Hercules, Ed. Interscience

(Wiley), New York, 1966. 272 pp. Illus. \$12. Eight papers given at a symposium organized by the Analytical Division of the American Chemical Society (Chicago), 1964.

Fundamental Phenomena in Hypersonic Flow. Proceedings of the international symposium sponsored by Cornell Aeronautical Laboratory (Buffalo, N.Y.), June 1964. J. Gordon Hall, Ed. Cornell Univ. Press, Ithaca, N.Y., 1966. 362 pp. Illus. \$12.50. Thirteen papers and comments on each.

The Growth of Cereals and Grasses. Proceedings of the Twelfth Easter School (Nottingham, England), March-April 1965. F. L. Milthorpe and J. D. Ivins, Eds. Butterworth, Washington, D.C., 1966. 370 pp. Illus. \$19. Twenty-two papers on the following topics: Vegetative Development (3 papers); Reproductive Development (4 papers); The Environment (4 papers); Responses to the Environment (5 papers); Biochemical Aspects of Quality (2 papers); and Agronomic Aspects (4 papers).

High Energy Physics. Lectures delivered at Les Houches Summer School of Theoretical Physics, 1965. C. DeWitt and M. Jacob, Eds. Gordon and Breach, New York, 1965. 521 pp. Illus. Paper, \$8.50; cloth, \$10.50. Eight lectures: "Group theory, invariance principle, symmetries" by G. C. Wick; "Group combining internal symmetries and spin" by F. Gürsey; "Introduction to the theory of strong interactions" by M. Froissart and R. Omnès; "The analytic S-matrix: A the-

ory for strong interactions" by G. F. Chew; "Quark models for the 'elementary particles'" by R. H. Dalitz; "Particle and polarization angular distribution for two- and three-body decays" by J. D. Jackson; "Peripheral interaction" by J. D. Jackson; and "Theory of weak interactions" by J. S. Bell.

Physics of Quantum Electronics. Proceedings of a conference (San Juan, Puerto Rico), June 1965. P. L. Kelley, B. Lax, and P. E. Tannenwald, Eds. McGraw-Hill, New York, 1966. 891 pp. Illus. \$24. Eighty-six papers on the following topics: Nonlinear Effects (14 papers); Raman, Brillouin, and Rayleigh Scattering (14 papers); Laser Materials, Spectroscopy, and Mechanisms (13 papers); Semiconductor Lasers (9 papers); Gas Breakdown (7 papers); Gas Masers (15 papers); and Measurement Theory, Oscillators, and Noise (14 papers).

Proceedings of a Conference on Research Problems in Leprosy (Washington, D.C.), May 1965. Esmond R. Long, Ed. International Leprosy Assoc., Washington, D.C., 1965. 414 pp. Illus. Paper, \$10 (order from Leonard Wood Memorial, Washington, D.C.).

Proceedings of the NMSE Systems Performance Effectiveness Conference (Washington, D.C.), April 1965. Robert J. Suslowitz, Ed. U.S. Naval Applied Science Laboratory, Brooklyn, N.Y., 1966. 231 pp. Illus. Paper. Sixteen papers.

Proceedings of the Symposium on Coordination Chemistry (Tihany, Hungary), September 1964. Mihály T. Beck, Ed. Akadémiai Kiadó, Budapest, 1965. 484 pp. Illus. \$15. Forty papers and discussions of the papers; papers are in English or German.

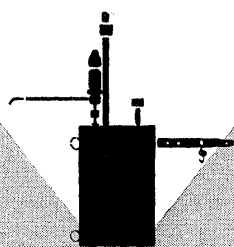
Psychophysiological Aspects of Cancer (*Ann. N.Y. Acad. Sci.* **125**). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1965. 282 pp. Illus. Paper, \$6. Twenty-seven papers presented at a conference held in April 1965.

Structure and Function of Connective and Skeletal Tissue. Proceedings of an Advanced Study Institute organized under the auspices of N.A.T.O. (St. Andrews, Scotland), June 1964. S. Fitton Jackson and G. R. Tristram, Eds. Butterworth, Washington, D.C., 1965. 559 pp. Illus. \$28.50. 101 papers.

