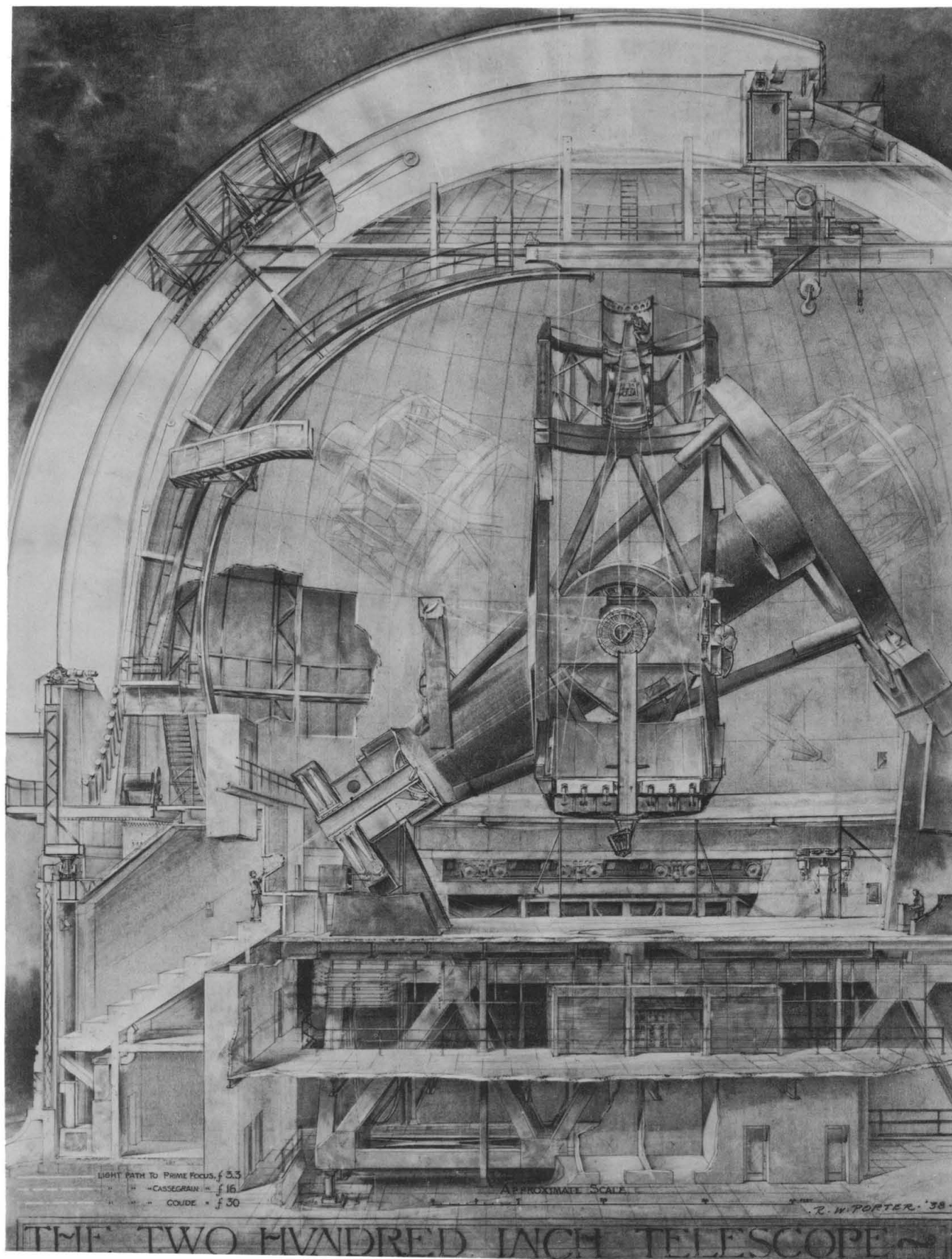


SCIENCE

9 June 1967

Vol. 156, No. 3780

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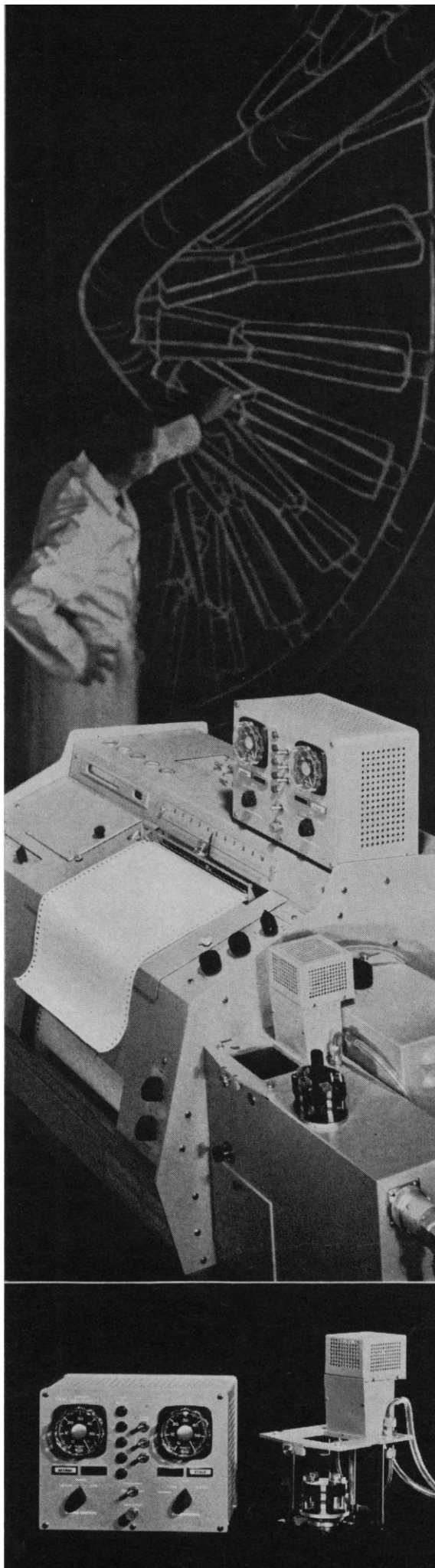
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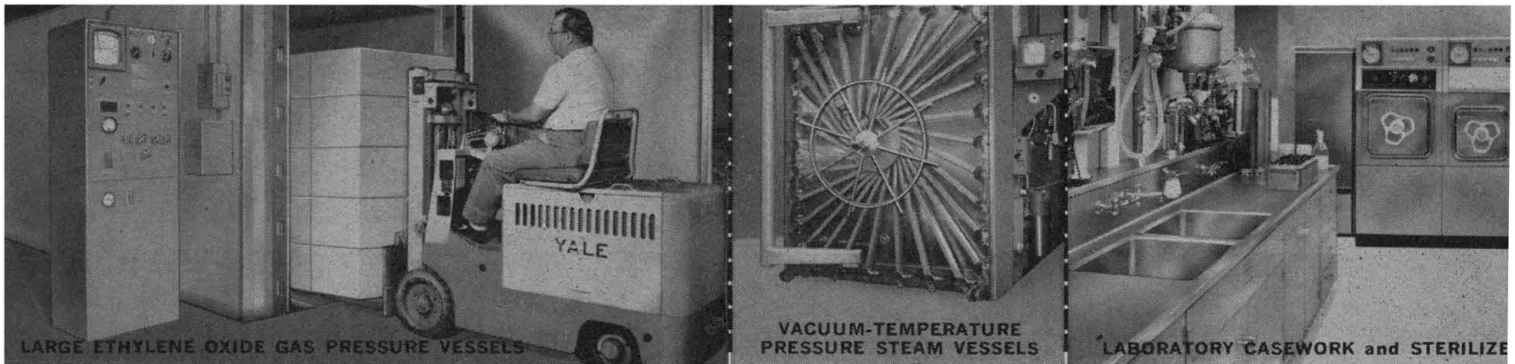
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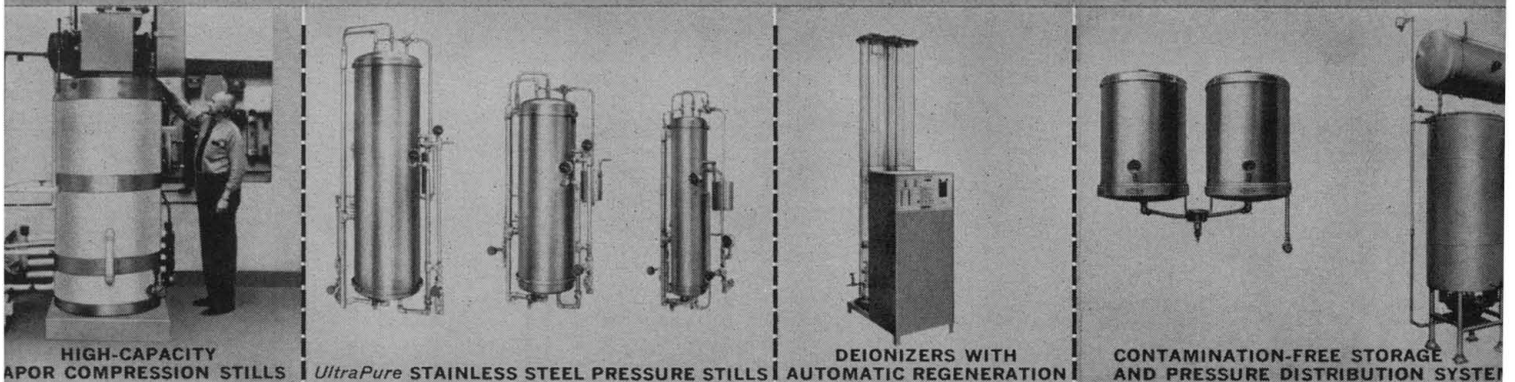
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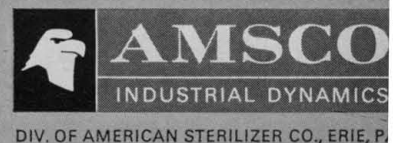
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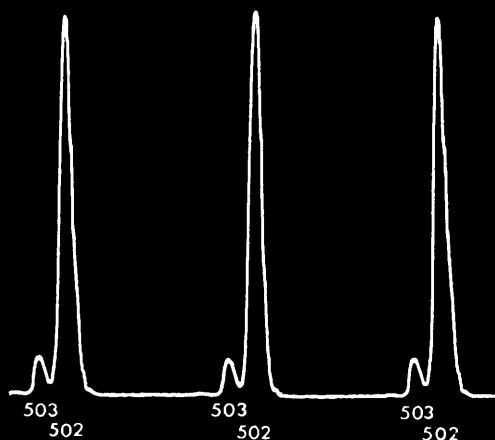
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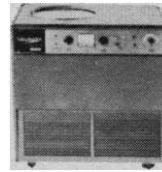
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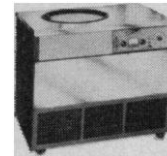
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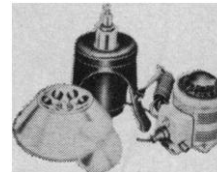
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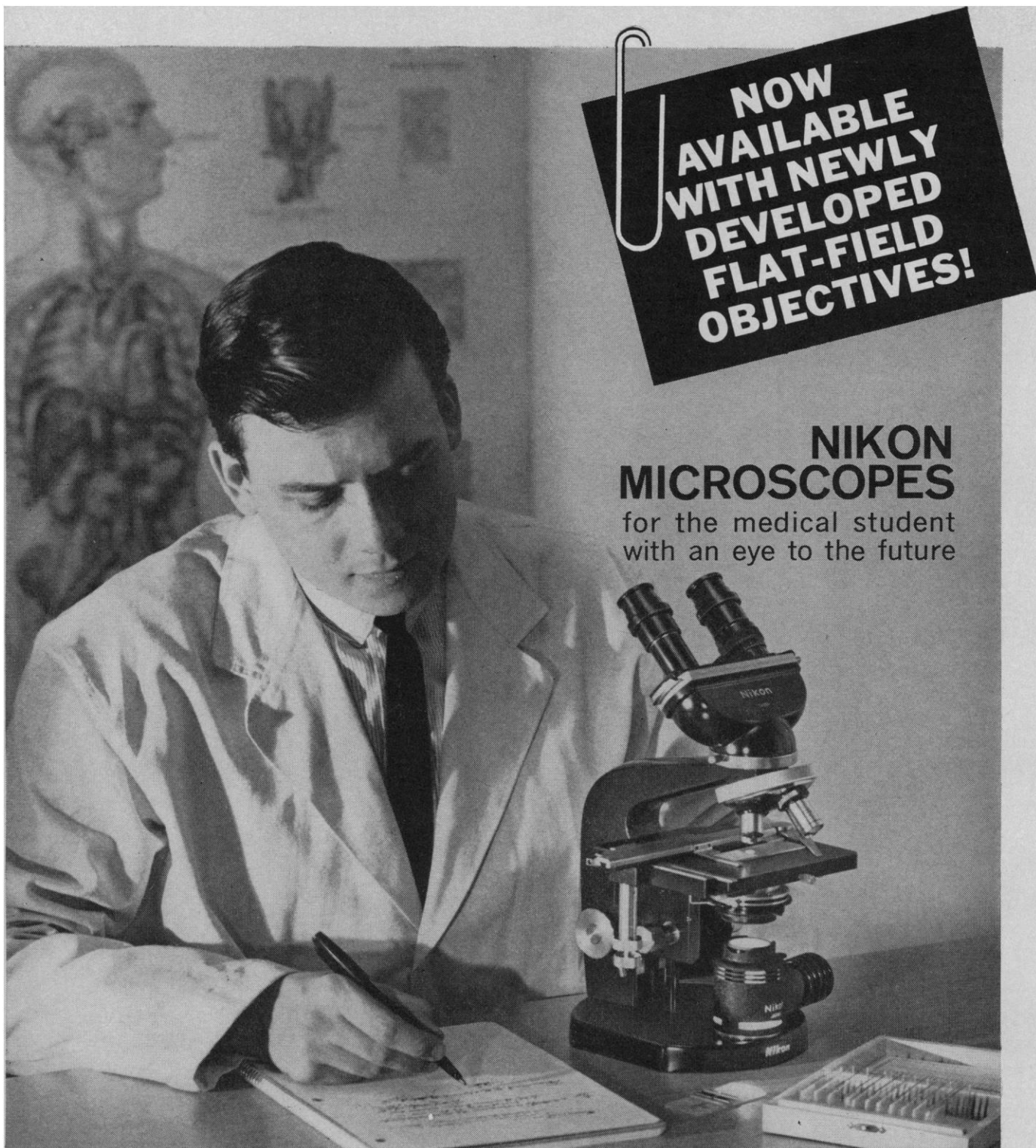
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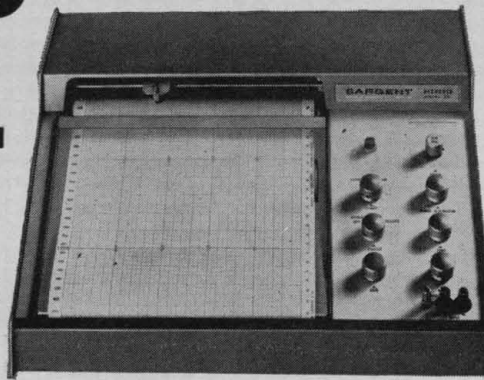
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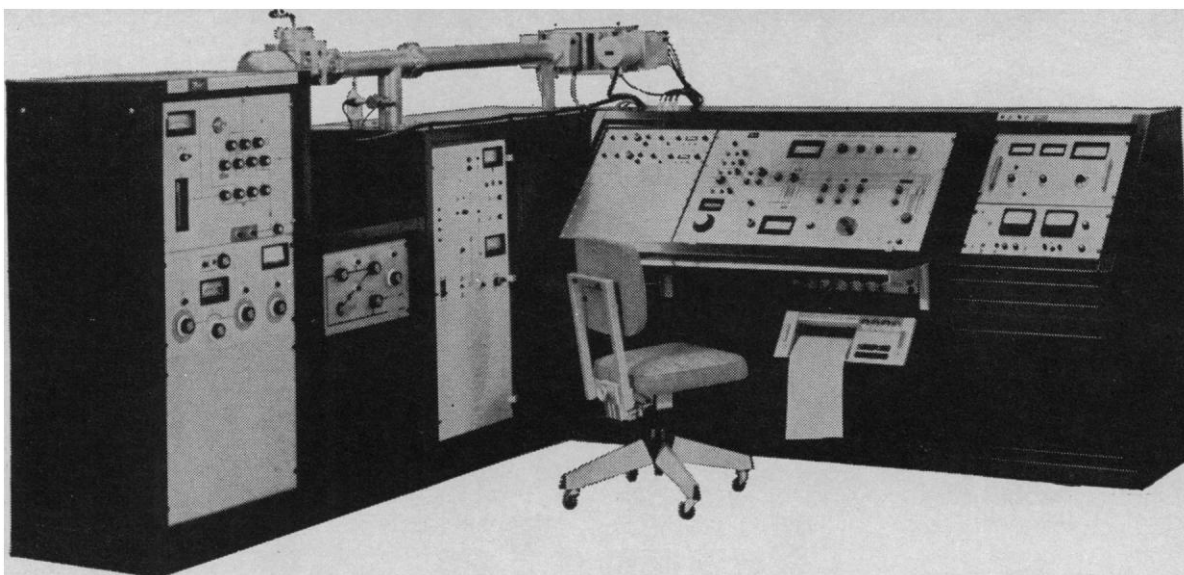
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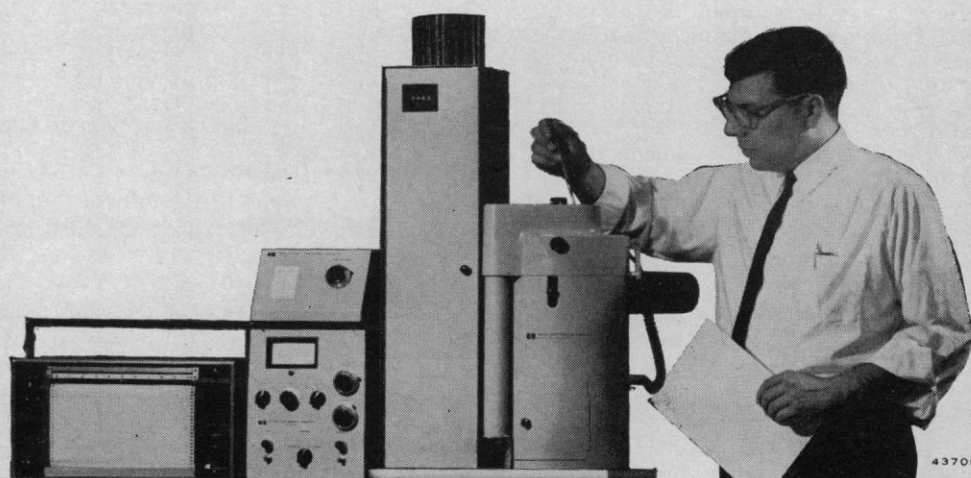
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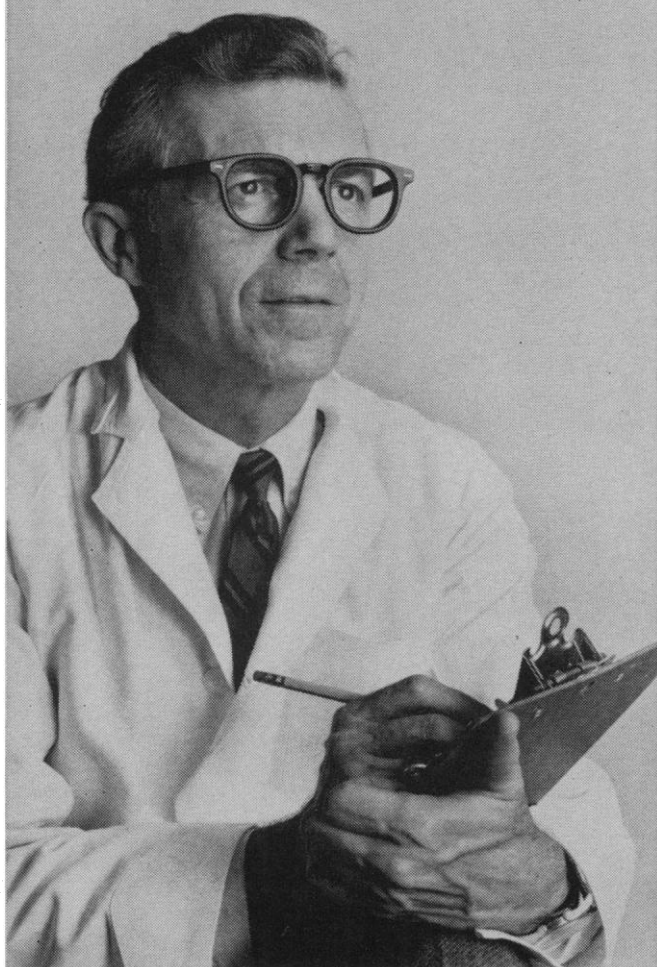
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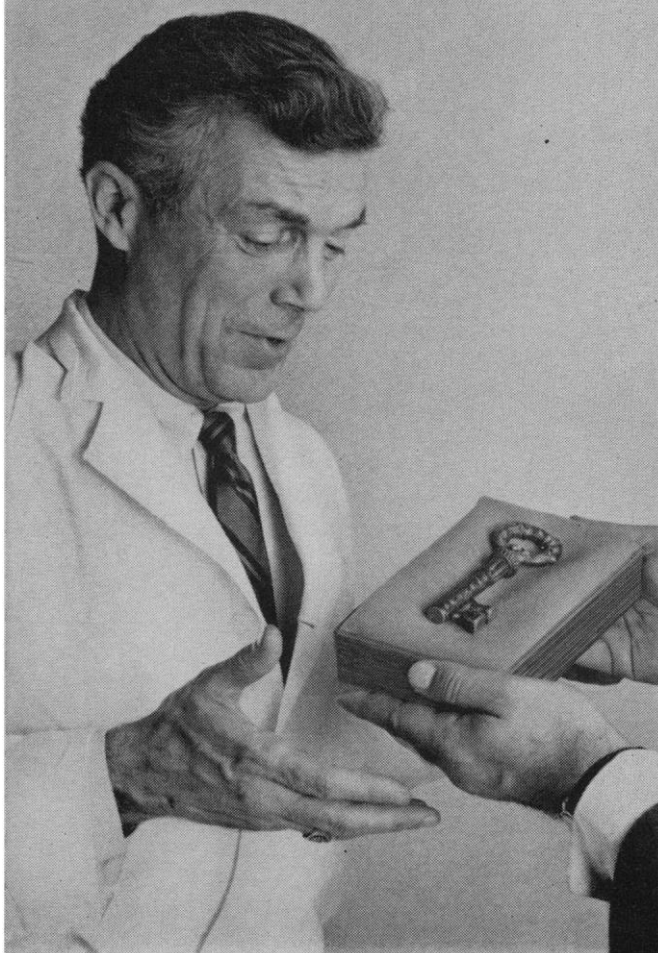
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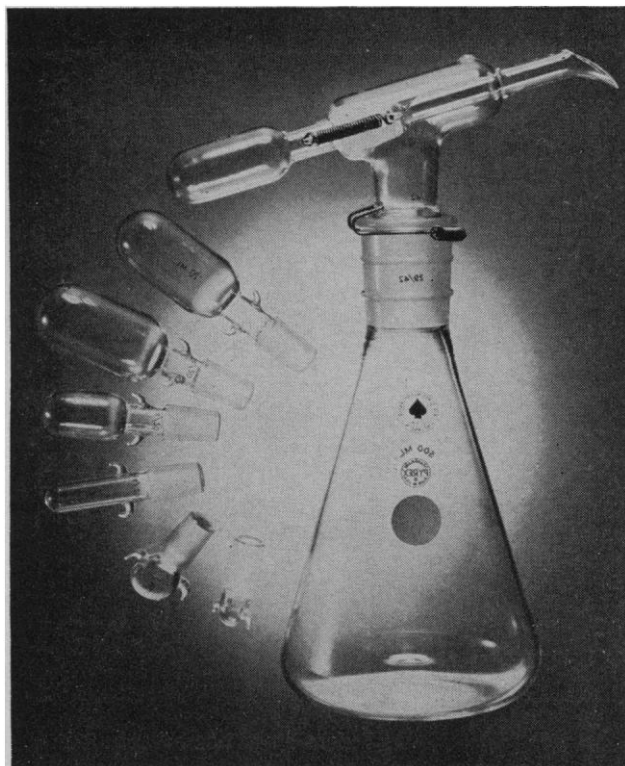
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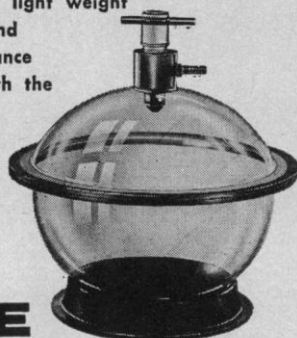
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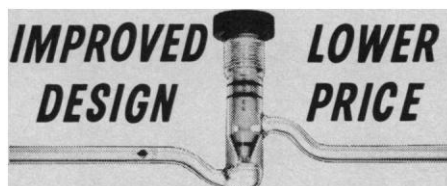
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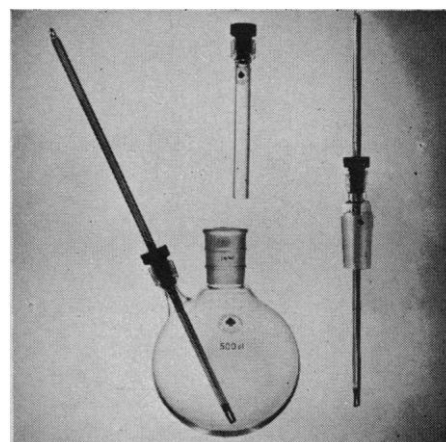


