

SCIENCE

27 December 1963

Vol. 142, No. 3600

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



DEVIL'S ROCK, MASHONALAND

Index Issue

IBM computers, science and you:

Your systems design problem just shrunk

Computer simulation is a great idea—especially in systems design. It can help you pre-test and improve performance of a steel mill layout, a communications network, a job shop.

But programming the computer for a simulation can be a problem. It takes time...and a thorough knowledge of programming. It can be expensive.

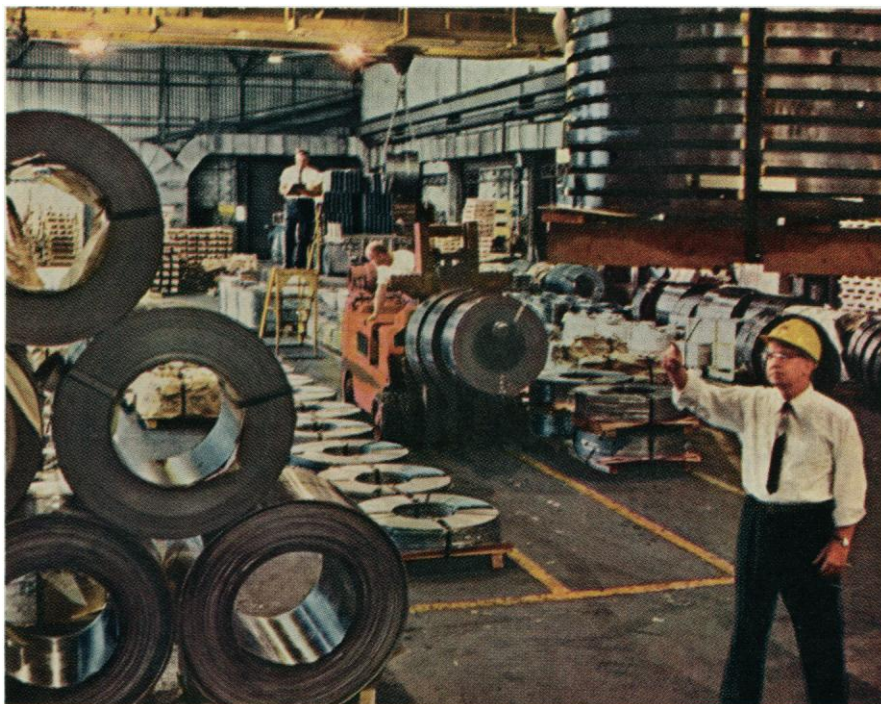
So we've developed a program to make systems simulation easier.

Any experienced systems engineer can use the IBM General Purpose Systems Simulator II. You describe the job with block diagrams and FORTRAN-like statements.

Once you describe the system in this simple engineering language, an IBM 7090 computer takes over and functions like the real-life system would. You can compress days, weeks, even months of real-life operation into a few minutes of 7090 running time.

You can change parameters or operating rules at will. You can see how system components interact. You can improve performance while your system is still only a computer program.

The General Purpose Systems Simulator II works on systems that involve transactions, traffic, people and equip-



ment that compete for services of other people or equipment and form queues at key points in the system while waiting for service.

The program can handle up to 800 blocks, 200 facilities, 200 queues, 100

functions, 100 tables, 50 variables and 1000 transactions.

If your system is bigger than this, you have a real giant of a problem. But we still may be able to help you cut it down to manageable size. Try us. Write.