The Structure of Glass. vol. 4, *Electrical Properties and Structure of Glass*. O. V. Mazurin, Ed. Translated from the Russian edition (Leningrad, 1962) by E. B. Uvarov. Consultants Bureau, New York, 1965. 164 pp. Illus. \$17.50. Thirty papers given at a symposium (Leningrad), December 1962.

Theory of Arch Dams. A symposium (Southampton, England), April 1964. J. R. Rydzewski, Ed. Pergamon, New York, 1965. 796 pp. Illus. \$40. Thirty-six papers.

Toward a National Information System. Second annual national colloquium on information retrieval (Philadelphia), April 1965. Morris Rubinoff, Ed. Spartan Books, Washington, D.C., 1965. 250 pp. Illus. \$9.50. Seventeen papers on the following topics: State of the National Information System (3 papers); Mechanization (5 papers); Administration and Economics (4 papers); and Current Development (5 papers).



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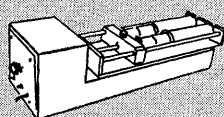
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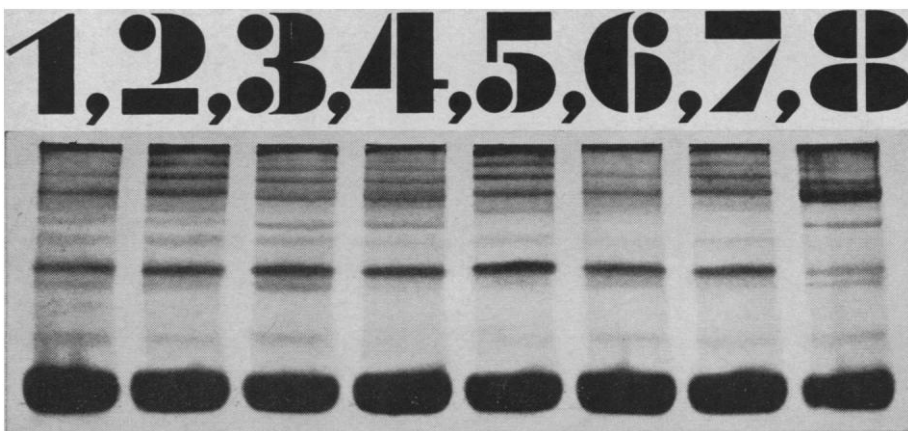
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NEWS AND COMMENT

(Continued from page 190)

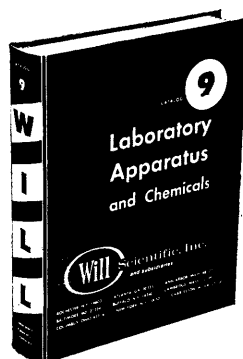
sión Nacional de Investigación del Espacio (CONIE) will work together in Spain to launch sounding rockets designed to obtain information on the dynamics of atmospheric circulation; the information is to be used in studies of meteorology and planetary atmospheres. Project directors have yet to be appointed.

Harvard University is establishing a **wildlife research** center and field station in Concord, Massachusetts, under the direction of the university's Museum of Comparative Zoology. The new facility includes nearly 800 acres, in two separate tracts, one near the National Fish and Wildlife Refuge of the Concord River. The center's value stems chiefly from its being typical of much of the land in New England and New York State. It has woodlands, open fields, marshes, and ponds which will serve as a laboratory for teaching and research on animal behavior and on the relationships of plants and animals to their environment. Ernst Mayr, director of the Museum of Comparative Zoology, says that the Concord station, about a half-hour's drive from the university, "will enable professors and students to spend time in the field and return to the city the same day for classes or laboratory work." It will be open both to people from Harvard and the other Boston-area institutions.