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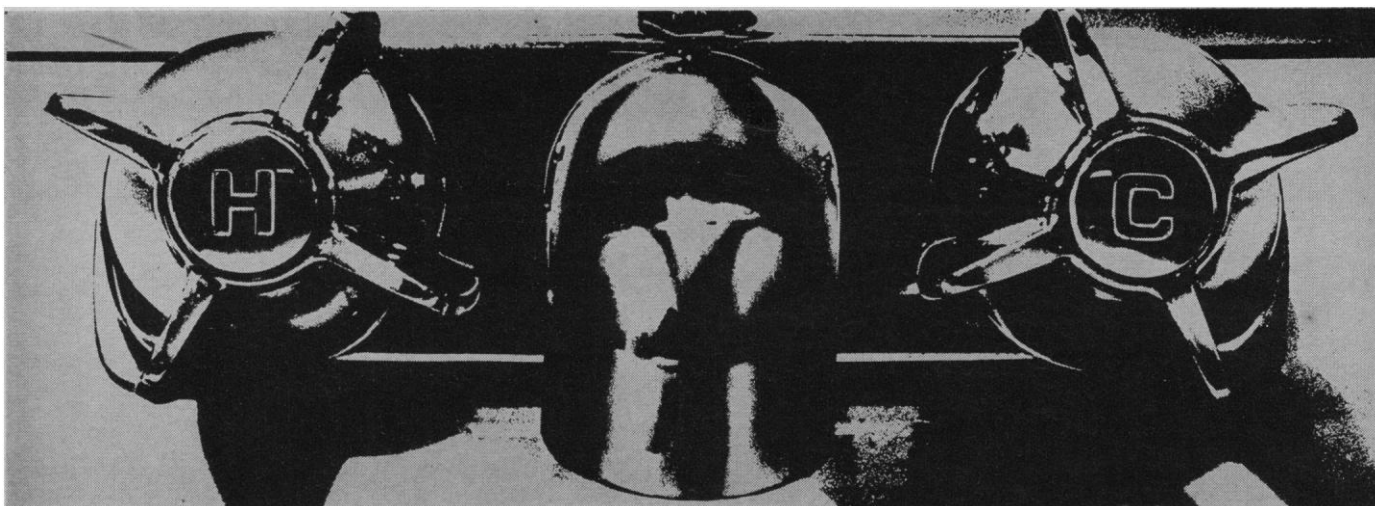
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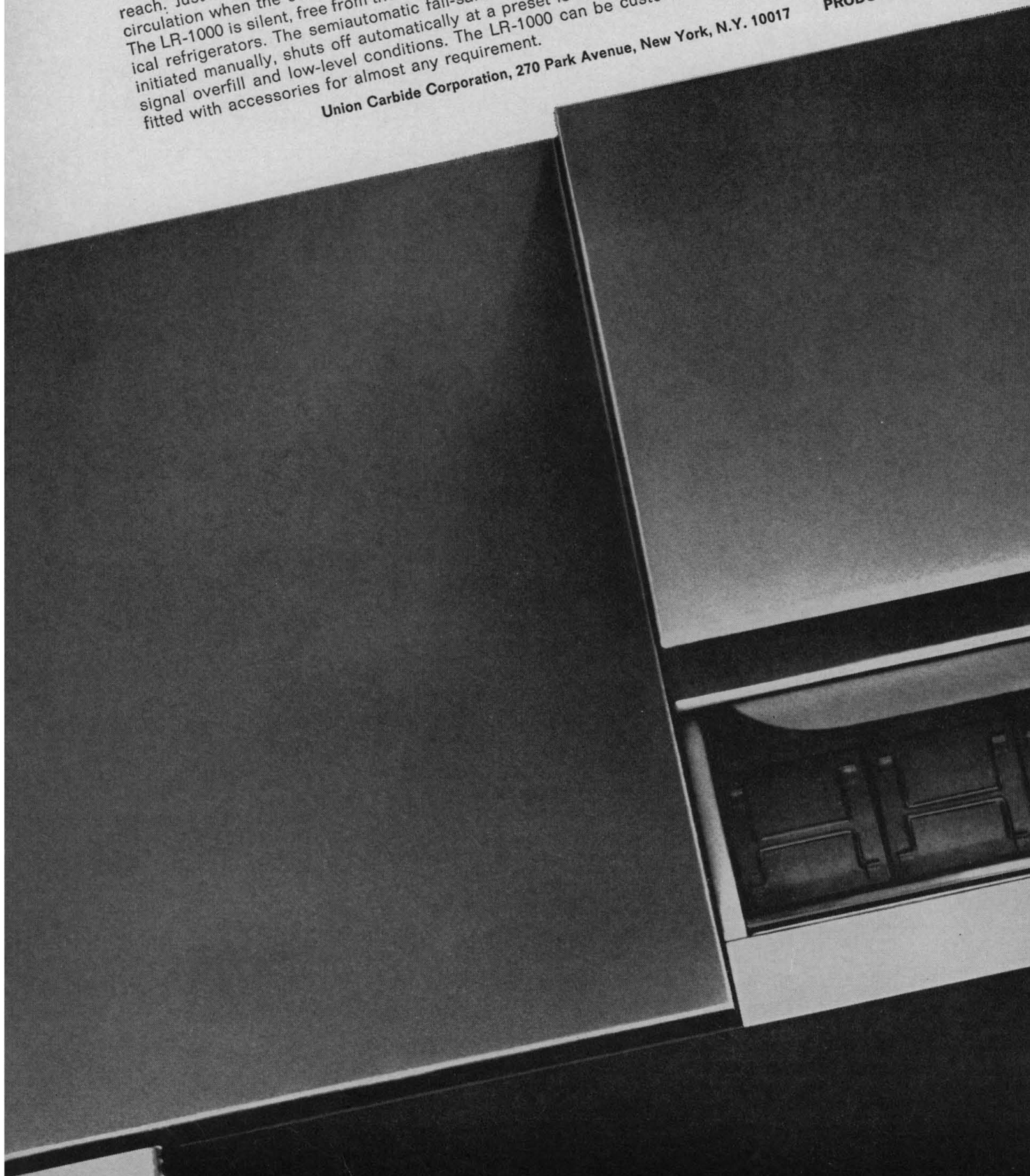
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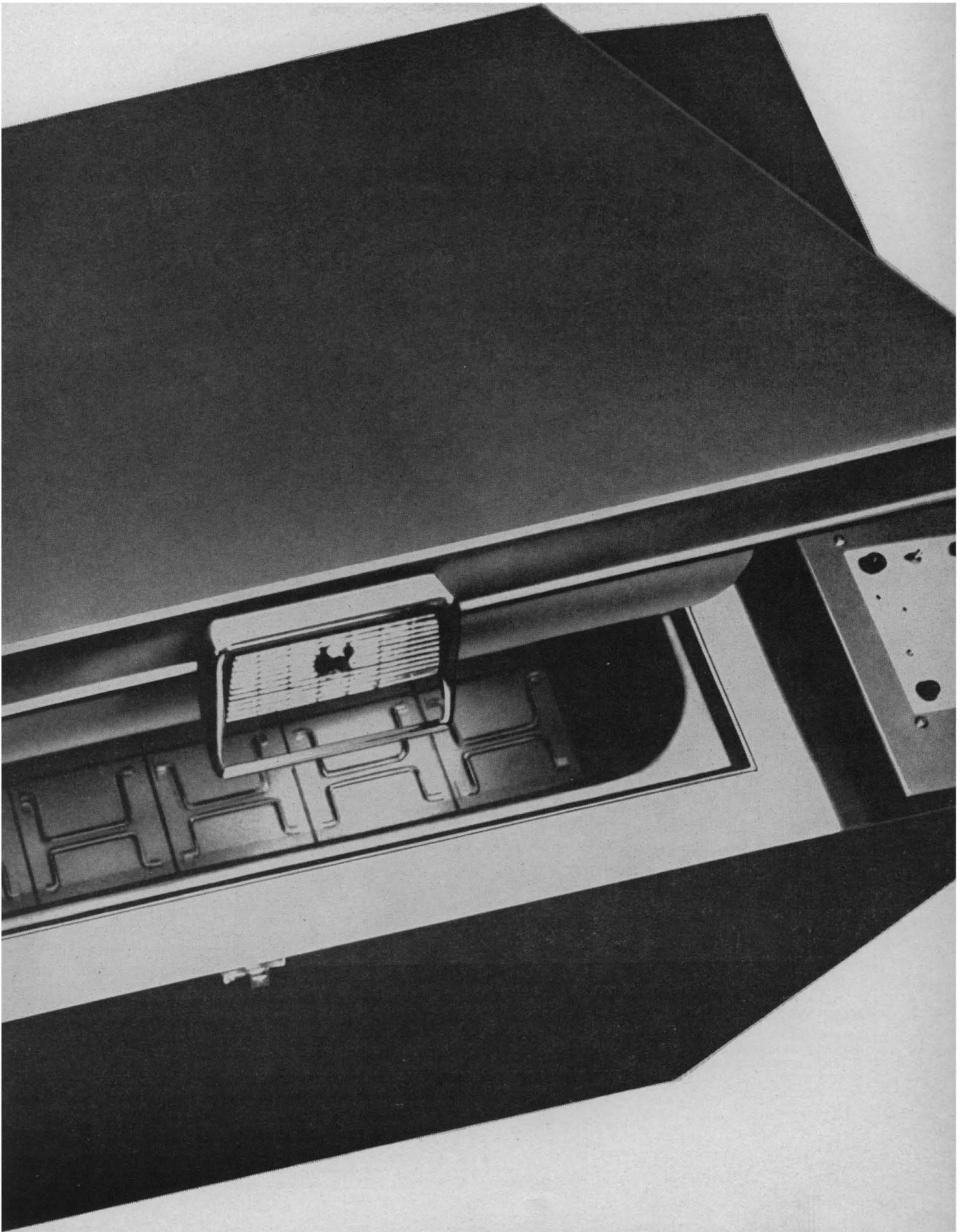
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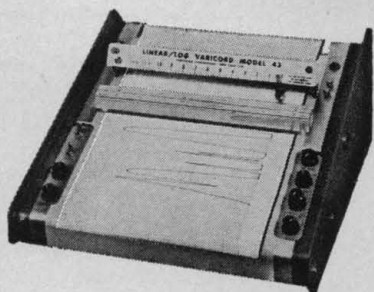
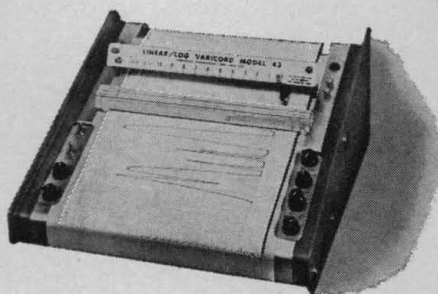
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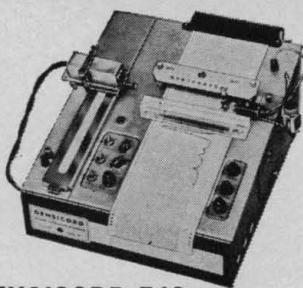