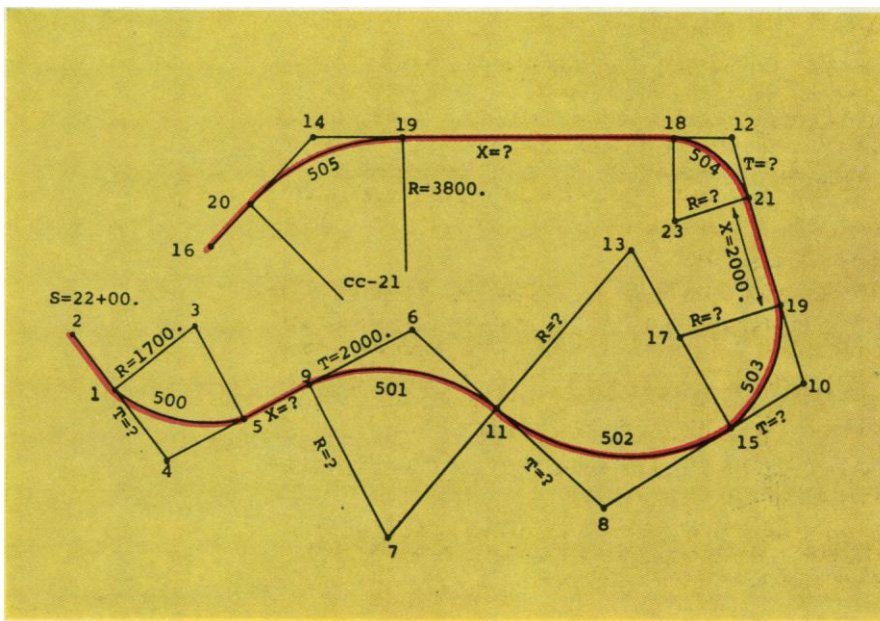
Semi-automatic geometry

Here's another new IBM computer program—this one useful to anyone who designs bridges, builds roads, plans housing developments.

We call it *cogo 1*. *cogo 1* lets an engineer program an IBM 1620 computer using the same notation he'd use in solving his problem by hand. The "language" is made up of 43 terms like LINE/INTERSECT, ARC/INTERSECT, ALIGNMENT, etc.

With *cogo 1*, you can easily and quickly solve problems in triangulation, curve geometry, traverse adjustment, highway alignment and structural geometry—without previous computer training. You can add your own problem statements to the language.

The program works with punched card input or random access storage in an IBM 1311 Disk File. You can run the program for as little as \$12 an hour. Ask your IBM representative about it.



For more information, write for literature to International Business Machines Corporation, Data Processing Division, 112 East Post Road, White Plains, New York. Department 805-S2.

IBM
DATA PROCESSING



ARMAC[®]

for rapid, accurate
measurement
of radioactivity

The Packard Model 445 Armac Scintillation Detector is an extremely sensitive, large sample-volume (up to two liters) well-type detector designed for measuring radiation from gamma-emitting isotopes.

Because its high counting efficiency and sensitivity permit shorter counting times, the Armac Detector enables the research scientist to quickly and accurately determine the presence of low levels of radioactivity in bulk samples including meat, milk, water, blood, feces, soil, or tissue with little or no sample preparation.

IDEALLY SUITED FOR *IN VIVO* RESEARCH

The Armac's 4-pi counting geometry and high counting efficiency require that only very small doses of radioactivity be administered to small experimental animals during *in vivo* research on retention and excretion of various gamma-emitting isotopes. Sacrificing is unnecessary and the animal acts as its own control for repeated experimentation.

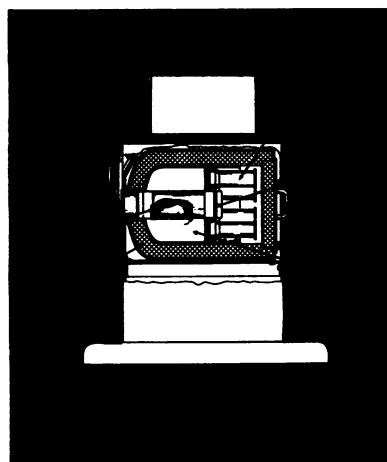
The Armac Detector is also useful in nutritional studies and clinical diagnosis where changes in the amount of circulating radioactivity in the blood can be directly related to other body functions. These changes can be measured accurately and rapidly using the blood-rich portion of the patient's forearm which can be accommodated in the Armac's counting chamber.

COMPLETE SYSTEMS

An Armac Detector System, comprised of the Model 445 Armac Scintillation Detector and any of several Packard Spectrometers and related control units, recording rate-meters, etc., can be supplied to meet your needs. Any Armac Detector System can be readily modified or expanded to meet changing research requirements.

Ask your Packard Sales Engineer for complete details, or write for Bulletins.

(Photograph) COUNTING LIVE FISH IN FLOWING STREAM WATER.
Photo courtesy of Oak Ridge National Laboratory operated by Union Carbide Corporation for the U.S. Atomic Energy Commission.