The University of Southern California has begun a graduate program in the **demography of social disorganization**. Students will take a 4-year course leading to the Ph.D. degree in sociology. Participants are eligible for National Institutes of Mental Health traineeships, which provide fellowships ranging from \$1800 through \$3000, plus tuition, fees, and a \$500 allowance for each dependent. (Maurice D. Van Arsdol, Jr., Department of Sociology and Anthropology, University of Southern California, Los Angeles 90007)

The psychiatry department at Yale University is offering a training program designed "to provide intensive experience in developing research skills in areas which could lead to investigative careers in **mental health**." Participants may choose laboratory training in the fields of their choice (pharmacology, neurochemistry, neurophysiology) and in specialized research areas in

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psychology. Work in clinical psychiatry will be provided when required. Applicants may hold an M.D. or Ph.D. degree; those with Ph.D.'s will be offered sufficient clinical training to provide relevant experience for their research interests. Stipends are \$6000 the first year, \$7000 the second. (Malcolm Bowers, School of Medicine, Yale University, 333 Cedar Street, New Haven, Connecticut)

New Journals

Antarctic Journal of the United States. Vol. 1, No. 1, January-February 1966. Kurt Sandved, Editor. Replacing *Bulletin of the U.S. Antarctic Projects Officer* (Defense Department) and *Antarctic Report* (NSF), as the official informational organ on U.S. programs in Antarctica. (Information Officer, Office of Antarctic Programs, NSF, Washington, D.C. 20550. Bimonthly; free of charge; supply limited)

International Journal of Cancer. Vol. 1, No. 1, January 1966. E. A. Saxon, Editor. Publication of the International Union Against Cancer. Research papers in English or French, summaries in both languages. (Munksgaard Publishers, 47 Prags Blvd., Copenhagen, Denmark. Bimonthly; \$25 a year)

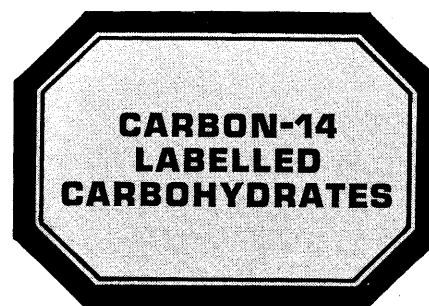
Neuroendocrinology. Vol. 1, No. 1, 1965/66. E. Bajusz, Editor. International journal for basic and clinical studies on neuroendocrine relationships. (Albert J. Phiebig, Box 352, White Plains, N.Y. Bimonthly; \$15.50 a year)

Grants, Fellowships, and Awards

Hahnemann Medical College and Hospital is offering research fellowships for the 1967 academic year to M.D.'s interested in **cardiology**. The awards are for training in electrocardiography and vectrocardiography, ecocardiography, myocardial metabolism and electrophysiology, or cardiac catheterization. Stipends are \$5000 to \$6000. Applicants must have had a year of internship and at least 2 years in medical residency. (Bernard L. Segal, Department of Medicine, Hahnemann Medical College and Hospital, 230 N. Broad St., Philadelphia 19102)

Awards for pre- and postdoctoral training in the organic and biological chemistry of **marine organisms** are

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D-Glucose-C14 (U)-6-phosphate	2-4
D-Glucose-C14 (U)-6-phosphate [High specific activity]	50-150
D-Glucose-1-C14-6-phosphate	2-4
myo-Inositol-C14 (U)	30-200
Lactose-1-C14	4-12
Maltose-C14 (U)	4-10
Maltotriose-C14 (U)	100-250
D-Mannitol-1-C14	10-30
D-Mannose-C14 (U)	1-4
D-Mannose-1-C14	2-5
D-Mannose-1-C14 [High S.A.]	20-30
D-Mannose-2-C14	1-3
Methyl-(α-D-glucosyl-C14 (U)) pyranoside	2-5
Potassium D-glucuronate-C14 (U)	2-4
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D-Ribose-C14 (U)	2-4
D-Ribose-C14 (U) [High S.A.]	15-30
D-Ribose-1-C14	2-4
D-Ribose-1-C14 [High S.A.]	15-30
Sodium D-gluconate-C14 (U)	2-6
Sodium D-gluconate-1-C14	2-5
Sodium D-gluconate-6-C14	1-4
Sorbitol-C14 (U)	5-10
Sorbitol-1-C14	2-5
L-Sorbose-C14 (U)	2-4
Starch-C14 (U)	2-50 μc/mg
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Sucrose-C14 (U)	5-15
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The Public Health Service's division of accident prevention offers aid for research and training in **accident prevention**. Since no single discipline has a monopoly on productive work in the area, individuals and institutions interested in accident-prevention research from any academic viewpoint may apply for the grants. The types of aid and the application deadlines for each are:

Research training grants. Support to colleges and universities for their ongoing, degree-granting programs in the field; this will include stipends for students.