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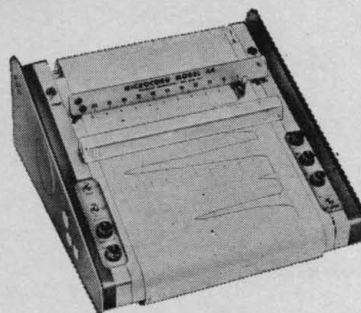
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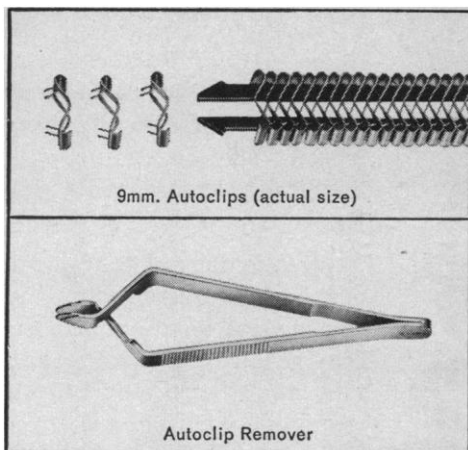
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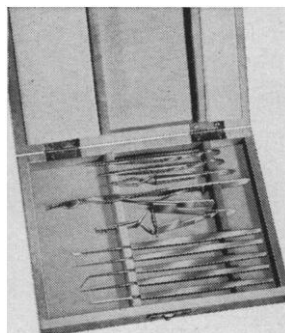
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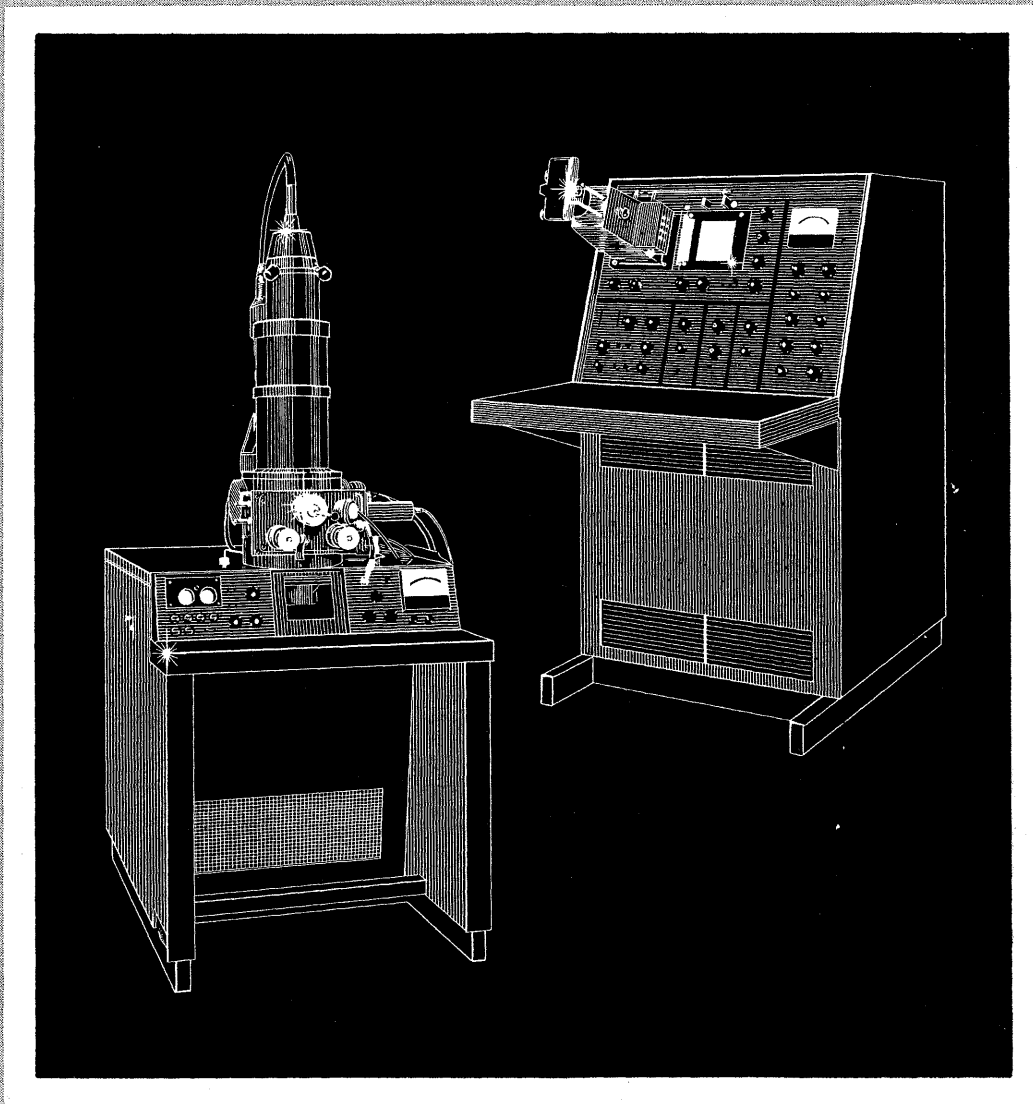
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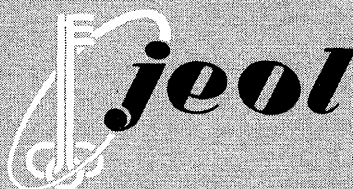


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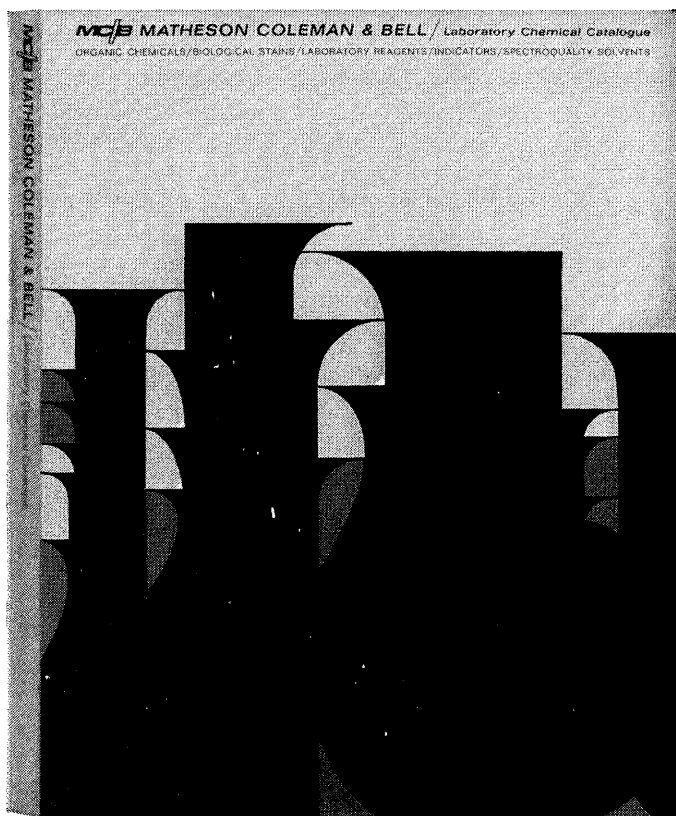
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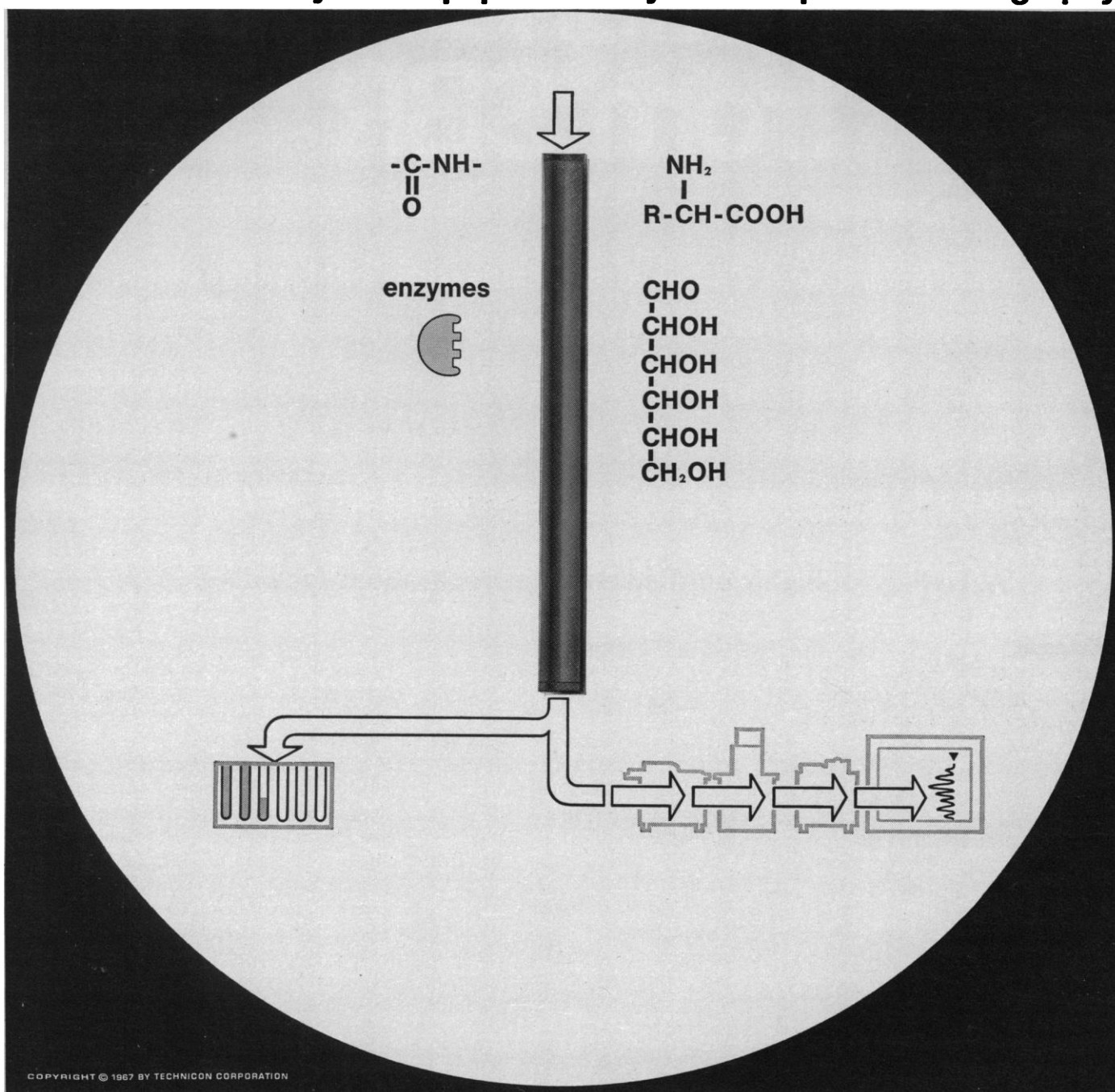
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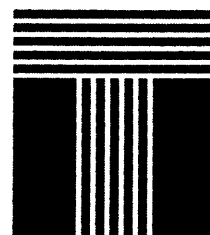
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9. Leucine Aminopeptidase (no tryptic or chymotryptic activity)
10. Papain
11. Pepsin
12. Pepsinogen
13. Protease
14. Trypsin

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2. Deoxyribonuclease II
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4. Micrococcal Nuclease (homogenous on gel electrophoresis)
5. Phosphatase, Acid (wheat germ)
6. Phosphatase, Alkaline (E. coli) (RNase free)
7. Phosphodiesterase (bovine spleen)
8. Phosphodiesterase, venom
9. Ribonuclease
10. Ribonuclease A (free of unidentified component in ribonuclease, homogenous on polyacrylamide gel electrophoresis)
11. Ribonuclease B
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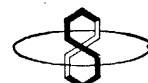
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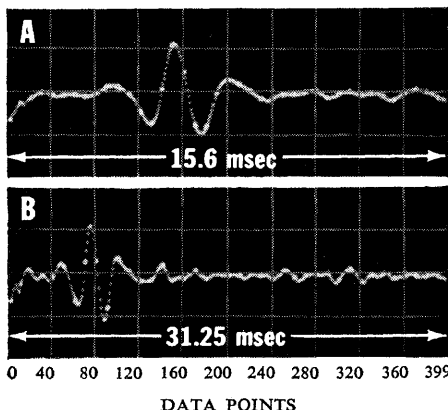
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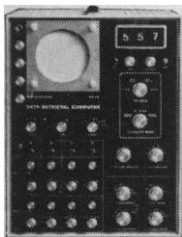
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correspondents have, that the ends are unquestionable without recognizing precisely what they happen to be.

The scientist cannot, any more than others, claim immunity from moral responsibility. The letters quoted above are very disheartening and seem to presage new and more frightful developments in an attempt to justify all those errors of judgment which so far have gone into this shameful affair. I hope that no one, besides their authors, is going to be fooled by these efforts at "objectivity."

M. C. GOODALL

*Institute for Biomedical Research,
American Medical Association,
535 North Dearborn Street,
Chicago, Illinois 60610*

... What is apparently overlooked and totally ignored by these petitioners is that this [the war in Vietnam] is not an academic exercise divorced from life and death. It is a very real exercise in how to achieve a goal, however distasteful, with a minimum of casualties among our own combat personnel. I believe that any technique, weapon, tactic, or strategy that will minimize casualties among our combat personnel is right, and any technique, tactic, or strategy that preserves the combat effectiveness of our opponent is wrong.

DONALD E. MCCRARY

*Post Office Box 1297,
Mountain View, California 94042*

Rothschild cites such nonlethal diseases as Venezuelan equine encephalomyelitis, Q-fever, and dengue fever, and implies that biological weapons of this kind might humanize warfare. Unhappily, the developers of biological weapons do not limit their attention to diseases with low mortality. Although the Army's microbiological laboratory at Fort Detrick has conducted considerable research on Venezuelan equine encephalitis virus, it is also interested in organisms a good deal less cuddlesome, including *Pasteurella pestis* (plague) and *Bacillus anthracis* (anthrax). The reason for this interest in highly virulent pathogens is perfectly obvious. The logic of military necessity requires that an enemy be destroyed, not given a case of sniffles. The military would be betraying its own responsibilities if it ignored this necessity.

There is, however, a crucial qualitative distinction between conventional explosive weapons and biological weapons, a distinction which underlies the

concern expressed in the CBW petition. Conventional weapons can, at least in principle, be *aimed*. Even aerial bombardment can be carried out with a considerable degree of precision. With conventional weapons it is therefore possible to discriminate to a large extent between combatants and noncombatants. Such discrimination is demanded, not only by the humane principles which are supposed to justify our society's reasons for engaging in warfare, but also by a body of international law ranging from the Hague Convention Rules of Land Warfare to the United Nations Genocide Convention of 1948.

But biological weapons cannot, in general, be used with such discrimination. There is no pathogen which is host-specific for military personnel. Crop destruction by plant pathogens (or, for that matter, by herbicides) is injurious to all, military and civilian, who require food. This unique aspect of biological warfare evidently escaped Silverman (Letters, 10 Mar.), who asks: "Why is it more horrible to be ill (even acutely ill for a period of time) than to be mangled or dead for all time?" First of all, this question conceals the assumption, as groundless here as in Rothschild's letter, that biological warfare will eschew lethal diseases. Secondly, the relative charms of being victimized by a bomb or by an aerosol of *P. pestis* is not the point at issue. The point is that bombs can be aimed at military targets, while the dissemination of a plague among a whole population would be genocide.