Packard

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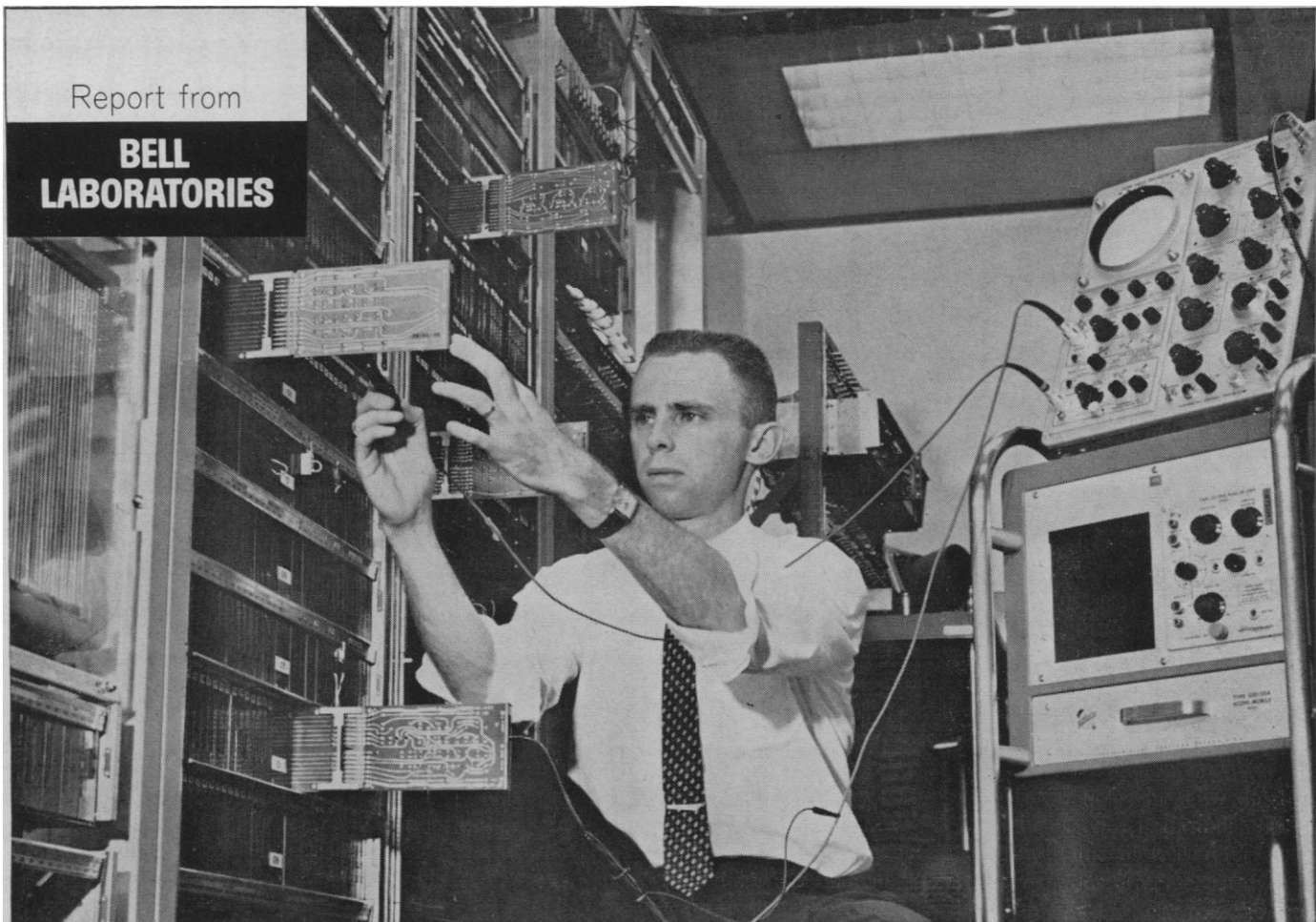
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COVER

This painting illustrates the first stage of anthropomorphism; some of the figures possess animal-like characteristics, but walk or behave like humans. The central figure, swinging a kind of rattle, is viewed by two people with long spidery legs (left), dog-like animals (right), and persons in a sitting position (center top). From *Prehistoric Rock Art of the Federation of Rhodesia and Nyasaland* [Chatto and Windus Ltd], reviewed on page 1642.



Report from

**BELL
LABORATORIES**

Bell Laboratories' E. G. Hughes tests printed circuit boards in experimental central office control equipment for 101-Electronic Switching System. The system automatically detects trouble, switching out a defective unit and switching in a duplicate unit so service is not interrupted.