Research grants. Support to educational and other nonprofit institutions for the actual research. Deadlines: 1 June, 1 October, 1 February.

Fellowships. Separate categories for pre- and postdoctoral applicants who want to attend universities which offer research and training of special interest to the individual. Deadlines: 1 January, 1 April, 1 October. (Leon G. Goldstein, Research Grants Branch, Division of Accident Prevention, PHS, Washington, D.C. 20201)

The AAAS is accepting entries for its annual **socio-psychological prize** contest. A \$1000 award will be presented for the paper which the judges consider best furthers understanding of the psychological-social-cultural behavior of human beings. The prize is intended to "encourage studies and analyses of social behavior based on explicitly stated assumptions or postulates leading to conclusions or deductions that are verifiable by systematic empirical research; to encourage in social inquiry the development and application of the kind of dependable methodology that has proved so fruitful in the natural sciences."

Entries should have a complete analysis of a problem and should include relevant data and an interpretation of

these data in terms of the postulates with which the study began. Unpublished manuscripts and papers published since 1 January 1965 are eligible. Deadline: *1 September*. (For instructions on how to submit entries: AAAS Socio-Psychological Prize, 1515 Massachusetts Ave., NW, Washington, D.C.)

The Helen Hay Whitney Foundation is offering fellowships for M.D.'s and Ph.D.'s interested in biological or medical research careers, preferably related to **diseases of the connective tissues**. Applicants may be from any country but may not be over 35 years old. The appointments are made annually and are renewable for 3 years. Stipends start at \$6500, with \$500 for each dependent and \$500 annual increment. Deadline for applications for 1967-68: *15 August*. (Helen Hay Whitney Foundation, 22 East 65th Street, New York 10021)

Meeting Notes

The 1966 **Engineering Foundation** Research conferences will be held 25 July to 26 August. Attendance will be limited to 100 and will be by invitation or acceptance of application. The registration fee is \$140. The first four meetings, to take place at Proctor Academy, Andover, New Hampshire, are:

25-29 July, "Technology and Society"

1-5 August, "Industry and the Young Engineer"

8-12 August, "Interdisciplinary Team Approaches in Engineering"

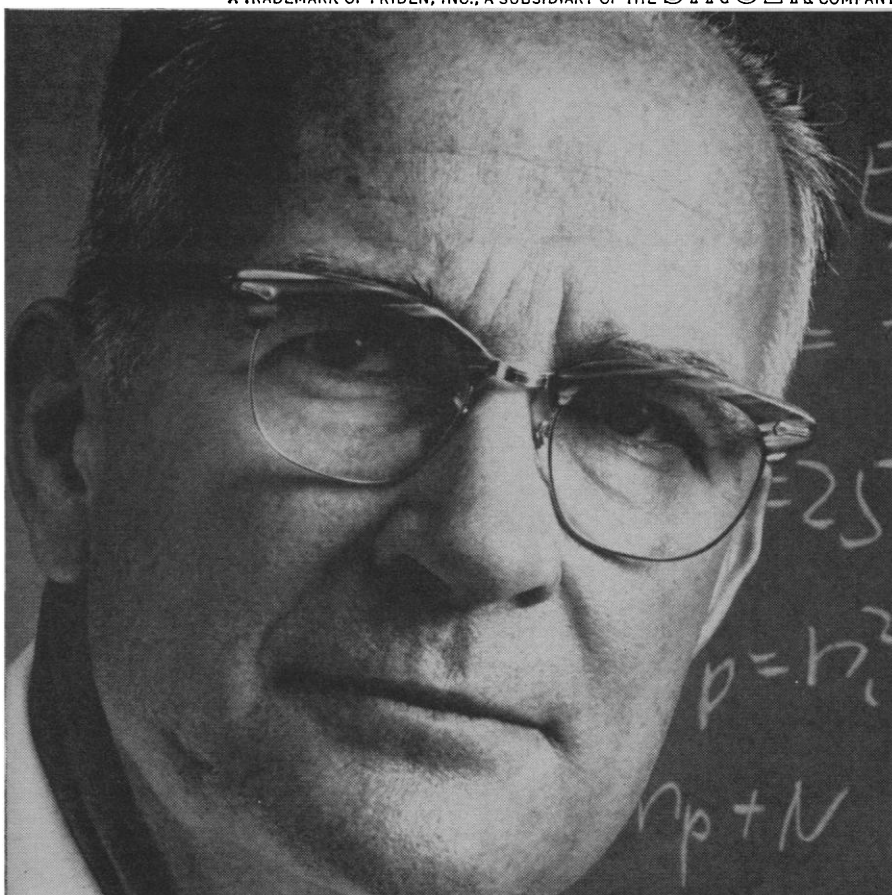
15-19 August, "Changing Science and Technology—Its Effect on the Professional Engineering Societies."