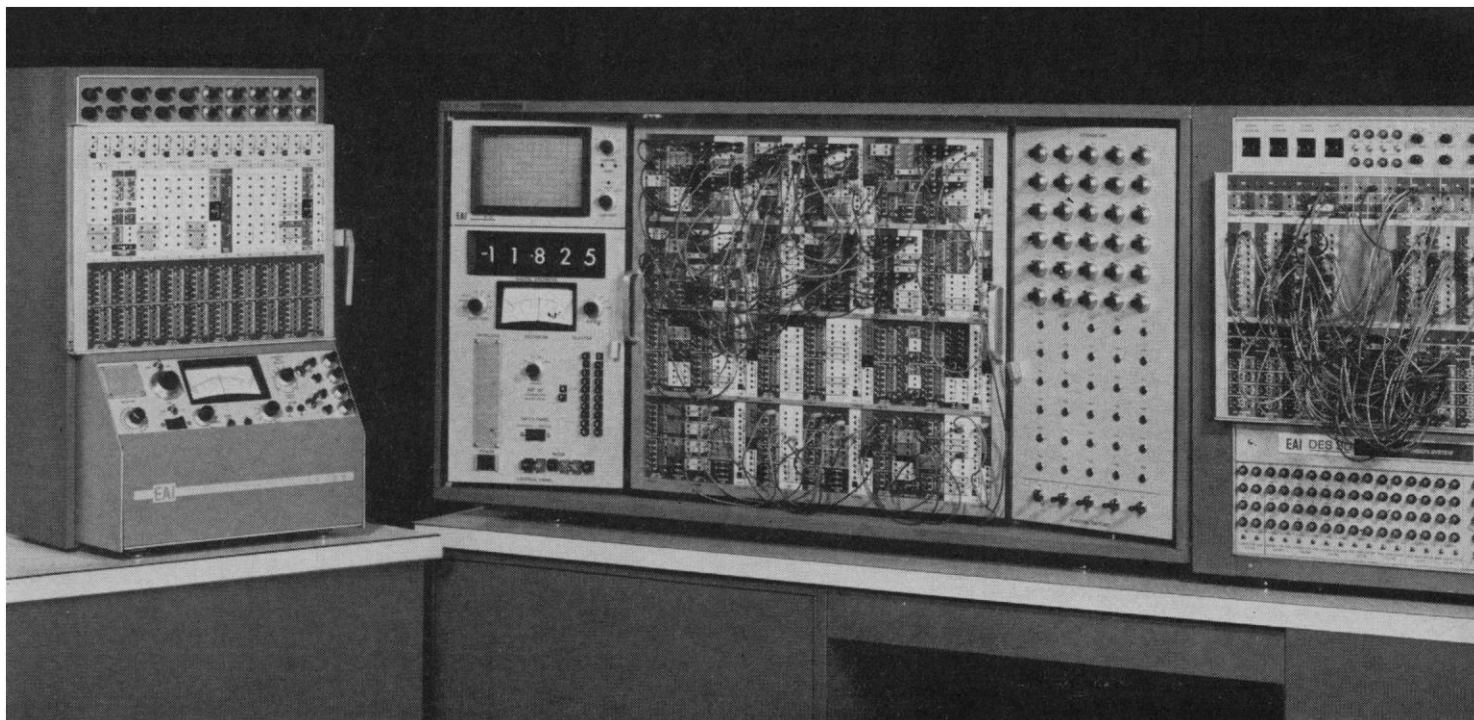
Those of us who are concerned about CBW are not necessarily pacifists, any more than were the framers of the Hague Convention. Our concern is with the philosophy of our society. Rothschild points out, somewhat paradoxically, that "the amount of damage a nation will execute upon civilians . . . is defined by the philosophy of the nation using the weapons." Precisely.

JONATHAN GALLANT

*Department of Genetics,
University of Washington, Seattle*

Congressional Witnesses

Marvin's letter, "Pesticides: Overstated dangers" (7 Apr.), mentions an investigation conducted by the House Appropriations Subcommittee on Agriculture, chaired by Congressman Jamie L. Whitten (Mississippi), in which



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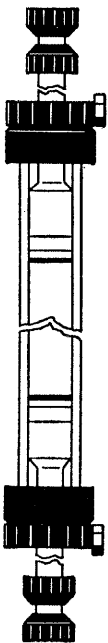


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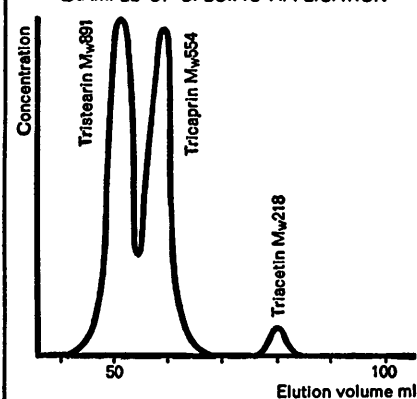
RANGE OF APPLICATION

Solvent	Approx. solvent regain ml solvent/g dry gel	Approx. bed volume ml/g dry gel
Dimethylformamide	2.2	4
Water	2.1	4
Methanol	1.9	3.5-4.0
Ethanol	1.8	3.0-3.5
Chloroform*	1.8	3.0-3.5
n-butanol	1.6	3
Dioxane	1.4	2.5-3.0
Tetrahydrofuran	1.4	2.5-3.0
Acetone	0.8	1.5

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"over 185 outstanding scientists and 23 physicians were interviewed, as well as officials of the American Medical Association and university medical school faculties. Also included were biologists, chemists, entomologists, nutritionists, pharmacologists, plant pathologists, toxicologists, zoologists (including a geneticist), as well as experts in agriculture, conservation, and public health." However, contrary to general practice, the testimony of these persons has never been published. Instead, only a summary written by the committee staff appears in the hearings report and there is no list of the scientists who appeared before the committee (1). A list does appear in Whitten's book but it includes only those who "were agreeable to being identified as having been interviewed by the staff" (2). Nowhere is there any indication that any, or which, of the scientists support Whitten's or the staff report's contentions, and nowhere is the testimony printed in its entirety for the open judgment of the scientific community.

MILTON LEITENBERG

Committee for Nuclear Information,
5144 Delmar Boulevard,
St. Louis, Missouri 63108

References

1. *Department of Agriculture Appropriations for 1966* (hearings before a Subcommittee of the Committee on Appropriations, H.R., 89th Congress, 1st session, Government Printing Office, Washington, D.C., 1966), pt. 1, p. 165.
2. J. L. Whitten, *That We May Live* (Van Nostrand, Princeton, N.J., 1966), p. 217.

Weightlessness Can Be Confusing

While much of the theory of the space age has no interest for the nonscientist, the concepts of orbiting in a gravitational field, and "floating freely" through space, are two which the public should be able to distinguish. The word "weightless" is used frequently to describe the condition of spacecraft and astronauts in orbit. A majority of readers of the daily press probably interpret weight to be simply the gravitational force of attraction between an object and the earth. I fear that many readers are led to the erroneous but understandable conclusion that if an object is weightless, then this force has ceased to exist. Some may invoke, as a reason, the great distance of an orbiting body from the earth. In fact, the height of most orbits reduces the gravitational force by only a minor part,

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and the force is itself the cause of the orbiting motion, according to Newton's laws.

It is a pity that there should be scope for confusion over this basic principle of mechanics, as a scientific venture has rarely captured the interest of the public to the extent of the present space program (or spent as much public money). Furthermore, the interest will be greatly increased by the first Apollo mission, and there will then be a fundamental difference. The gravitational forces on an Apollo crewman will be very weak for much of his journey, and his weightless condition will indeed be due to his remoteness from the earth and moon.

Perhaps science writers, in view of the great public interest, should take care to make the distinction between the two different kinds of "weightlessness."

F. E. M. LILLEY

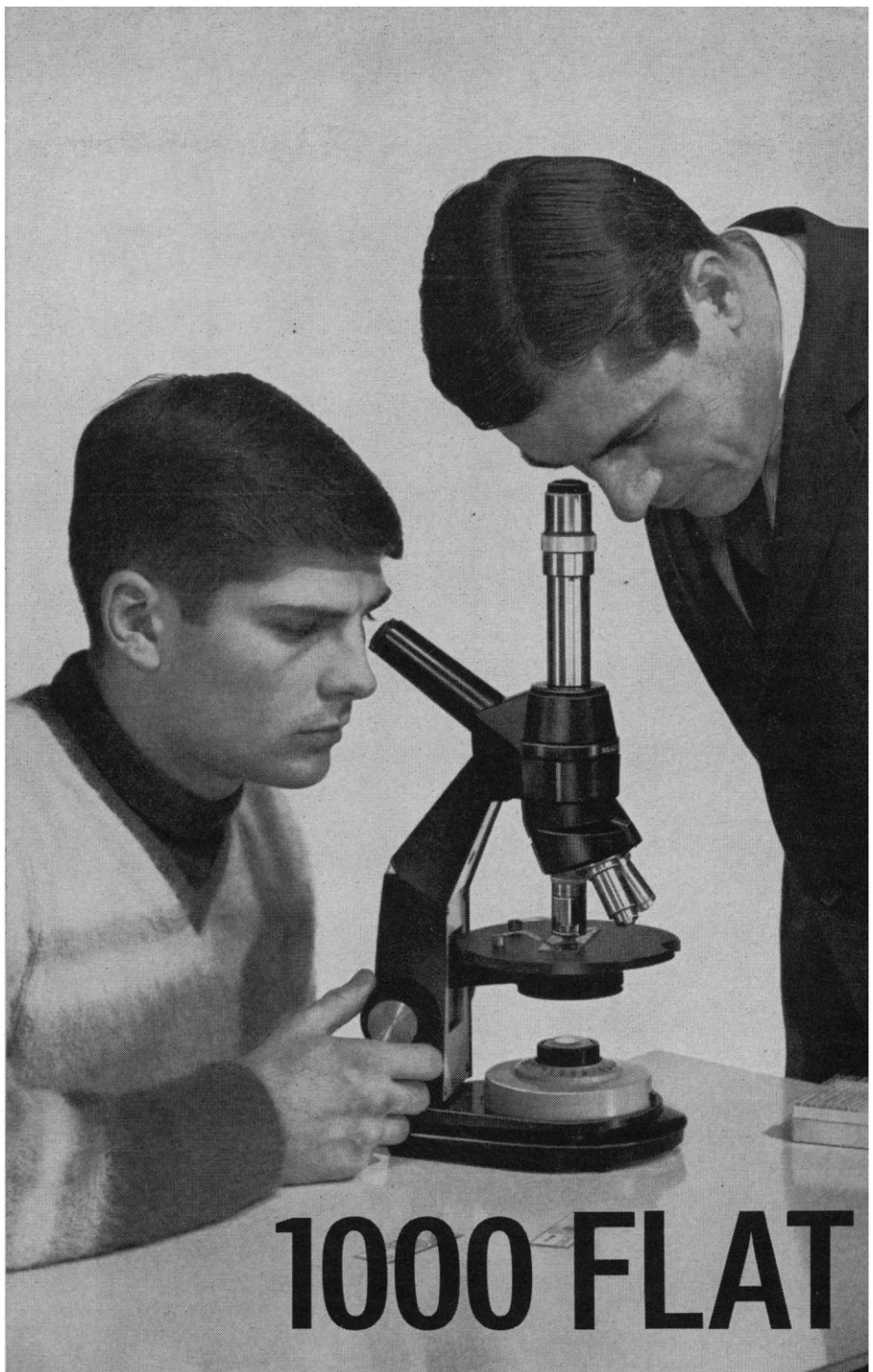
*Department of Geodesy and
Geophysics, University of Cambridge,
England*

A Trained Eye on UFO's

Correspondence in your columns on UFO's points to a grievous lack of trained observers. For the elucidation of these rare and mysterious objects, first-class observations are necessary, and very few people, even among those supposed to be scientifically trained, can observe. The following drill, commonly used by observers of meteors, fireballs, and so on, is applicable and deserves to be better known. It is assumed you can transfer your whole attention to the phenomenon.

On becoming aware of the object, stand still and start counting seconds. Kick with your heel to mark your position exactly. Hold a hand out at arm's length and gauge the angular size of the object. (The thumb in width subtends $2\frac{1}{2}^\circ$, the open hand, 20° .) Note the brightness of the object, compared to other visible objects, and any changes that may occur. Establish the beginning and the end of the object's path with reference to marks on the horizon. Determine whether the object passes behind or in front of any landmark. Try to fix the position of touchdown on earth, if you think that has occurred. After the object has disappeared, make written notes of the above details. Transfer the seconds count to accurate time by your watch. Listen critically for sounds as-

9 JUNE 1967

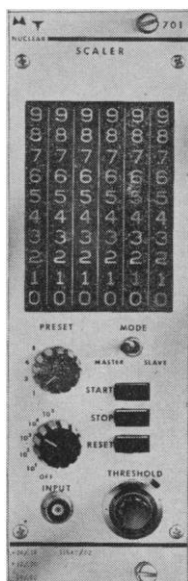


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sociated with the object and time them. Proceed to the position of touch-down and search for material objects. Notice any smell, as of ozone, at this point. Feel for a temperature gradient. Pace off the heelmark from a permanent landmark for later transfer to a map reference. Obtain a watch correction to the nearest second, preferably from a radio time signal. Forward a fair copy of the notes to the nearest observatory.

Practice this for a few evenings on meteors, to get the hang of it. And next time Venus is a daylight object, go to a busy intersection with a companion and point it out to him. (Look! A flying saucer! See how fast it goes, past those clouds!) The reports in the press the next morning will be very entertaining.

F. P. HUGHES

315 Poplar Street,
Hawkesbury, Ontario, Canada

A Poverty of Spirit in Underdeveloped Nations

Parsegian made some valuable points concerning the factors that spur underdeveloped nations toward greater productivity and self-reliance (Letters, 21 Apr.). But he fails to consider the problems of a population debilitated by chronic diseases such as malaria, vitamin deficiency, intestinal parasites, semistarvation due to insufficient food, and, worst of all, by a poverty of the spirit, the result of living for generations at an animal level of existence.

One does not have to leave the limits of the United States to find areas where, a generation ago, the population suffered from malaria, vitamin deficiency, and all the other conditions that lead to debilitation. In various military training camps in the South during World War II, there was a constant alert for the presence of the anopheles mosquito, a malaria carrier. The state of Missouri closed its trachoma hospital about 1950, only because of the availability of antibiotics. The derogatory appellation of "red-neck" usually describes one of the symptoms of pellagra, a vitamin deficiency disease.

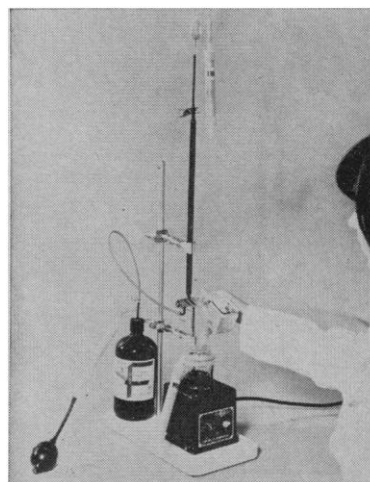
Debilitation in parts of the South, in earlier years, led to the conclusion that the people were lazy, good-for-nothing, and that there was no need to help, for the money would be wasted. Many conditions have been



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corrected, but often the poverty of the spirit remains, induced by a continual struggle to exist. American Indians living on their reservations exemplify this problem.

Foreign aid programs are not doles, inasmuch as a dole implies a welfare program in which the function is only to keep the recipient alive. The various aid programs allocate funds for specific projects which, in the long run, should help the people raise their standard of living. A good example of the benefits of aid programs was the recovery of Western Europe after World War II, more rapid than Eastern Europe which received the Soviet type of negative foreign aid. However, recipient nations which are underdeveloped cannot improve their living standard until they overcome their food and population problems.

Over-regulation, as Parsegian points out, has not assisted the situation. Often the governments have modeled themselves after ideological models which were proposed for nations in Western Europe a century ago to correct conditions then existent. In these instances, a flexible, pragmatic approach to government and regulation would be more helpful.

H. P. LEIGHLY, JR.
*Department of Metallurgical
Engineering, University of Missouri
at Rolla, Rolla 65401*

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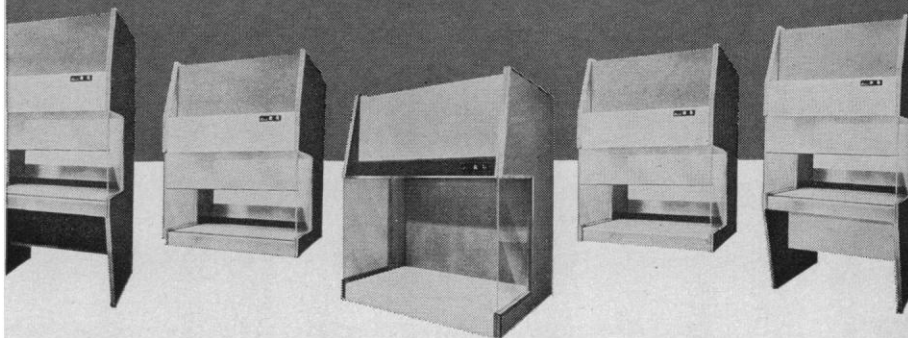
The enclosed resolution on freedom of expression was passed unanimously on 6 March 1967 by the Los Angeles Division of the Academic Senate, University of California, and a copy sent to Leland J. Haworth of the National Science Foundation.

The University of California Academic Senate, Los Angeles Division, strongly commends the National Science Foundation for its recent reaffirmation of its policy which clearly sustains the right of an individual whose research is supported by the NSF to hold and express dissenting views, as any other citizen can, subject only to the restraints contained in the laws of the land. The adherence to this policy in the case of Professor Stephen Smale shows that the NSF defends this right in deed as well as words. The Academic Senate, Los Angeles Division, congratulates Director Leland J. Haworth on his forthright statements in this matter.

THOMAS L. JACOBS
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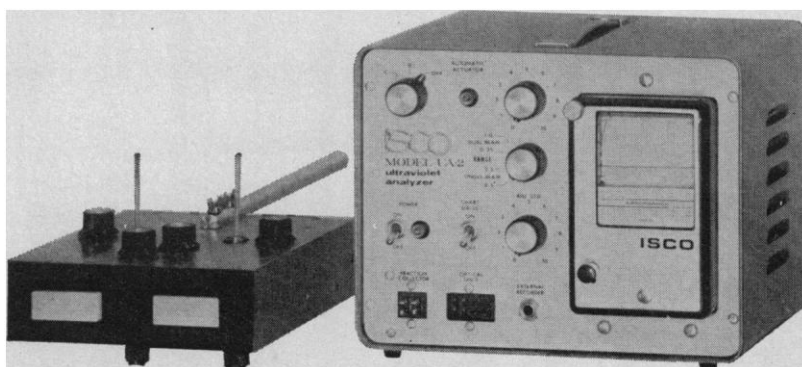
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A Partisan Attack on Research

Congressmen serving on committees dealing with aspects of research and development generally become knowledgeable about their areas of responsibility. As a result, they are often well disposed toward support of scientific research. However, as politicians they cannot afford to be so partisan as to become vulnerable. They must take into account tides of public opinion and matters likely to affect opinion, such as articles in mass-circulation magazines.