High-Speed Switching System Provides New Telephone Services for Business

A new electronic switching system designed to meet the special needs of business customers has been developed at Bell Telephone Laboratories. This system provides many new telephone services such as a way for reaching a seven- or ten-digit number by dialing only three digits, setting up conference calls by dialing other customers into the conversation, and automatically transferring incoming calls from your phone to another by predialing special codes.

A notable feature of the new system is a high-speed control unit. Operating from a telephone switching center, the unit scans—thousands of times per second—all the telephone connections in dozens of business offices that may be located many miles apart. It spends only two-thousandths of a second in

each office, but in that time it determines what has to be done and arranges for the necessary actions.

Another feature of the new system is the high-capacity memory. From this, the control unit can draw, in eight-millionths of a second, such specific instructions as how to handle a certain call.

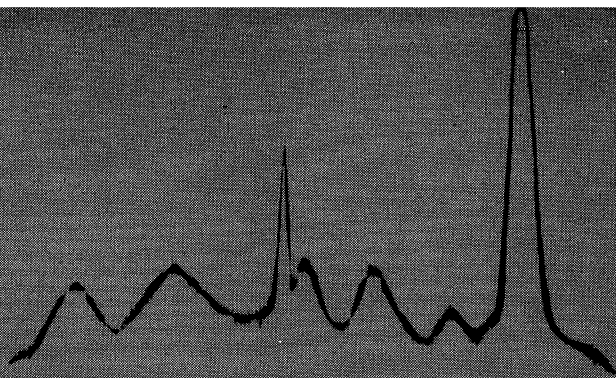
The new switching system operates compatibly with existing electromechanical switching systems in the Bell System. Such Bell Laboratories inventions as the transistor are indispensable to its compactness and the high reliability of its operation. The system was developed for use by businesses as a private branch exchange, and a model has been installed by Western Electric for trial by two New Brunswick, New Jersey, companies.



BELL TELEPHONE LABORATORIES

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Electrophoresis diagram (above) from a descending limb obtained by using the half-wave phaseplate as the schlieren diaphragm. Electrophoresis diagram (lower left) of same serum as that represented above, but made by combining interference and phaseplate schlieren optics. Another electrophoresis diagram (lower right) of the same serum, made by using an 0.35 mm diagonal slit as the schlieren diaphragm.