The University of California, Santa Barbara, will be the site of the meeting, 22-26 August, on "Technology and the City Matrix." The final session, "Particulate Matter Systems—Their Simulation and Optimization," will be held at the University School of Milwaukee. (Engineering Foundation, 345 E. 47 Street, New York 10017)

The call for papers has been issued for a **nuclear science** symposium, to be held in Boston 19-21 October. The theme of the meeting will be instrumentation in space and laboratory, and papers are desired on nuclear instruments and circuits, data handling and acquisition, reactor instrumentation, and radiation detectors. Sponsors: Nu-

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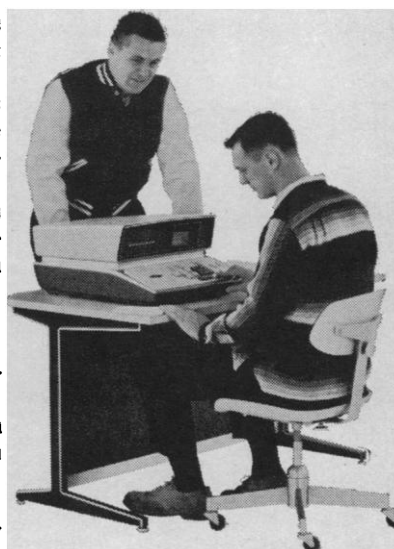
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clear Science Group of the Institute of Electrical and Electronic Engineers, and the National Bureau of Standards. Presentation time: 10 minutes; abstracts: 100 to 300 words; deadline: 13 June. (J. A. Coleman, Electron Devices Section, National Bureau of Standards, Washington, D.C. 20234)

Colorado State University will present a "tutorial symposium" on advances in **quantum electronics** 20 June to 1 July in Estes Park, Colorado. Attendance will be limited to 100 researchers and advanced students, and no academic credit will be given. The topics to be covered include fundamentals of the optical maser, nonlinear optical effects, quantum noise, application of gas lasers to spectroscopy, and recent advances in pulsed laser technology. The tuition will be \$240, and room and board \$11 a day. Some fellowships for tuition and lodging will be available. Application deadline: 10 May. (David F. Edwards, Department of Physics, Colorado State University, Fort Collins 80521)

An international conference on **nuclear physics** will be held 12-17 September in Gatlinburg, Tennessee. The sponsors are the International Union of Pure and Applied Physics, the U.S. Atomic Energy Commission, and Oak Ridge National Laboratory. Invited and contributed papers will be presented. Attendance at the conference is by invitation only; a limited number of invitations are available. Papers deadline: 22 July. (Alexander Zucker, Oak Ridge National Laboratory, Post Office Box X, Oak Ridge, Tennessee 37831)

Lehigh University will conduct an NSF-sponsored conference on **colloid, surface, and macromolecular chemistry**, 11-23 July. The major purposes of the meeting are to encourage the introduction of these areas into standard undergraduate chemistry courses, to help instructors who want to develop advanced courses in colloid or polymer chemistry, and to present current trends in research. Participation will be limited to 30 college teachers. (Albert C. Zettlemoyer, Department of Chemistry, Lehigh University, Bethlehem, Pennsylvania 18015)

An international symposium on **free radicals in solution** will be held at the University of Michigan, Ann Arbor, 21-24 August. The sponsors are the

university and the division of organic chemistry of the International Union of Pure and Applied Chemistry. The meeting is in commemoration of the centennial of the birth of Moses Gomberg, who in 1900 discovered the first stable free radical, triphenylmethyl. Ten plenary lectures will be included; there will be no contributed papers. (R. C. Elderfield, Department of Chemistry, University of Michigan, Ann Arbor 48104)