Several congressmen have commented privately on the adverse impact on their constituents of an article entitled "The great research boondoggle," which appeared recently in a monthly publication. As a partisan document, the article is a triumph. Research is confused with development, and the reader is left with the impression that the annual cost of government-supported research is \$16 billion. Then research is downgraded by citation of examples likely to seem ridiculous to the reader and by skillful choice of guilt-connoting words—such phrases as "federal research craze," "complex jungle of federal research," "sprawling research program," "research bug," "lucrative contracts," "profitable parasite industry," and "getting fat at the public trough."

In the article 12 specific government-supported projects are cited as examples. Most of these involve the social sciences, which receive a tiny fraction of the funds. For example, the article quotes Senator Proxmire as attacking the National Institutes of Health as a "worst offender" for supporting projects designated "A Social History of French Medicine, 1789–1815" (\$11,782); "Emergence of Political Leadership: Indians in Fiji" (\$10,917); and "Changing Patterns of [Moslem] Family Life" (\$28,755).

Similarly, the Department of Agriculture was cited for spending 5 years "revising pickle standards." The Office of Education drew mention in an unfavorable context because it supported research on "understanding the fourth-grade slump in creative thinking."

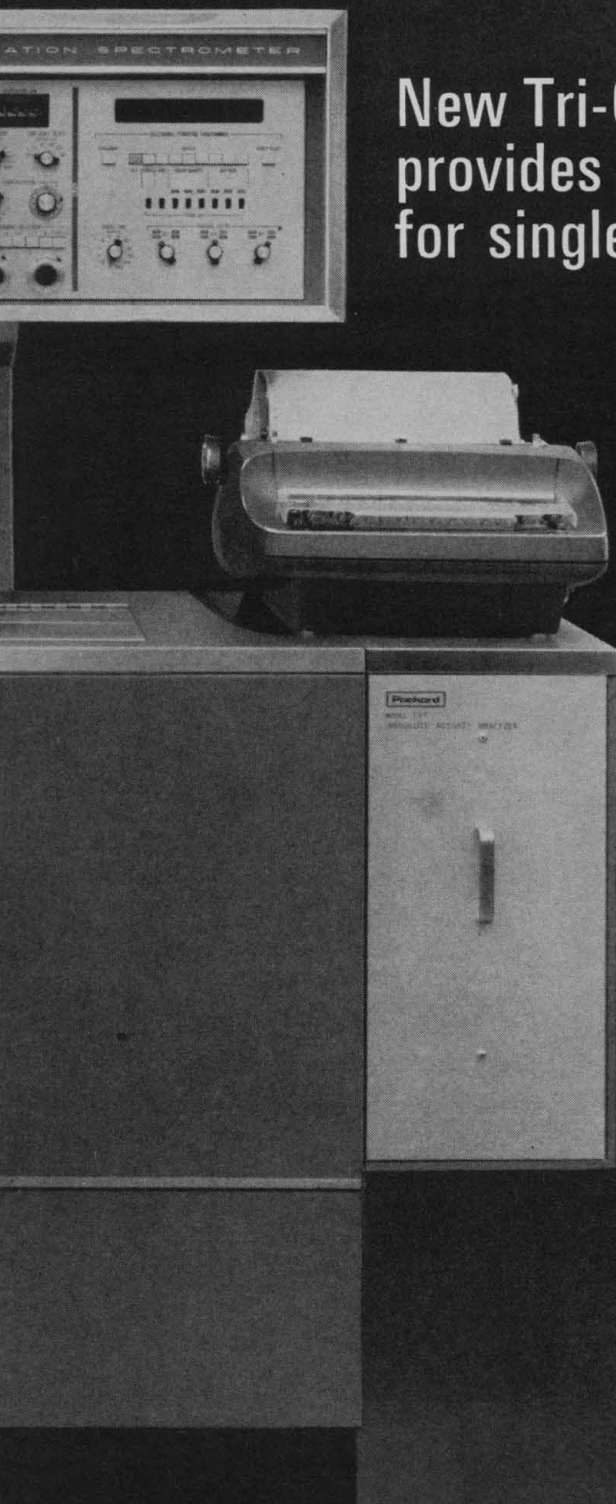
A knowledgeable observer might smile at so much ado about so little. However, a less astute reader could be left with the impression that a large fraction of NIH and other federal funds is spent in irrelevant areas.

No enterprise supported by the federal government should be free of criticism. Research is no exception. Some scientists have questioned aspects of the science establishment with the goal of making government expenditures more effective. It is desirable that such self-policing continue. However, the article in question illustrates a cost of public self-criticism. It seems very damaging when it quotes a prominent scientist out of context as saying that federal support has encouraged "shoddy, redundant, uncritical and ill-conceived research." The article is also very damaging when it quotes a professor of chemistry at a large university as saying that government support of research is "potentially the most powerful destructive force the higher educational system has ever faced."

Congressmen can easily judge the validity of magazine articles. Politicians, however, cannot be expected to assume all the burden of setting the record straight. Scientists must help ensure that the public has an accurate understanding of what it is getting for its money.

—PHILIP H. ABELSON

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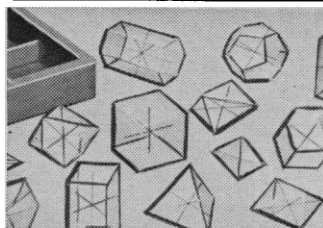
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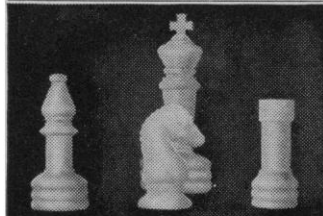
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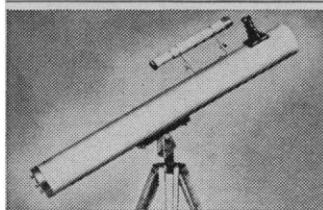
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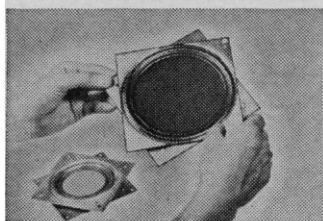
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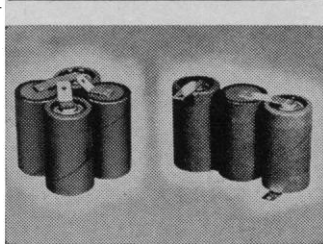
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dents in the use of library materials and retrieval systems. Incidentally, Gore recently created a furor in the library profession by publishing an article in the *Bulletin of the AAUP* which attacked the bureaucrats of the library profession and the proliferation of local cataloging at the eventual sacrifice of book purchases. His paper, "Sweetness and light: A goal for libraries," demonstrated the beauty that can result from the blending of a humanities-trained scholar with a science-oriented theme.

Andrew Lasslo (University of Tennessee) opened the session with "Scientists and literature resources," a presentation of the feelings of a pharmaceutical chemist who had taken the time and energy to do something about training a core of badly needed science librarians.

James D. B. O'Toole (Boston University) provided a fitting parallel in discussing his graduate program for the training of science communicators. His program is designed to increase public understanding of science by equipping science graduates to help unclog the communication channels between science and society.

In opening the session, the chairman read statements by several panelists who could not attend, including Halvor Christensen (University of Michigan), William Fowler (California Institute of Technology), and Alvin Weinberg (Oak Ridge National Laboratory). Weinberg's remarks would appear to be a fitting conclusion to this report:

"Science's commitment to the handling of scientific information is increasing daily. As science grows, so this commitment must grow.

"What is the nature of this commitment? Obviously, more money will have to be spent for information-handling systems—for computers, new journals, and new retrieval mechanisms. More secondary information handlers will be required: the information center, which was viewed as crucial in the PSAC report 'Science, Government and Information,' is proving to be a dominant element in the new information system. The information center will surely continue to proliferate and develop as science and scientific information increase.

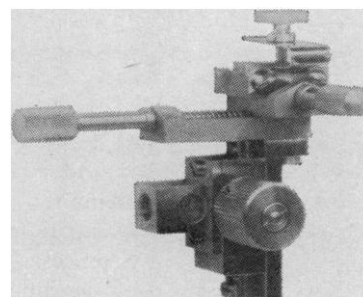
"But the most important commitment of science to information must be the commitment of the individual scientist. Generally, scientists view the handling of scientific information as separate from science itself. They are individually unwilling to devote much of their



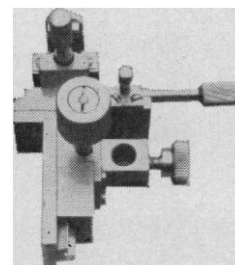
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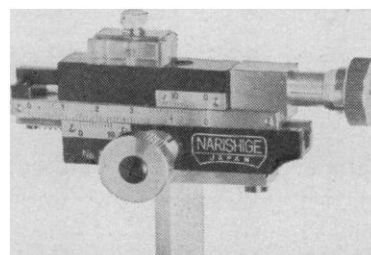
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time to the task of managing the flood of scientific information. This attitude is untenable. Every scientist must accept his share of the responsibility for controlling scientific information. He must realize, as a matter of course, that when he adds to the cascade of scientific information, he assumes a responsibility to participate in the management of the flood.

"I believe the university has a clear duty in this connection. Our coming generations of scientists must be taught to accept their responsibility toward information—not grudgingly and with half heart, but fully and constructively. This attitude represents a change from the prevailing attitude. Scientists generally fail to see why they should be bothered with helping to manage scientific information; this they learn from their professors and colleagues who are similarly disinclined to make the necessary sacrifices.

"But sacrifices will have to be made if science itself is not to collapse. The education of every scientist will have to include instruction in handling the new and ingenious tools of information retrieval. The educational process will even more have to inculcate into all scientists a willingness to contribute time and effort in behalf of the entire scientific communication system."

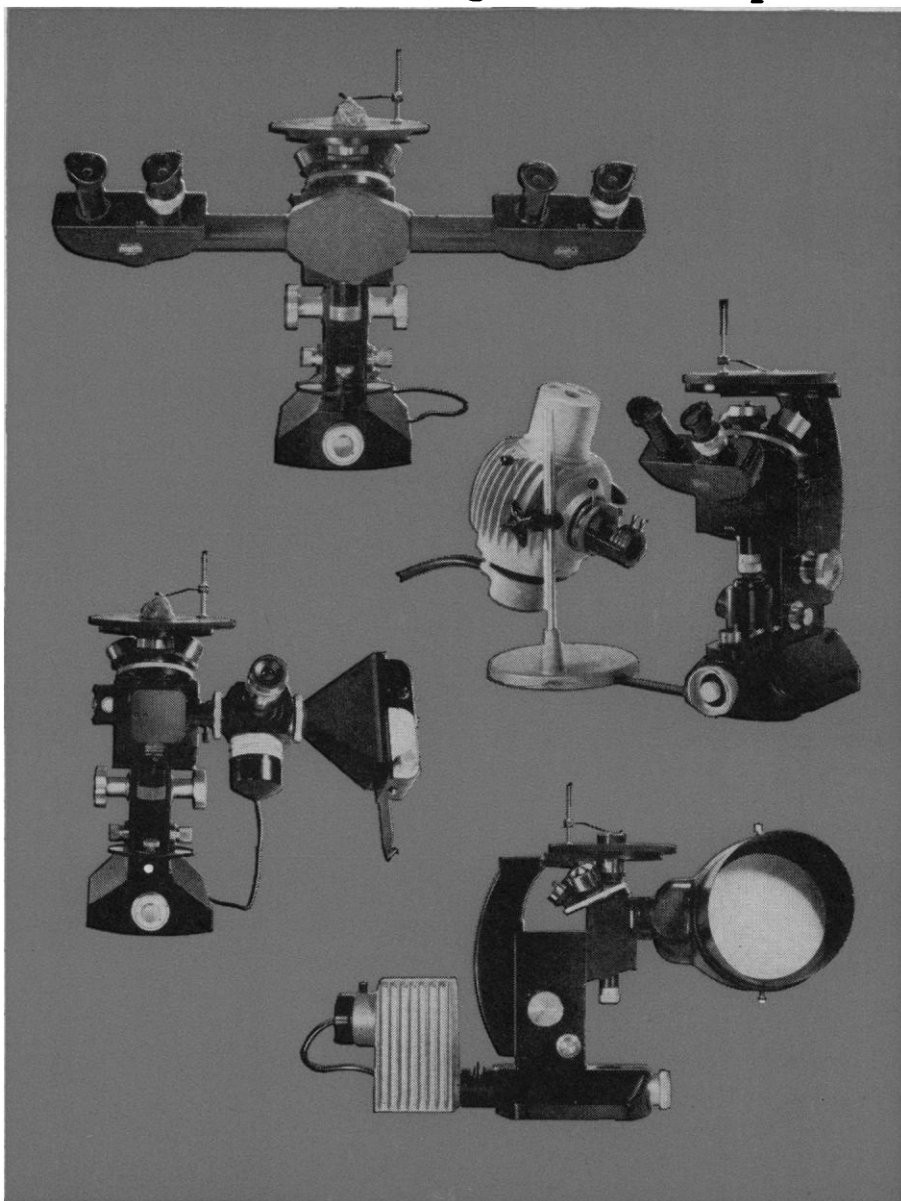
EUGENE GARFIELD

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Aphids

Five projects for studying factors affecting the biological control of the arthropod pests of food crops have been proposed as part of the International Biological Programme. One of these projects concerns aphids. After consultation involving more than 100 aphidologists in all parts of the world, the project has been orientated around the green peach aphid, *Myzus (Nectarosiphon) persicae* Sulz., and other aphids associated with it on various crops. While the proposal is focused on this one species of worldwide importance, findings will also be relevant to the evaluation, selection, and implementation of biological methods to be used in biological and integrated control programs for crop aphids in general. Since the information required will be largely ecological, the project is being assisted by the publication of reviews of what is known of the biology

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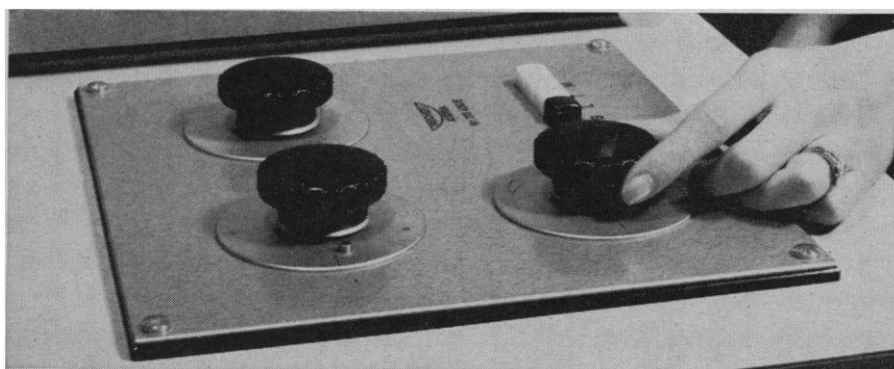
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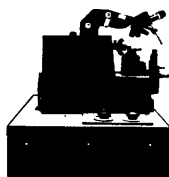


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and ecology of the aphids and their natural enemies.

A meeting to discuss methods and work plans for obtaining more information about biological aspects of aphid control was held in England at the Imperial College of Science and Technology (Field Station), 6-7 April 1967. The coordinator of the project, M. J. Way, brought together a small group of aphid workers from various parts of the world. They were helped by a representative group of British workers including experts in insect ecology. The meeting had no formal agenda but the discussion led to a clearer understanding of fields of work in which information was most needed. Such fields include: (i) Recognition and determination of the biological properties of aphid species and biotypes; (ii) relation of aphid and host plant; (iii) the determination of predatory species and of their role in the control of aphids; (iv) the evaluation of parasites and pathogens; (v) the role of aerial movement; (vi) the sampling techniques for aphids and associated species on plants; and (vii) population dynamics.

Within these fields useful reviews of methodology were made; the comparisons of the experience of several workers with the same method were particularly illuminating. Finally, ways in which the international nature of the project could be exploited were discussed.

Three approaches seemed open: (i) Complementary studies. Development of individual projects would result in much better coverage of the fields relevant to biological control. (ii) Comparative studies. Geographic separation of the study centers would provide opportunity to study, with standardized methods, the nature and effects of the genetic make-up of the population and the physical and biotic environment. (iii) Collaborative studies. A planned sequence of observations or experiments in different centers could provide principles with predictive value as, for example, studies in aerial movement in relation to future pest outbreaks.

It was decided that a set of methodology reviews by specialists in the different fields should be prepared and published in the I.B.P. Handbook series. It was agreed that although complementary studies could be initiated soon, some collaborative studies might need to wait until appropriate methodology had been selected and tested.

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tailed proposals to aphid workers throughout the world and encourage their cooperation. Inquiries should be addressed to M. J. Way, Imperial College Field Station, Silwood Park, Sunninghill, Ascot, Berks, England.

M. J. WAY

*Imperial College Field Station,
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Calendar of Events

National Meetings

June

18-22. American Medical Assoc., 116th annual conv., Atlantic City, N.J. (The Association, 535 N. Dearborn St., Chicago, Ill. 60610)

18-22. Health Physics Soc., 12th annual mtg., Washington, D.C. (J. C. Villforth, Radiological Health Lab., 1901 Chapman Blvd., Rockville, Md.)