NEW LOW-COST ELECTROPHORESIS UNIT PROVIDES HIGH RESOLUTION WITH UNIQUE THERMOELECTRIC COOLING

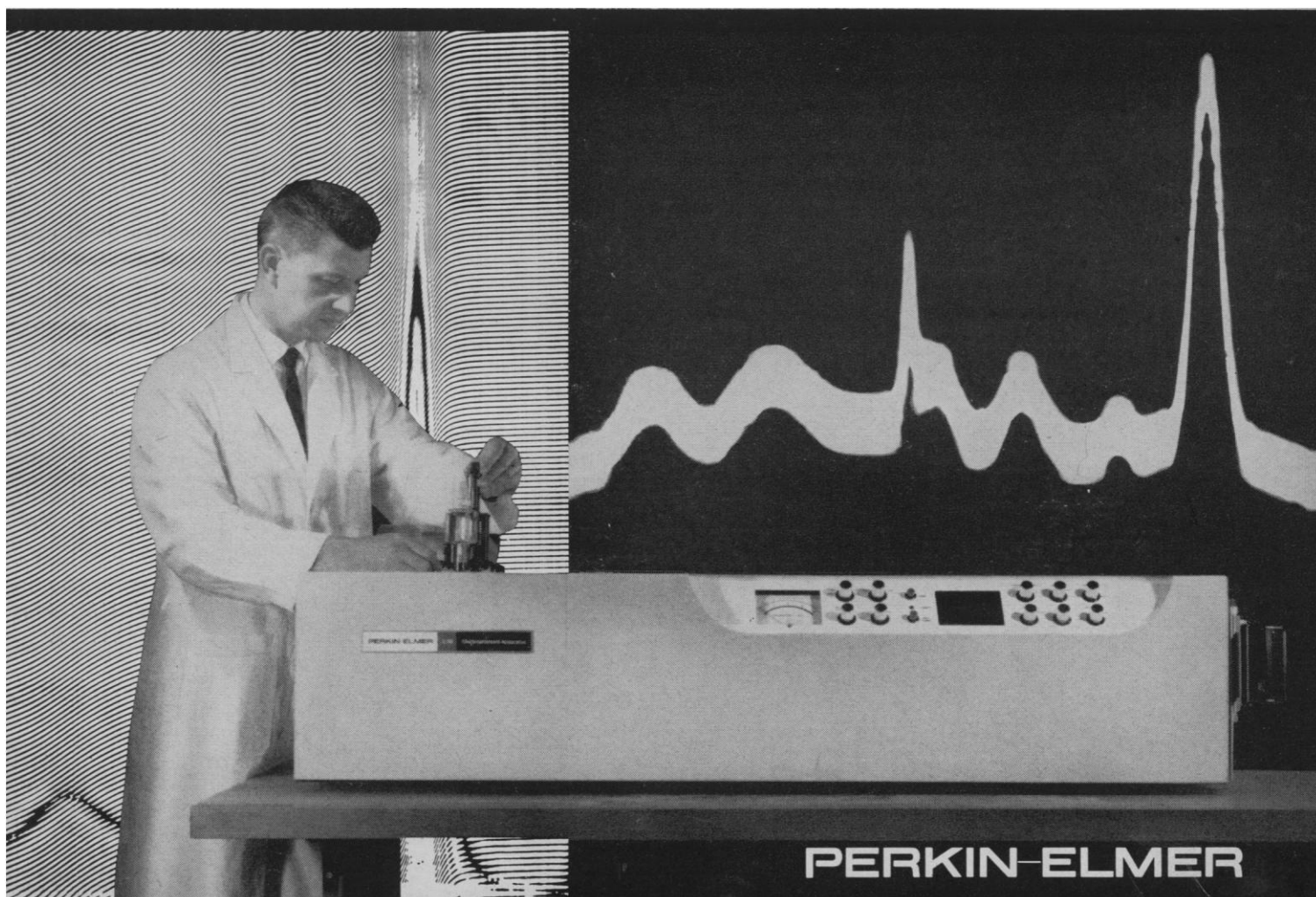
Here is an electrophoresis instrument that has everything *plus* automatic 0°C tem-

perature stabilization. Cooling is thermoelectric and trouble-free—no ice baths to bother with and no mechanical refrigeration equipment to wear out or require maintenance.

Model 238 utilizes the superior, free-boundary method of electrophoresis; can handle either *schlieren* or *Rayleigh fringe* measurements at the click of a selector switch; has a top viewing screen for continuous observation of changing patterns as analysis progresses...and provision for use of either standard or Polaroid film.

Applicable to a broad variety of assignments, particularly medical and pharmaceutical analyses, this instrument can perform extra jobs such as separating components of a mixture or measuring interactions between a solvent and substance or between particles of a substance.

Wouldn't now be a good time to consider up-dating your electrophoresis facilities? For further Model 238 information, write to Instrument Division, Perkin-Elmer Corporation, 910 Main Avenue, Norwalk, Connecticut.



PERKIN-ELMER

Recent AAAS Symposium Volumes

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Edited by: Wynne Thorne.

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Price: \$8.00 AAAS Member's Cash Price: \$7.00.

#72. Spermatozoan Motility.

1962. 322 pages. 113 illustrations.

Edited by: David W. Bishop.

For the first time the details of sperm motility are here presented in monograph form. A wealth of previously unpublished data. A valuable source of reference for the student and investigator, as well as for the practitioner of applied reproductive biology.

Retail Price: \$7.50. AAAS Member's Cash Price: \$6.50.

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1962. 320 pages. 92 illustrations.

Edited by: Howard J. Pincus.

The reader will find here material on pure and applied science, accounts of new research and reviews of material published elsewhere, historical and social studies, and pleas for action and planning.

Retail Price: \$7.50. AAAS Member's Cash Price: \$6.50.

#70. Fundamentals of Keratinization.

1962. 202 pages. 136 illustrations.

Edited by: E. O. Butcher and R. F. Sognnaes. The fields of anatomy, dentistry, dermatology, medicine, pathology, and zoology are represented in this volume.

Retail Price: \$6.50. AAAS Member's Cash Price: \$5.75.

#69. Biophysics of Physiological and Pharmacological Actions.

1961. 612 pages. 212 illustrations.

Edited by: Abraham M. Shanes.

A bird's-eye view of a number of principles now considered important. Useful for teaching, as well as for research purposes.