Courses

A workshop on theory and applications of **fracture mechanics** is scheduled for 7-26 August at the University of Denver. The sponsors are Universal Technology Corporation, Dayton, Ohio, and Denver Research Institute. The first 2 weeks will deal with fundamentals of linear elastic fracture theory, effects of plasticity and stress concentration, laboratory fracture-testing and data interpretation, electron fractography, and incorporation of fracture mechanics in design. The 3rd week will be spent on advanced theoretical topics and on testing and design. Attendance at the first 2-week session is not prerequisite for enrollment. Applicants must have a college-level background, experience in mechanical or metallurgical engineering, and a knowledge of calculus and ordinary differential equations. (David L. Wells, Department 75, Universal Technology Corporation, P.O. Box 7, Dayton, Ohio 45449)

The University of Michigan has published a brochure describing the 38 short courses it will offer between May and August for engineers, scientists, and managers. The booklet, **Engineering Summer Conferences**, lists the title, dates, prerequisites, fee, content, and staff of each course. Copies of the brochure and complete information on the courses are available from Engineering Summer Conferences, West Engineering Building, University of Michigan, Ann Arbor 48104.

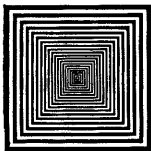
An international course on the techniques of **freeze-drying** will be offered 18-27 July in Lyon and Dijon, France. Discussion will center on the basic principles of freeze-drying and its applications to biology, to human and veterinary medicine, and to the pharmaceutical industry. A fee of 1700 francs (about \$350) will cover the expenses of the course, along with room,