18-22. Society for Investigative Dermatology, Atlantic City, N.J. (G. W. Hambrick, Jr., The Society, Johns Hopkins Hospital, 601 N. Broadway, Baltimore, Md. 21205)

18-23. American Soc. of Ichthyologists and Herpetologists, annual mtg., San Francisco, Calif. (W. I. Follett, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)

18-30. Electron Microscopy, workshop, Northeastern Univ., Boston, Mass. (C. Youse, Continuing Education, Northeastern Univ., 360 Huntington Ave., Boston)

19. Scombroid Phylogeny: Ideas and Approaches, symp. of American Soc. of Ichthyologists and Herpetologists, San Francisco, Calif. (B. J. Rothschild, Tuna Ecology Program, Bureau of Commercial Fisheries, P.O. Box 3830, Honolulu, Hawaii 96812)

19-21. Automatic Data Processing Systems in Local Government, 3rd annual conf., New York, N.Y. (H. Sellin, School of Continuing Education, New York Univ., New York 10003)

19-21. Colloid, 41st natl. symp., Buffalo, N.Y. (P. Becher, Chemical Research Dept., Atlas Chemical Industries, Wilmington, Del. 19899)

19-21. Heat Transfer and Fluid Mechanics Inst., La Jolla, Calif. (D. B. Olfe, Dept. of Aerospace and Mechanical Engineering Sciences, Univ. of California at San Diego, La Jolla)

19-21. Microelectronics, symp., St. Louis, Mo. (R. Pellin, Inorganic Chemicals Div., Monsanto Co., 800 N. Lindbergh Blvd., St. Louis 63166)

19-22. American Soc. for Engineering Education, 75th annual mtg., East Lansing, Mich. (L. Winner, 152 W. 42 St., New York 10036)

19-22. Western Soc. of Soil Science, annual mtg., Los Angeles, Calif. (J. L. Young, 100 Agricultural Hall, Oregon State Univ., Corvallis)

19-23. Automating State and Local Records Making and Records Keeping, American Univ., Washington, D.C. (P. W.

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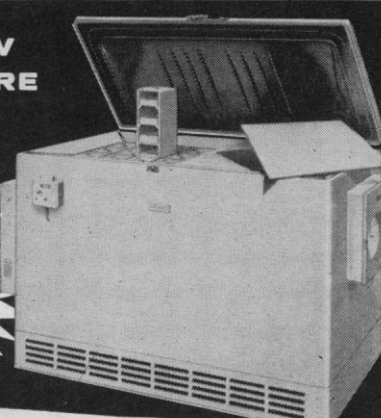
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SCIENCE, VOL. 156

Howerton, Director, Center for Technology and Administration Inst., 2000 G St., NW, Washington 20010)

21-23. **Modern Titrimetry**, 20th annual summer symp. on analytical chemistry, Claremont, Calif. (A. L. Beilby, Dept. of Chemistry, Pomona College, Claremont 91713)

21-25. Society of **Women Engineers**, 17th annual conv., Washington, D.C. (Mrs. J. R. Fisher, 12501 Connecticut Ave., Silver Spring, Md. 20906)

21-30. **Combustion-Generated Air Pollution**, mtg., Berkeley, Calif. (Engineering Extension, 2223 Fulton St., Berkeley 94720)

22-23. **Animal Reproduction**, 8th symp., Urbana, Ill. (Short Courses and Conferences, 116 Illini Hall, Champaign, Ill. 61820)

22-24. American Soc. of **Enologists**, annual mtg., Santa Barbara, Calif. (The Society, Box 411, Davis, Calif.)

22-25. American Assoc. of **Bioanalysts**, mtg., Detroit, Mich. (D. Birenbaum, The Association, 805 Ambassador Bldg., St. Louis, Mo. 63101)

25-27. **Mountain Meteorology**, symp., Fort Collins, Colo. (J. L. Rasmussen, Dept. of Atmospheric Science, Colorado State Univ., Fort Collins 80521)

25-28. American Soc. of **Agricultural Engineers**, annual mtg., Saskatoon, Sask., Canada. (O. L. Symes, Dept. of Agricultural Engineering, Univ. of Saskatchewan, Saskatoon)

25-28. American **Dairy Science Assoc.**, Ithaca, N.Y. (C. Cruse, The Association, 903 Fairview Ave., Urbana, Ill. 61801)

25-28. American **Leather Chemists Assoc.**, Lake Placid, N.Y. (W. T. Roddy, Executive Secretary, The Association, Univ. of Cincinnati, Cincinnati, Ohio 45221)

25-30. American Soc. for **Testing and Materials**, 70th annual mtg., Boston, Mass. (H. H. Hamilton, Public Relations, The Society, 1916 Race St., Philadelphia, Pa.)

26-27. American Soc. of **Pharmacognosy**, annual mtg., Ann Arbor, Mich. (A. G. Paul, College of Pharmacy, Univ. of Michigan, Ann Arbor)

26-28. **Computer Workshop**, Columbia Univ., New York, N.Y. (Workshop Director, College of Pharmaceutical Sciences, Columbia Univ., 115 W. 68 St., New York 10023)

26-30. American **Schools for the Deaf**, conf. West Hartford, Conn. (E. W. Tillinghast, Arizona State School of Deaf and Blind, P.O. Box 5545, Tucson 85703)

26-30. **Computers in Chemistry**, conf., Univ. of California, San Diego. (P. James, Chancellor Office, Univ. of California at San Diego, La Jolla)

26-30. Workshop on Graduate Training in **Scientific Writing**, Rockefeller Univ., New York, N.Y. (F. P. Woodford, Rockefeller Univ., New York 10021)

26-8. **Immunology**, summer course. Lake Forest, Ill. (S. Dray, Univ. of Illinois at Medical Center, P.O. Box 6998, Chicago)

27-29. Western Soc. of **Crop Science**, University Park, N.M. (B. A. Melton, Jr., New Mexico State Univ., University Park 88001)

28-30. American Scientific **Glassblowers Soc.**, 12th annual symp., Atlanta, Ga. (R. W. Poole, 100 Cedar Lane, Oak Ridge, Tenn. 37832)

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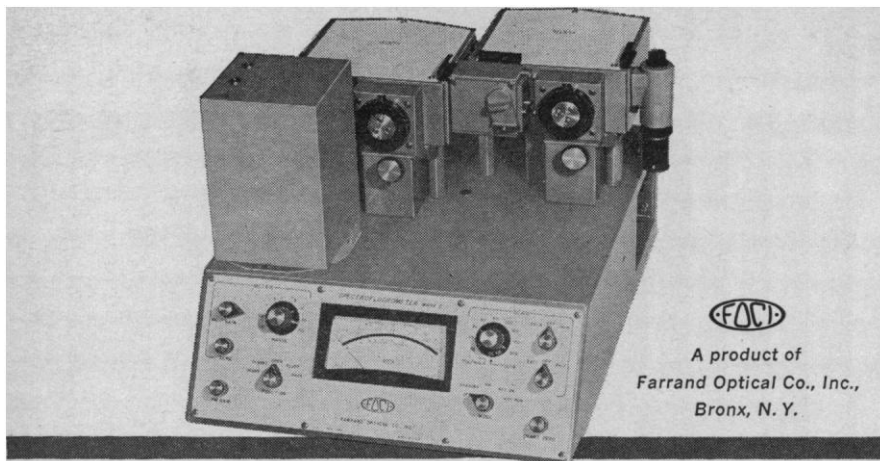
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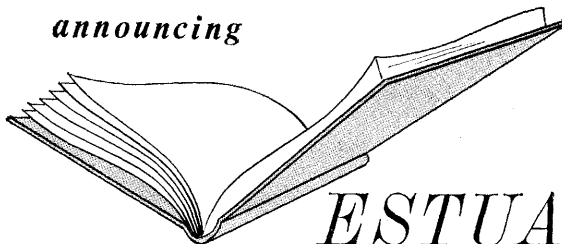
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28-30. Joint Automatic Control Conf., 8th annual mtg., Philadelphia, Pa. (L. Winner, 152 W. 42 St., New York 10036)

28-30. Society of Protozoologists, Toronto, Ont., Canada. (R. W. Hull, Dept. of Biological Sciences, Florida State Univ., Tallahassee 32306)

29-1. Navigation in the Last Third of the 20th Century: Where Do We Stand; What Needs to be Done, Inst. of Navigation, 23rd annual mtg., Washington, D.C. (The Institute, 711 14th St., NW, Suite 912, Washington 20005)

July

5-8. National Soc. of Professional Engineers, annual mtg., Hartford, Conn. (P. H. Robbins, 2029 K St., NW, Washington, D.C. 20006)

9-13. American Veterinary Medical Assoc., 104th annual mtg., Dallas, Tex. (Executive Secretary, 600 S. Michigan Ave., Chicago, Ill. 60605)

10-11. American College of Laboratory Animal Medicine, annual mgt., Dallas, Tex. (R. H. Yager, Secretary, ILAR-NRC, 2101 Constitution Ave., NW, Washington, D.C. 20418)

10-12. Aviation and Space Transportation, symp., New York, N.Y. (American Soc. of Mechanical Engineers, 345 E. 47 St., New York 10017)

10-14. Nuclear and Space Radiation Effects, Columbus, Ohio. (IEEE, Technical Activities Board, 345 E. 47 St., New York 10017)

14-15. Rocky Mountain Cancer Conf., 21st, Denver, Colo. (N. P. Isbell, Colorado Medical Soc., 1809 E. 18 Ave., Denver 80218)

17-19. Sixth Aerospace Reliability and Maintainability Meeting, Cocoa Beach, Fla. (Meetings Manager, ASME, 345 E. 47 St., New York 10017)

17-21. Neutron Thermalization and Reactor Spectra, Ann Arbor, Mich. (J. H. Kane, Intern. Conf. Branch, Technical Information Div., Atomic Energy Commission, Washington, D.C.)

17-21. Third Propulsion Joint Specialist Conf., Washington, D.C. (Meetings Dept., American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

18-20. Electromagnetic Compatibility, 9th symp., Washington, D.C. (F. T. Mitchell, Atlantic Research Corp., Shirley Hwy. and Edsall Rd., Alexandria, Va.)

18-22. American Medical Technologists, 29th annual mtg., Washington, D.C. (C. B. Dziekonski, 710 Higgins Rd., Park Ridge, Ill. 60068)

19-21. Marine Chemists Assoc., 9th annual mtg., San Francisco, Calif. (K. M. Savage, c/o National Fire Protection Assoc., 60 Batterymarch St., Boston, Mass.)

24-27. American Soc. for Metals, W. H. Eisenman Conf. on Metal Ceramics Composites, San Francisco, Calif. (The Society, Metals Park, Ohio 44073)

24-28. Solid Waste Research and Development, conf., Milwaukee, Wis. (United Engineering Center, 345 E. 47 St., New York 10017)

24-29. Fluorine Chemistry, 4th intern. symp., Estes Park, Colo. (P. Tarrant, Dept. of Chemistry, Univ. of Florida, Gainesville 32601)



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* Kaji, et al., Ann. N.Y. Acad. Sci, 94, 798 (1961).

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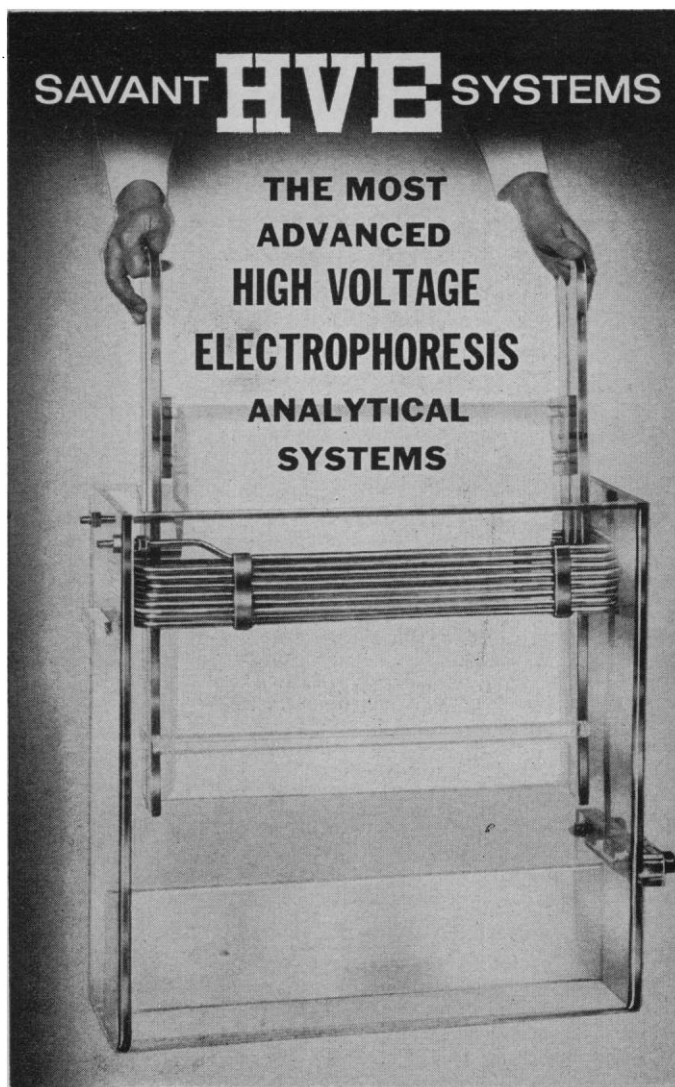
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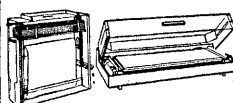
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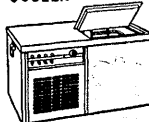
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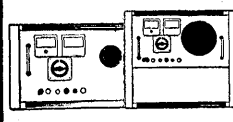
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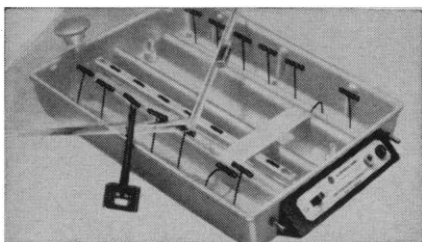
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27-29. Linguistic Soc. of America, annual summer mtg., Ann Arbor, Mich. (A. A. Hill, Box 8120, University Station, Austin, Tex. 78712)

30-3. American Soc. of Animal Science, mtg., Reno, Nev. (A. M. Pearson, Dept. of Food Science, Michigan State Univ., East Lansing 48823)

31-2. International Soc. for Human and Animal Mycology, 4th conf., New Orleans, La. (R. Baker, Louisiana Univ. School of Medicine, New Orleans)

31-4. Mammalian Oviduct, symp., Pullman, Wash. (E. S. E. Hafez, Reproduction Lab., Washington State Univ., Pullman 99163)

31-4. Association for the Advancement of Medical Instrumentation, annual mtg., San Francisco, Calif. (J. J. Post, Box 314, Harvard Sq., Cambridge, Mass. 02138)

31-4. Particulate Matter Systems, conf., Milwaukee, Wis. (United Engineering Center, 345 E. 47 St., New York 10017)

International and Foreign Meetings

June

22-25. Urology, 32nd Belgian Congr., Liège, Belgium. (L. Timmermans, Hôpital de Bavière, Clinique Urologique, 66, boulevard de la Constitution, Liège)

25-2. Application of Mathematics in Engineering, 4th intern. congr., Weimar, East Germany. (H. Matzke, Inst. of Mathematics and Scientific Computing Center, Weimar College of Architecture and Building, Karl Marx Platz, 2 Weimar)

26-30. Carbonium Ions, 1st intern. symp. on physical organic chemistry, Athens, Greece. (The Symposium, Dept. of Chemistry, Michigan State Univ., East Lansing 48823; or G. Gregoriou, Nuclear Research Center "Democritos," Aghia Paraskevi, Athens, Greece)

July

2-4. Canadian Soc. of Clinical Chemists, annual mtg., Montreal, P.Q. (M. Francoeur, Dept. of Biochemistry, Hotel-Dieu Hospital, 109 Pine Ave. W., Montreal)

2-6. Forest Products Research Society, annual mtg., Vancouver, B.C., Canada. (The Society, 417 N. Walnut St., Madison, Wis. 53705)

3-7. Instruments and Techniques for Assessment of Airborne Radioactivity in Nuclear Operations, Vienna, Austria. (International Atomic Energy Agency, Kartner Ring 11, Vienna 1)

5-7. Canadian Federation of Biological Societies (Canadian Physiological Soc., Pharmacological Soc. of Canada, Canadian Assoc. of Anatomists, Canadian Biochemical Soc., Nutrition Soc. of Canada), 10th annual mtg., Montreal, Que. (Honorary Secretary, % Faculty of Medicine, University of Western Ontario, London, Ontario)

5-7. Congress of Medicinal Chemistry, 3rd intern. mtg., Paris, France. (Société de Chimie Thérapeutique, 2 rue d'Alesia, 75-Paris 14^e)

6-14. British Medical Assoc., annual mtg., Bristol, England. (The Secretary, Tavistock Square, London W.C.1, England)

7-13. International Dental Federation,

55th annual mtg., and 14th congr., Paris, France. (Secretary General, 35 Devonshire Pl., London, W.1, England)

7-13. Physics of Electronic and Atomic Collisions, 5th intern. conf., Leningrad, U.S.S.R. (R. N. Ilin, Ioffe Physico-Technical Inst., Leningrad K-21)

9-15. International Soc. of Urology, 14th congr., Munich, Germany. (Secretary General, 63 Ave. Niel, Paris 7^e, France)

10-15. International Mining Congr., 5th, Moscow, U.S.S.R. (A. S. Archangel'sky, % Ministry of the Coal Industry of the U.S.S.R., B. Kiselny per., 13/15, Moscow K-45)

10-15. Latin American Soil Biology, 2nd congr., Santa Maria, Brazil. (Science Dept., British Council, Albion House, 59 New Oxford St., London, W.C.1, England)

11-14. International Union of School and University Health Medicine, 5th congr., Prague, Czechoslovakia. (The Union, Centre International de l'Enfance, Château de Longchamp, Bois de Boulogne, Paris 16^e, France)

14-28. Plant Pathology, 1st intern. congr., London, England. (R. K. S. Wood, Imperial College, London, S.W.1)

16-22. Organic Photochemistry, intern. symp. (IUPAC), Enschede, Netherlands. (W. G. Dauben, % Dept. of Chemistry, Univ. of California, Berkeley 94720)

17-19. Organic Chemistry, symp. (IUPAC), Nottingham, England. (A. W. Johnson, Dept. of Chemistry, Univ. of Nottingham, Nottingham)

17-21. Solar-Terrestrial Relationships during Solar Minimum Conditions, symp., London, England. (G. de Q. Robin, % Scott Polar Research Inst., Univ. of Cambridge, Cambridge, England)

17-22. World Veterinary Assoc., 18th intern. congr., Paris, France. (R. Vuillaume, 27, rue des Petits-Hôtels, Paris 10^e)

18-23. Laser Applications, 1st intern. congr., Paris, France. (The Congress, 14, rue de Buffon, Paris 5^e)

19-22. Ibero-Latin American Congr. of Dermatology, Barcelona, Spain. (J. Pinol-Aguade, % Facultad de Medicina, Univ. de Barcelona, Spain)

21-31. Space Science, 8th intern. symp., London, England. (M. J. Gazin, Committee on Space Research, 55, Boul. Malesherbes, Paris 8^e, France)

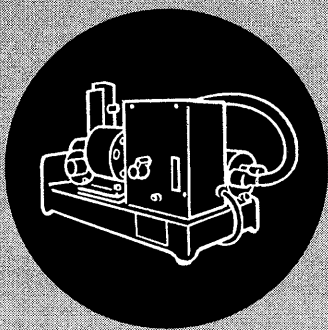
23-26. Society of Naval Architects and Marine Engineers, spring mtg., Montreal, Canada. (M. H. Gluntz, The Society, 74 Trinity Pl., New York 10006)

23-28. International Soc. for Neurochemistry, 1st intern. mtg., Strasbourg, France. (J. Folch-Pi, McLean Hospital, Belmont, Mass.)