Retail Price: \$13.50. AAAS Member's Cash Price: \$11.75.

#68. Sciences in Communist China.

1961. 884 pages. 23 illustrations.

Edited by: Sidney H. Gould.

"... strongly recommended to all who are in search of facts and source material on the sciences in China."—*Science*, 22 September 1961

Retail Price: \$14.00. AAAS Member's Cash Price: \$12.00.

#67. Oceanography.

1961. 2nd printing, 1962. 665 pages. 146 illustrations.

Edited by: Mary Sears.

"I know of no other volume that so well defines oceanography, its purpose, opportunities and requirements."—*Science*, 9 June 1961

Retail Price: \$14.75. AAAS Member's Cash Price: \$12.50.

#66. Germ Plasm Resources.

1961. 394 pages. 59 illustrations.

Edited by: Ralph E. Hodgson.

"This book will be of interest to nonplant and animal breeders, for the rather general treatment of various topics . . . allows for rapid perusal."—*Bulletin of the Entomological Society of America*, September 1961

Retail Price: \$9.75. AAAS Member's Cash Price: \$8.50.

#65. Aging . . . Some Social and Biological Aspects.

1960. 436 pages. 65 illustrations.

Edited by: Nathan W. Shock.

"The 26 contributors include many of the most respected names in American gerontology, and the chapters cover a wealth of material."—*Journal of Gerontology*

Retail Price: \$8.50. AAAS Member's Cash Price: \$7.50.

#64. Calcification in Biological Systems.

1960. 526 pages. 283 illustrations.

Edited by: R. F. Sognnaes.

"Those interested in current concepts of mineralization of calcified tissues will find in this text the sources of current knowledge on the subject."—*American Journal of Orthodontics*, May 1961

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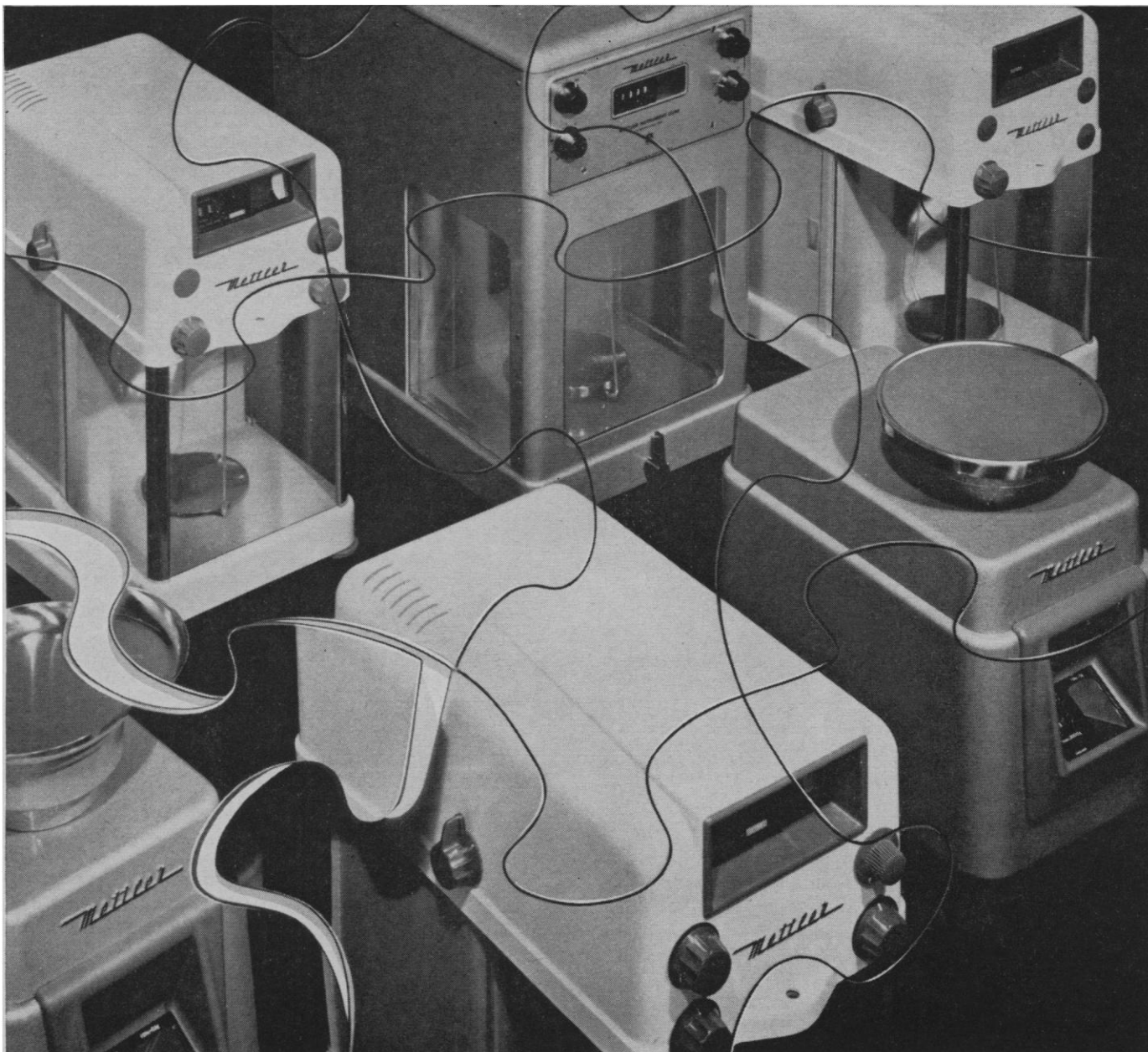
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Volume 1
By GEORGE DE STEVENS