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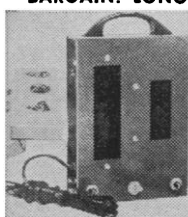
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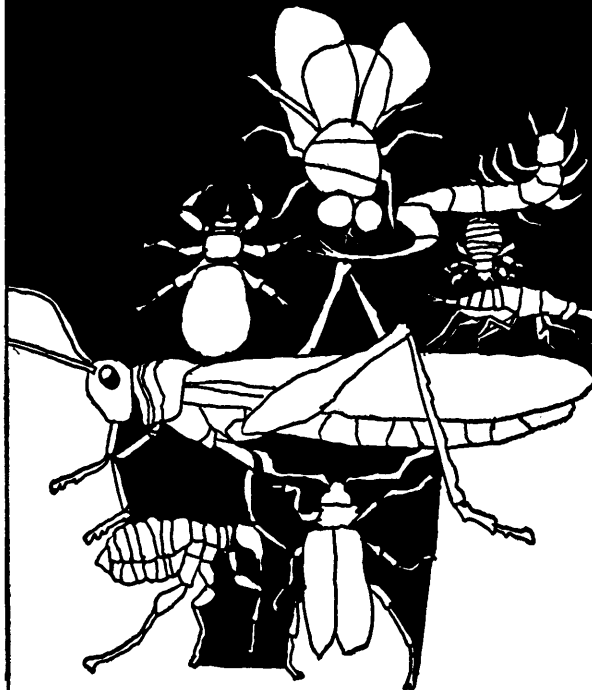
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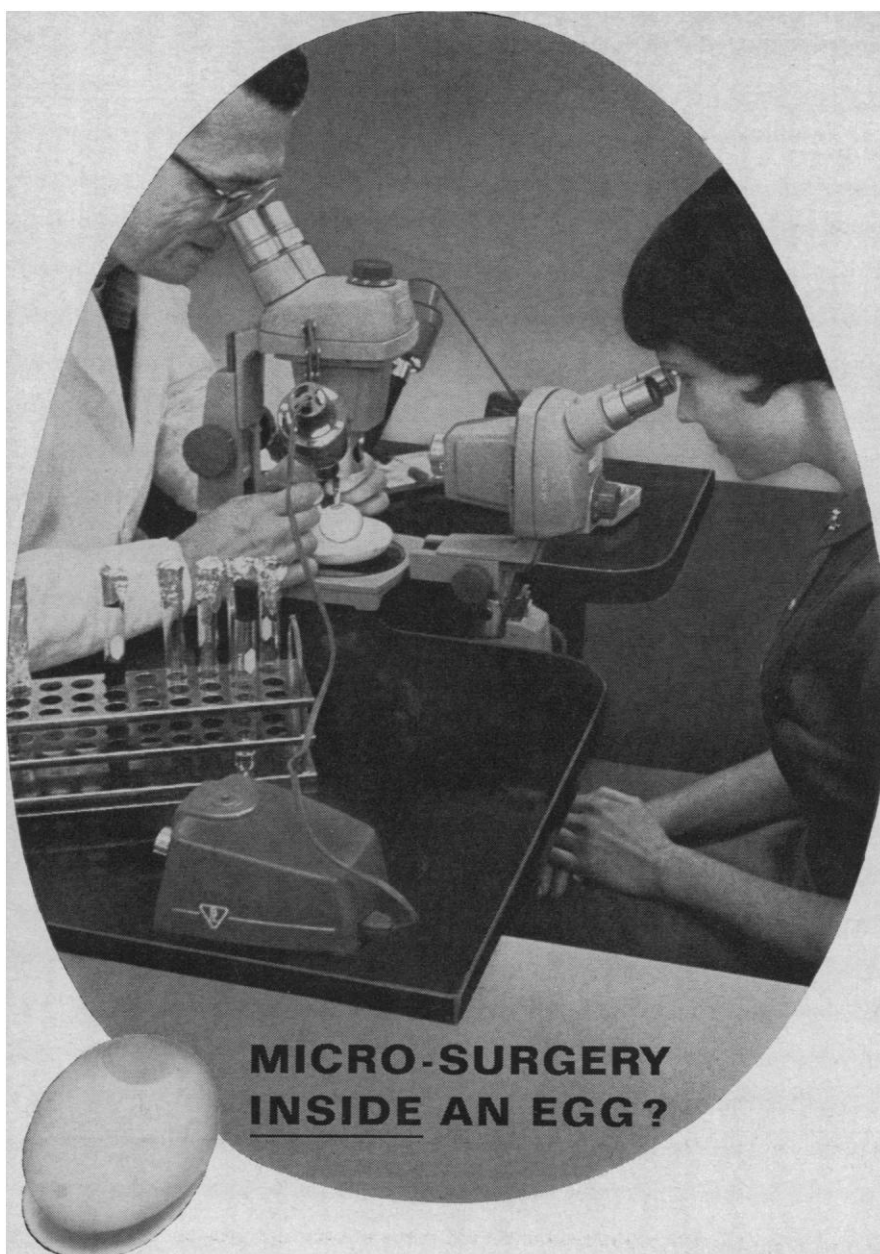
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board, and special programs. An additional 600 francs will be charged for participants' wives, and separate excursions and entertainment are being arranged for them. (International Course of Lyophilization, 17, rue Bourgelat, Lyon, France)

A course on methods for the **preparation and characterization of materials** is scheduled for 31 May to 10 June in the Materials Research Laboratory, Pennsylvania State University. Emphasis will be on high band gap materials such as oxides, sulfides, and halides. (Conference Center, Pennsylvania State University, University Park)

Scientists in the News

Jerome B. Wiesner, dean of the school of science at MIT, has been named a nonresident fellow of the Salk Institute for Biological Studies, San Diego, California. Under the appointment, he will spend part of each year at the Salk Institute, helping to develop its academic and scientific program.

Roy H. Garstang, professor of astrophysics at the University of Colorado, has become chairman of the Joint Institute for Laboratory Astrophysics. The institute is a joint project of the university and the National Bureau of Standards; it conducts research and graduate study in atomic and astrophysics, and in related sciences.

Frederick Reines, chairman of the physics department at Case Institute of Technology, has been appointed professor of physics and dean of physical sciences at the University of California, Irvine.

Kenneth F. Vernon has been appointed director of the Agency for International Development's office of engineering. He had been chief of the engineering division of the AID regional bureau for the Near East and South Asia since 1964.

John J. Karakash, head of the electrical engineering department at Lehigh University, has been appointed dean of the school's college of engineering.

E. Gartly Jaco, professor in the school of public health and the department of sociology at the University of Minnesota, will become chairman of