23-28. International Psychoanalytical Assoc., 25th congr., Copenhagen, Denmark. (M. M. Montessori, Psycho-Analytical, 63 New Cavendish St., London, W.1, England)

24-28. Carbohydrate Chemistry, 4th intern. conf., Kingston, Ont., Canada. (J. K. Jones, Gordon Hall, Queen's Univ., Kingston, Ont.)

25-27. Solution Properties of Natural Polymers, intern. symp., Edinburgh, Scotland. (The General Secretary, The Chemical Soc., Burlington House, London, W.1, England)



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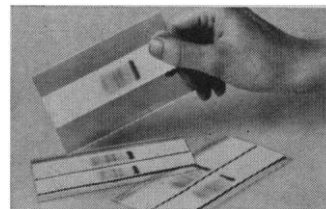
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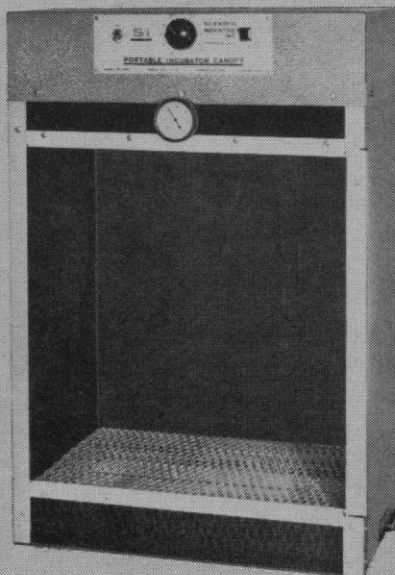
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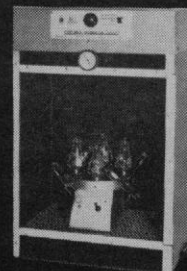
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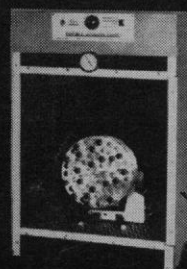
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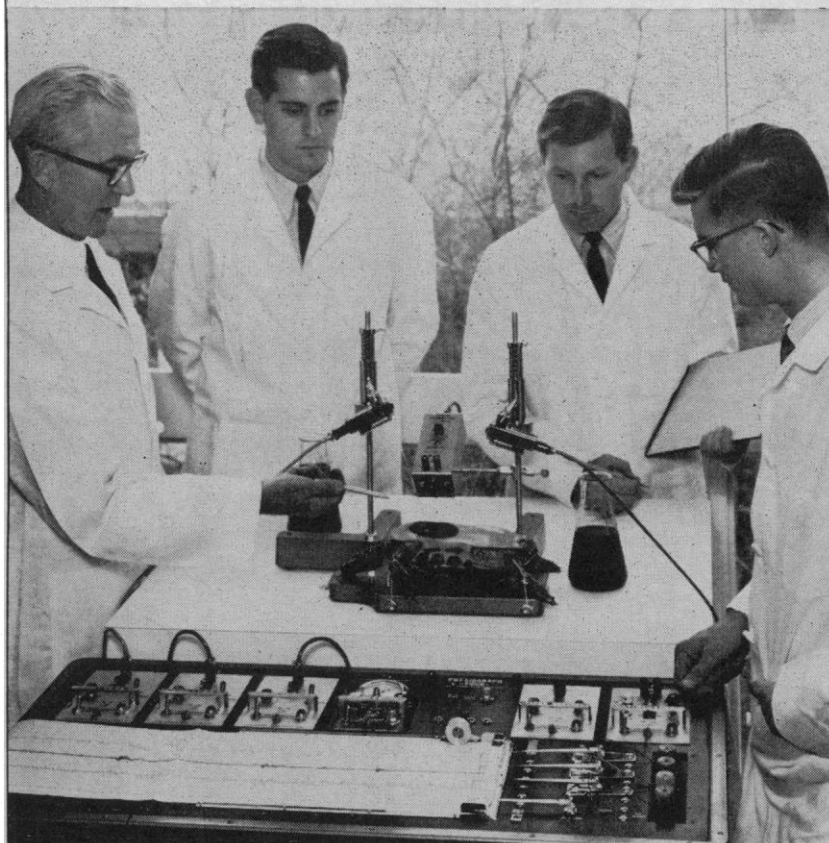
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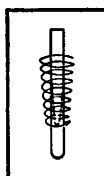
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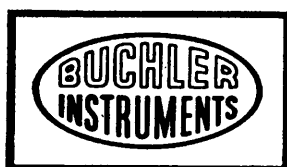
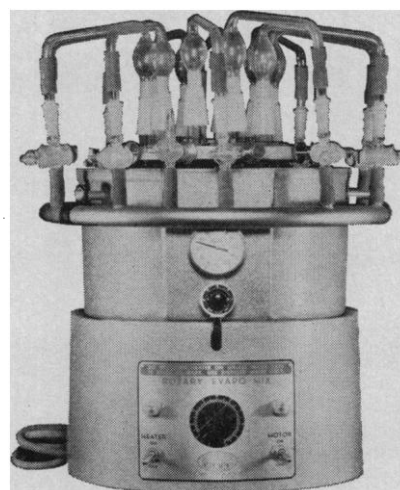
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BOOKS RECEIVED

(Continued from page 1356)

Atomism in England from Hariot to Newton. Robert Hugh Kargon. Oxford Univ. Press, New York, 1966. 178 pp. \$6.75.

The Biology of Ultimate Concern. Theodosius Dobzhansky. New American Library, New York, 1967. 172 pp. \$5.

Bioscience. Robert B. Platt and George K. Reid. Reinhold, New York, 1967. 544 pp. Illus. \$9.50.

Andrew Brown and Cypress Lumbering in the Old Southwest. John Hebron Moore. Louisiana State Univ. Press, Baton Rouge, 1967. 196 pp. Illus. \$6.

B-Vitamine: Klinische und physiologisch-chemische Probleme. A symposium (Berlin), September-October 1965. H. Frhr. von Kress and K.-U. Blum, Eds. Schattauer, Stuttgart, Germany, 1966. 404 pp. Illus. Paper, DM. 69. Thirty-four papers. Most of the papers are in German, others in English.

Carbonatites. O. F. Tuttle and J. Gittins, Eds. Interscience (Wiley), New York, 1967. 611 pp. Illus. \$22.50. Sixteen papers.

The Central Nervous System of Vertebrates. vol. 2, *Invertebrates and Origin of Vertebrates.* Hartwig Kuhlenbeck. Academic Press, New York, 1967. 380 pp. Illus. \$17.50.

Chemistry: A Conceptual Approach. Charles E. Mortimer. Reinhold, New York, 1967. 704 pp. Illus. \$8.95.

Conserving Natural Resources: Principles and Practice in a Democracy. Shirley Walter Allen and Justin Wilkinson Leonard. McGraw-Hill, New York, ed. 3, 1966. 442 pp. Illus. \$8.95.

The Constitution of Glasses: A Dynamic Interpretation. vol. 2, pt. 2, *Constitution and Properties of Some Representative Glasses.* Woldemar A. Weyl and Evelyn Chostner Marboe. Interscience (Wiley), New York, 1967. 713 pp. Illus. \$27.95.

Creative Encounters in the Classroom: Teaching and Learning Through Discovery. Byron G. Massialas and Jack Zevin. Wiley, New York, 1967. 286 pp. Illus. Paper, \$3.50; cloth, \$5.95.

Delaware Seminar in the Foundations of Physics. Mario Bunge, Ed. Springer-Verlag, New York, 1967. 205 pp. \$9.50. Eleven papers. Studies in the Foundations Methodology and Philosophy of Science, vol. 1.

Digital Simulation in Operational Research. Proceedings of a conference (Hamburg), September 1965. Sponsored by the Scientific Affairs Division of NATO. S. H. Hollingdale, Ed. Elsevier, New York, 1967. 408 pp. Illus. \$14.50. There are 39 papers; in English or French.

A Different Approach to Thermodynamics. William Fay Luder. Reinhold, New York, 1967. 176 pp. Illus. Paper, \$2.95. Reinhold Chemistry Textbook Series.

Dragons of the Air. An account of extinct flying reptiles. H. G. Seeley. Dover, New York, 1967. 263 pp. Illus. Paper, \$1.75. Reprint, 1901 edition.

Dynamics of Fluids and Plasmas. Proceedings of a symposium held in honor of J. M. Burgers (College Park, Md.), October 1965. Sponsored by Air Force Office



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of Scientific Research and the Institute for Fluid Dynamics and Applied Mathematics. S. I. Pai *et al.*, Eds. Academic Press, New York, 1966. 543 pp. Illus. \$24. Twenty-four papers.

Electron-Diffraction Analysis of Clay Mineral Structures. Boris Borisovich Zvyagin. Translated from the revised Russian edition by Simon Lyse. Plenum Press, New York, 1967. 380 pp. Illus. \$19.50. Monographs in Geoscience Series.

Elementary Theory and Application of Numerical Analysis. David G. Moursund and Charles S. Duris. McGraw-Hill, New York, 1967. 311 pp. Illus. \$8.95. International Series in Pure and Applied Mathematics.

Éléments d'Embryologie Causale. J. Fautrez. Gauthier-Villars, Paris, 1967. 306 pp. Illus. Paper, F. 32. Collection d'Enseignement Biologique.

Endocrine Genetics. Proceedings of a symposium (Cambridge, England), March 1966. S. G. Spickett and J. G. M. Shire, Eds. Cambridge Univ. Press, New York, 1967. 341 pp. Illus. \$13.50. Memoirs of the Society for Endocrinology, No. 15. Twenty-one papers.

An English-Classical Dictionary for the Use of Taxonomists. Compiled by Robert S. Woods. Pomona College, Claremont, Calif., 1966. 345 pp. \$5.50.

Equations of Mathematical Physics. G. N. Polozhiy. Translated from the Russian edition (Moscow, 1964) by Scripta Technica. Michael Yanowitch, Translation Ed. Hayden, New York, 1967. 553 pp. Illus. \$14.50.

Essentials of Statistics for Scientists and Technologists. C. Mack. Plenum Press, New York, 1967. 182 pp. Illus. \$5.95.

Extraction Metallurgy. J. D. Gilchrist. Pergamon, New York, 1967. 303 pp. Illus. Paper, \$6. Commonwealth and International Library.

Fire Resistance of Hydraulic Fluids. A symposium (New Orleans), January 1966. Sponsored by the American Society for Testing and Materials and the Society of Automotive Engineers. American Soc. for Testing and Materials, Philadelphia, 1966. 200 pp. Illus. Paper, \$6.75. Ten papers.

Forest Trees of the Pacific Slope. George B. Sudworth, Dover, New York, 1967. 471 pp. Illus. Paper, \$3. Reprint, 1908 edition.

Four Lectures on Relativity and Space. Charles Proteus Steinmetz. Dover, New York, 1967. 152 pp. Illus. Paper, \$1.35. Reprint, 1923 edition.

From Cell to Organism. Readings from *Scientific American*. Donald Kennedy. Freeman, San Francisco, 1967. 264 pp. Illus. Paper, \$4.45; cloth, \$9. Twenty-four papers.

Gallium Arsenide. Proceedings of an international symposium (Reading, England), September 1966. A. C. Stickland and M. E. Hilton, Eds. Institute of Physics and Physical Soc., London, 1967. 255 pp. Illus. \$12. Thirty-four papers.

Gems, Minerals, Crystals and Ores: The Collector's Encyclopedia. Richard M. Pearl. Golden Press, New York, 1967. 320 pp. Illus. Paper, \$2.95. Reprint, 1964 edition.

Geochemistry and Mineralogy of Rare Elements and Genetic Types of Their Deposits. vol. 1, *Geochemistry of Rare Ele-*



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ments. K. A. Vlasov, Ed. Translated from the Russian edition (Moscow, 1964) by Z. Lerman. Y. Brenner, Translation Ed. Israel Program for Scientific Translations, Jerusalem, 1966; Davey, New York, 1967. 702 pp. Illus. \$24.

Geology: Our Changing Earth through the Ages. Jerome Wyckoff. Golden Press, New York, 1967. 288 pp. Illus. Paper, \$2.95. Reprint, 1960 edition.

Getting Acquainted with Comets. Robert S. Richardson. McGraw-Hill, New York, 1967. 318 pp. Illus. \$7.50.

Gyroscopic Theory. Sir G. Greenhill. Chelsea, Bronx, N.Y., 1966. 283 pp. Illus. Plates. \$9.50. Reprint, 1914 edition.

John Harrison: The Man Who Found Longitude. Humphrey Quill. Humanities Press, New York, 1966. 269 pp. Illus. \$10.

William Harvey's Biological Ideas. Selected aspects and historical background. Walter Pagel. Hafner, New York, 1967. 394 pp. Illus. \$25.50.

Human Behavior: Shorter Edition. Bernard Berelson and Gary A. Steiner. Harcourt, Brace and World, New York, 1967. 231 pp. Illus. \$4.75. A condensation of *Human Behavior: An Inventory of Scientific Findings*.

Human Development. Frank Falkner, Ed. Saunders, Philadelphia, 1966. 664 pp. Illus. \$20. Sixteen papers.

The Human Nervous System: Basic Elements of Structure and Function. Charles R. Noback. McGraw-Hill, New York, 1967. 287 pp. Illus. \$13.95.

Hymenoptera of America North of Mexico. Prepared under the direction of Karl V. Krombein and B. D. Burks. U.S. Department of Agriculture, Washington, D.C., 1967 (order from Superintendent of Documents, Washington, D.C.). 586 pp. \$2.75.

Information Transmission. An introductory guide to the application of the theory of information to the human sciences. Elwyn Edwards. Chapman and Hall, London, 1964; Barnes and Noble, New York, 1967. 142 pp. Illus. Paper, \$2.85.

Inorganic Syntheses. vol. 9. S. Young Tyree, Jr., Ed. McGraw-Hill, New York, 1967. 255 pp. Illus. \$9.95.

Insect Colonization and Mass Production. Carroll N. Smith, Ed. Academic Press, New York, 1966. 640 pp. Illus. \$27. Thirty-nine papers.

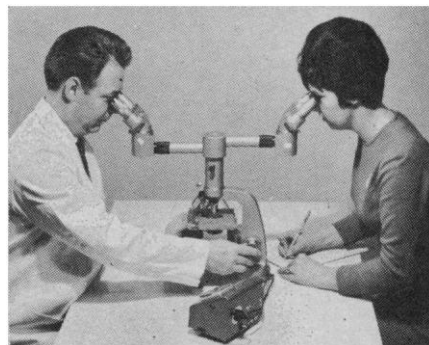
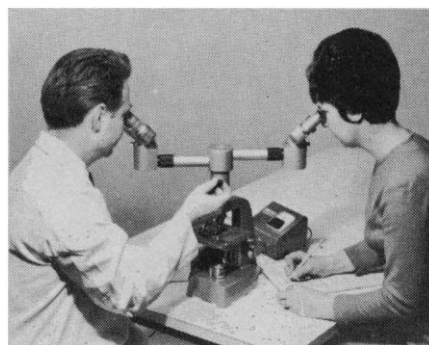
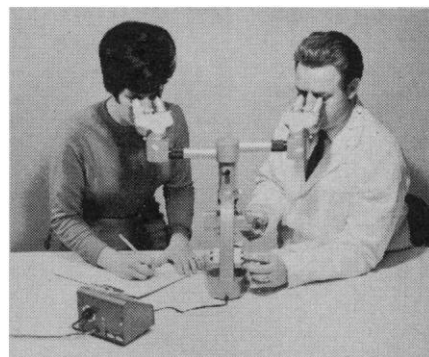
Interaction of Radiation with Solids. Proceedings of the Solid State Conference (Cairo), September 1966. Adli Bishay, Ed. Plenum Press, New York, 1967. 711 pp. Illus. \$20. Forty-six papers.