December 1963, 186 pp., \$7.00

A critical evaluation of the development of diuretic agents, this work is an authoritative appraisal of the progress in chemistry and pharmacology of the field.

Lipid Pharmacology

Edited by RODOLFO PAOLETTI

January 1964, about 500 pp., \$17.50

Lipid Pharmacology will stimulate pharmacologists into realizing that many unsolved problems in the field are amenable to study by combined biochemical and pharmacological techniques, and that the effects of drugs on lipid metabolism are deserving of more intensive study.

The Enzymes

Second Edition

Edited by PAUL D. BOYER, HENRY LARDY, and KARL MYRBÄCK

Volume 8: Oxidation and Reduction, Part B
1963, 484 pp., \$16.50

Volume 8 includes coverage of various porphyrin enzymes, of other oxidases, and of direct oxygenation. The multiplicity of function of the porphyrin structure, as exemplified by enzymes discussed in this volume, is one of the many remarkable features of enzymology.

Photographic Atlas of Shark Anatomy

The Gross Morphology of *Squalus acanthias*

By CARL GANS and THOMAS PARSONS

January 1964, 106 pp., (7" x 9"), approx. \$3.00

This atlas presents, by means of photography, a general picture of the anatomy of *Squalus acanthias* in which virtually all the structures visible in gross dissection are shown and labelled.

Primary Processes of Photosynthesis

By MARTIN D. KAMEN

December 1963, 182 pp., \$5.50

This unique work explains the rationales of modern researches into the primary processes of photosynthesis which terminate before the onset of biochemical and physiological phases.

Synchytrium

By JOHN S. KARLING

January 1964, 475 pp., \$17.50

Synchytrium is a complete study of the known species of this important genus of plant parasites and includes full descriptions and discussions of general host reactions, cellular reactions to infection, cytology, sexuality, phylogeny, and evolution.

Mass Spectrometry of Organic Ions

Edited by F. W. McLAFFERTY

1963, 730 pp., \$24.00

Both the basic theories and the significant applications of this unique method in organic systems are treated in this volume concerned with the chemistry and physics of organic ions.

Physical Acoustics

Edited by WARREN P. MASON

Volume 1, Part A: Properties of Gases, Liquids, and Solutions
Early 1964, about 525 pp., approx. \$17.50

Volume 1, Part B: Properties of Polymers and Nonlinear Acoustics
Early 1964, about 375 pp., in preparation

Physical Acoustics describes both frequency sound waves in gases, liquids, and solids, in their uses as tools for analyzing the molecular, defect, domain wall, and other types of motions that can occur in these media.

Methods in Cell Physiology

Edited by DAVID M. PRESCOTT

Volume 1, early 1964, about 450 pp.

Methods in Cell Physiology encompasses new techniques, new refinements, innovations, applications of methods in current use, and work not previously treated adequately.