International Review of Experimental Pathology. vol. 5. G. W. Richter and M. A. Epstein, Eds. Academic Press, New York, 1966. 384 pp. Illus. \$16.50. Seven papers.

International Symposium on the Nucleolus, Its Structure and Function (Montevideo, Uruguay), December 1965. W. S. Vincent and O. L. Miller, Jr., Eds. U.S. Department of Health, Education, and Welfare, Washington, D.C., 1967 (order from Superintendent of Documents, Washington, D.C.). 630 pp. Illus. \$5. Thirty-seven papers.

Introduction to Animal Physiology and Physiological Genetics. E. M. Pantelouris.

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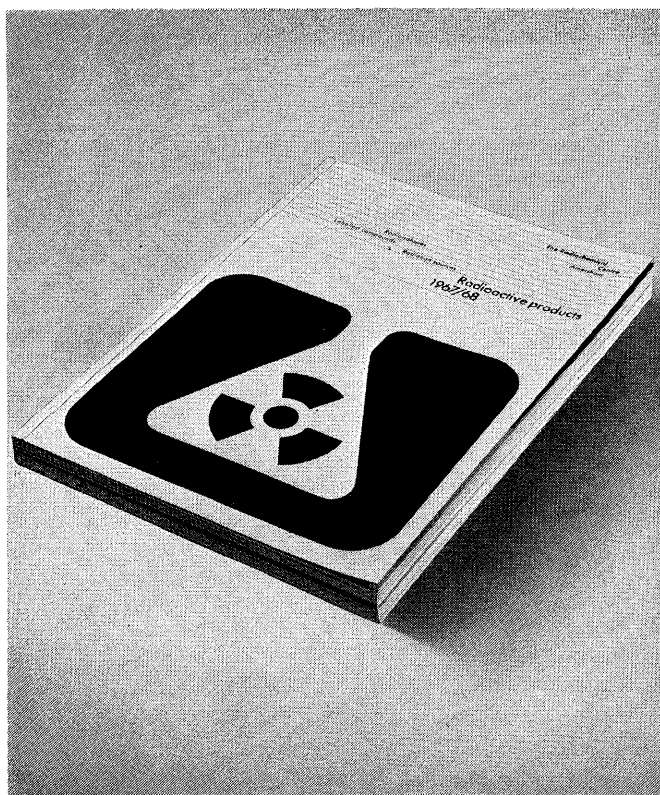
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Pergamon, New York, 1967. 505 pp. Illus. \$11.50. International Series of Monographs in Pure and Applied Biology.

An Introduction to Parasitology. R. Alan Wilson. St. Martin's Press, New York, 1967. 63 pp. Illus. Paper, \$1.50. Studies in Biology, No. 4.

An Introduction to Sequences, Series, and Improper Integrals. O. E. Stanaitis. Holden-Day, San Francisco, 1967. 220 pp. Illus. \$7.95.

An Introduction to Stochastic Processes: With Special Reference to Methods and Applications. M. S. Bartlett. Cambridge Univ. Press, New York, ed. 2, 1966. 378 pp. Illus. \$9.50.

An Introduction to Tensor Calculus and Relativity. Derek F. Lawden. Methuen, London; Barnes and Noble, New York, ed. 2, 1967. 198 pp. Illus. Paper, \$2.85; cloth, \$4.50.

An Introduction to the Behavior of Ants. John H. Sudd. St. Martin's Press, New York, 1967. 208 pp. Illus. Paper, \$3.95; cloth, \$8.25.

An Introduction to the Laplace Transformation: With Engineering Applications. J. C. Jaeger. Methuen, London; Barnes and Noble, New York, 1967. 164 pp. Illus. Paper, \$1.50; cloth, \$3. Reprint of edition 2, 1961.

Ionic Reactions and Equilibria. Omer Robbins, Jr. Macmillan, New York, 1967. 384 pp. Illus. Paper, \$3.95.

Kinetics and Thermodynamics in Biochemistry. H. Geoffrey Bray and Kenneth White. Academic Press, New York, ed. 2, 1966. 430 pp. Illus. \$15.

Machine Intelligence. vol. 1. N. L. Collins and Donald Michie, Eds. Elsevier, New York, 1967. 288 pp. Illus. \$12.50. Seventeen papers.

Magnetic Resonance Spectroscopy. Harry G. Hecht. Wiley, New York, 1967. 173 pp. Illus. \$5.95. Wiley Series in Pure and Applied Spectroscopy.

A Manager's Guide to Marketing Research: Survey of Recent Developments. Paul E. Green and Ronald E. Frank. Interscience (Wiley), New York, 1967. 199 pp. Illus. \$7.95. Manager's Guide Series.

The Mathematical Theory of Linear Systems. B. M. Brown. Chapman and Hall, London; Barnes and Noble, New York, ed. 2, 1967. 293 pp. Illus. Paper, \$4.75; cloth, \$9. Automation and Control Engineering Series.

The Molecular Properties and Evolution of Excitable Cells. C. J. Duncan. Pergamon, New York, 1967. 265 pp. Illus. \$11.

The Morning of Mankind: Prehistoric Man in Europe. Robert Silverberg. New York Graphic Soc., Greenwich, Conn., 1967. 256 pp. Illus. \$4.95.

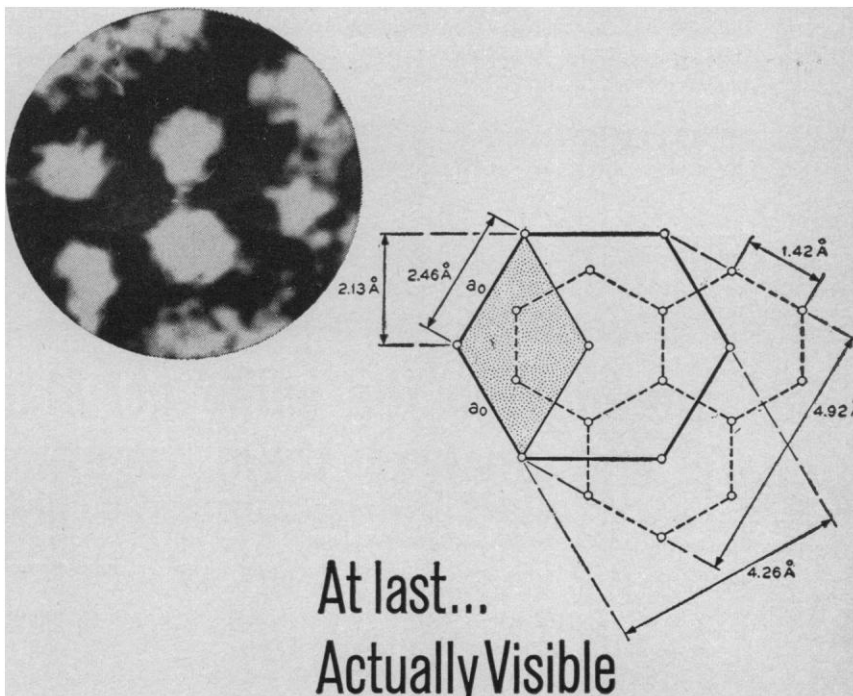
Multivariate Statistical Methods. Donald F. Morrison. McGraw-Hill, New York, 1967. 352 pp. Illus. \$9.95. McGraw-Hill Series in Probability and Statistics.

Mysterious Fires and Lights. Vincent H. Gaddis. McKay, New York, 1967. 288 pp. \$5.50.

The Neural Basis of Behavior. Lloyd S. Woodburne. Merrill, Columbus, Ohio, 1967. 384 pp. Illus. \$10. Merrill's International Psychology Series.

Pharmaceutical Historiography. Proceedings of a colloquium (Madison, Wis.), January 1966. Alex Berman, Ed. American Inst. of the History of Pharmacy,

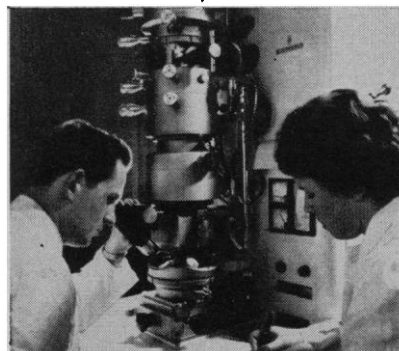
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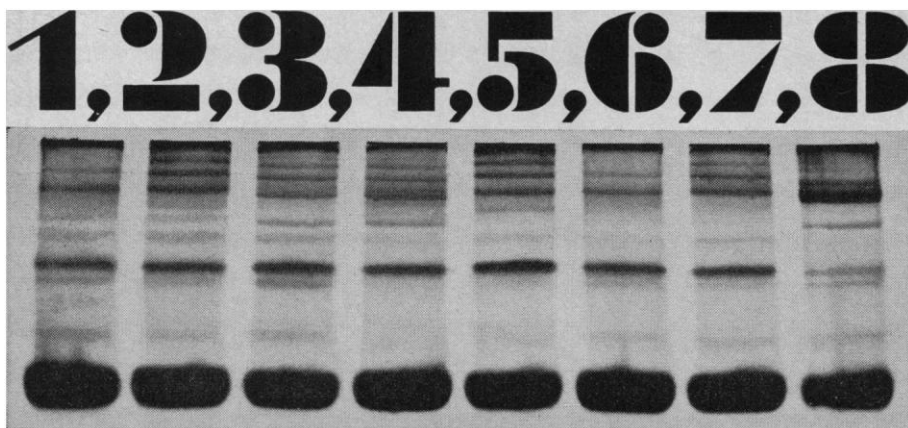
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Madison, 1967. 147 pp. Illus. Paper, \$2. Eleven papers.

Planets, Stars, and Galaxies: An Introduction to Astronomy. Stuart J. Inglis. Wiley, New York, ed. 2, 1967. 494 pp. Illus. \$7.95.

Plant Taxonomy. V. H. Heywood. St. Martin's Press, New York, 1967. 64 pp. Illus. Paper, \$1.50. Studies in Biology, No. 5.

The Politics of Experience. R. D. Laing. Pantheon Books, New York, 1967. 154 pp. \$4.95.

Polymer Fractionation. Manfred J. R. Cantow, Ed. Academic Press, New York, 1967. 539 pp. Illus. \$22.50. Fifteen papers.

Quantum Field Theory and Hydrodynamics. D. V. Skobel'tsyn, Ed. Translated from the Russian edition (Moscow, 1965). Consultants Bureau, New York, 1967. 283 pp. Illus. Paper, \$7.50. Proceedings of the P.N. Lebedev Physics Institute, vol. 29.

Radio Astronomy. John D. Kraus. With a chapter by Martti E. Tiuri. McGraw-Hill, New York, 1966. 491 pp. Illus. \$13.75.

Raman Spectroscopy: Theory and Practice. Herman A. Szymanski, Ed. Plenum Press, New York, 1967. 265 pp. Illus. \$12.50. Seven papers.

Rayonnement et dynamique du corpuscule chargé fortement accéléré. Henri Arzelès. Gauthier-Villars, Paris, 1966. 477 pp. Illus. F. 88.

Scientific Research I: The Search for System. Mario Bunge. Springer-Verlag, New York, 1967. 548 pp. Illus. \$21. Studies in the Foundations Methodology and Philosophy of Science, vol. 3, pt. 1.

Seismic Love Waves. Z. S. Andrianova, V. I. Keilis-Borok, A. L. Levshin, and M. G. Neigauz. Translated from the Russian (Moscow, 1965) by F. M. C. Goodspeed. Consultants Bureau, New York, 1967. 105 pp. Illus. Paper, \$15.

Semiconductors and Semimetals. vol. 1, *Physics of III-V Compounds.* R. K. Willardson and Albert C. Beer. Academic Press, New York, 1966. 512 pp. Illus. \$19.

Southeast Asian Tribes, Minorities, and Nations. vols. 1 and 2. Peter Kunstadter, Ed. Published for the Princeton Center of International Studies. Princeton Univ. Press, Princeton, N.J., 1967. vol. 1, 500 pp.; vol. 2, 424 pp. Illus. \$22.50 per set.

Stochastically Dependent Equations: An Introductory Text for Econometricians. P. R. Fisk. Hafner, New York, 1967. 189 pp. Illus. Paper, \$6.40.

Symétries de Type Lorentzien et Interactions Fortes. Moshé Flato. Gauthier-Villars, Paris, 1967. 154 pp. Illus. Paper, 32 F.F.

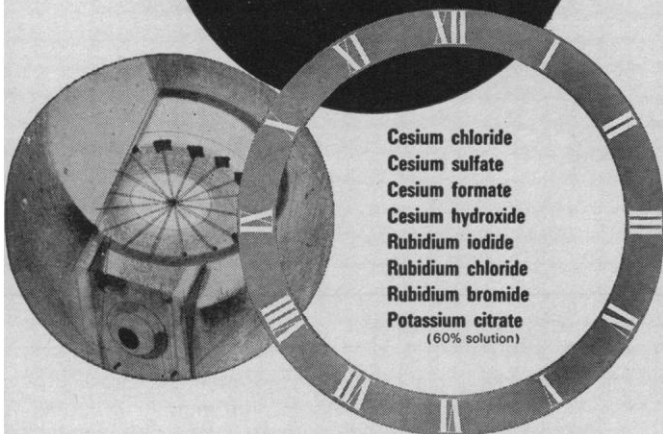
Symmetry Principles at High Energy. Coral Gables Fourth Conference (Coral Gables, Fla.), January 1967. Arnold Perlmuter and Behram Kurşunoğlu, Eds. Freeman, San Francisco, 1967. 259 pp. Illus. Paper, \$6. Nineteen papers.

Synthesis of RC Networks. Hun H. Sun. Hayden, New York, 1967. 160 pp. Illus. \$7.50.

Textile Laboratory Manual. vol. 3, *Detergents.* W. Garner. Elsevier, New York, ed. 3, 1967. 222 pp. Illus. \$9.

The Theory of the Scattering Matrix: For the Interactions of Fundamental Particles. A. O. Barut. Macmillan, New York, 1967. 364 pp. Illus. \$13.95.

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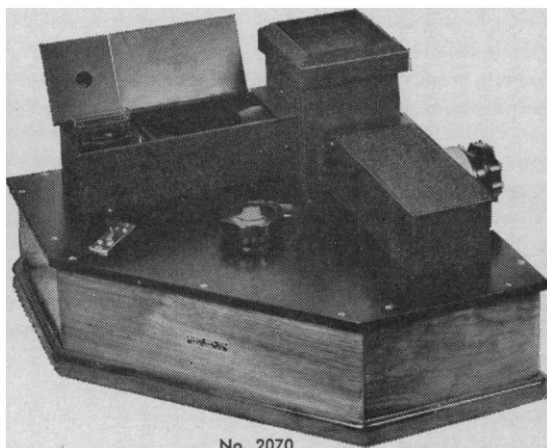
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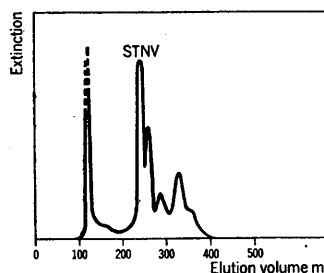
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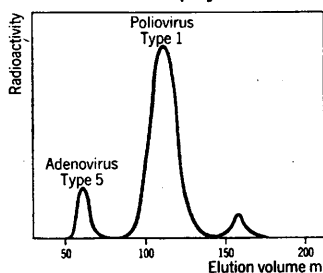
SEPHAROSE

Sepharose Type	Particle Size Microns	Percent Agarose	Fractionation Range
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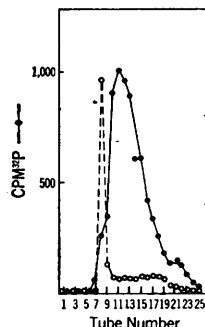
*Determined with polysaccharides.



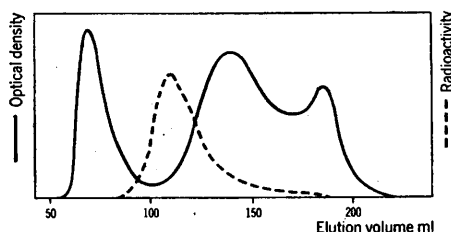
Chromatography of a crude preparation of satellite tobacco necrosis virus on Sepharose 4B.



Separation of ³²P-labeled adenovirus and poliovirus on Sepharose 2B.



Separation of the replicative RNA intermediate (first peak) synthesized in RNA phage-infected cells from single stranded cellular RNA (second peak) on Sepharose 4B. Erikson and Gordon, Biochem. Biophys. Res. Commun. 23 (1966) 422-428.



Separation of a mixture of KB-cell nucleic acids and ³²P-labeled poliovirus RNA on Sepharose 2B. The first peak contains KB-cell DNA, followed by poliovirus RNA, KB-cell r-RNA and KB-cell s-RNA.

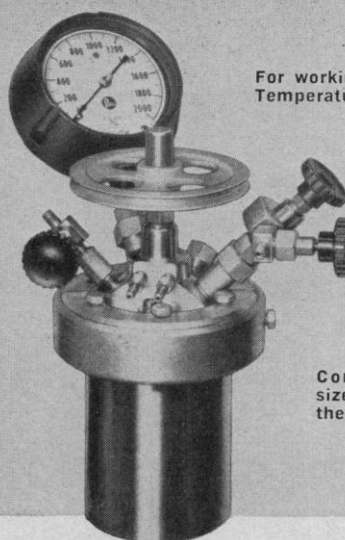
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