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Edited by DAVID A. HALL

Volume 1, 1963, 401 pp., \$14.00

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Molecular Pharmacology

The Mode of Action of Biologically Active Compounds
Edited by E. J. ARIENS

Volume 1, March 1964, 501 pp., \$17.00

Volume 2, Spring 1964, in preparation

The authors consider the pharmacological aspects of their specific fields on the basis of the physicochemical interaction of the molecules of the pharmacodynamic substances with the molecules of the biological object.

Psychopharmacological Agents

Edited by MAXWELL GORDON

Winter 1964, about 600 pp., \$6.50

This is the first available summary in a single volume of the most up-to-date chemistry, pharmacology, metabolic fate, analytical procedures and clinical summary on the major tranquilizers and anti-depressants.

Evolutionary and Genetic Biology of Primates

Edited by JOHN BUETTNER-JANUSCH

Volume 1, 1963, 327 pp., \$12.00

Volume 2, Spring, 1964, about 325 pp.

This survey of contemporary research includes a review of relevant studies, and new material on fossils, biochemical genetics and cytogenetics, modern analyses of display and manipulative behavior, the histochemistry and histology of the skin as well as studies of the anatomy and physiology of the Primates.

Physiological Mammalogy

Edited by W. V. MAYER and R. G. VAN GELDER

Volume 1, Mammalian Populations

January 1964, about 375 pp., \$12.00

Volume 2: Mammalian Reactions to Stressful Environments
Spring 1964, about 225 pp.

Covering the literature up to the present time, these volumes provide comprehensive articles on specific topics in physiological mammalogy. The work will be indispensable to anyone who works with mammals.

Experimental Pharmacogenetics

Physiopathology of Heredity and Pharmacologic Responses

By HANS MEIER

1963, 213 pp., \$7.50

Dr. Meier's work reviews heritable factors recognized by the use of drugs and hereditary defects altering drug responses. It presents the physiopathology and biochemistry of hereditary disorders of animals that may be utilized in pharmacologic studies of analogous hereditary diseases in man.

Comparative Nutrition of Man and Domestic Animals

By H. H. MITCHELL

Volume 1, 1963, 701 pp., \$25.00

Volume 2, Early 1964, 840 pp., *Special price until March 31, 1964, \$23.00*, Thereafter, \$28.00

The nutrient requirements of man and his domesticated animals and the factors that modify these requirements are presented and correlated in a quantitative fashion in these two volumes.

Magnetism

A Treatise on Modern Theory and Materials—in 3 Volumes

Edited by GEORGE T. RADO and HARRY SUHL

Volume 1, December 1963, 688 pp., \$19.00

Volume 2, in preparation

Volume 3, 1963, 623 pp., \$18.00

Magnetism deals with ferromagnetism, ferrimagnetism, and anti-ferromagnetism with an emphasis on the developments of the last fifteen years.

Chemical Applications of Infrared Spectroscopy

By C. N. R. RAO

December 1963, 681 pp., \$19.50

On one of the most powerful techniques available for chemical analysis, this new book presents the basic concepts, measurements, and techniques of infrared spectroscopy.

The Liver

Morphology, Biochemistry, Physiology

Edited by CH. ROUILLER

Volume 1, 1963, 683 pp., \$26.00

Volume 2, Spring 1964, about 575 pp.

The correlation of structural, functional, and biochemical aspects is emphasized in this treatise based on morphological, biochemical, and physiological studies.

Visit our display, Booth #58, 1963 Exposition of Science and Industry, American Association for the Advancement of Science, Cleveland, Ohio, December 27-30, 1963.

HIGH VOLTAGE ENGINEERING REPORT

DECEMBER, 1963

A New Industrial Radiation Center

A new, complete production-scale service radiation processing center is now in operation in Burlington, Mass. Owned and operated by Electronized Chemicals Corporation (a subsidiary of High Voltage Engineering), the new unit houses 3 electron accelerators of varying capacities, bringing together the widest range of radiation processing facilities ever offered under one roof.

The new facility offers anyone interested in radiation processing effects a unique opportunity to carry out development work before making a capital investment in equipment. In fact, economics may dictate the use of a rental facility indefinitely. Or you may conclude that an accelerator belongs in your laboratory or plant. We're glad to be able to offer you either approach. Write for ECC facilities brochure.

Particle Accelerators and Space Research

The effect of space radiations on instruments, devices, and materials is of major concern to researchers today. Steady progress in man's ability to predict these variables is being made through the basic studies of High Voltage Engineering customers.

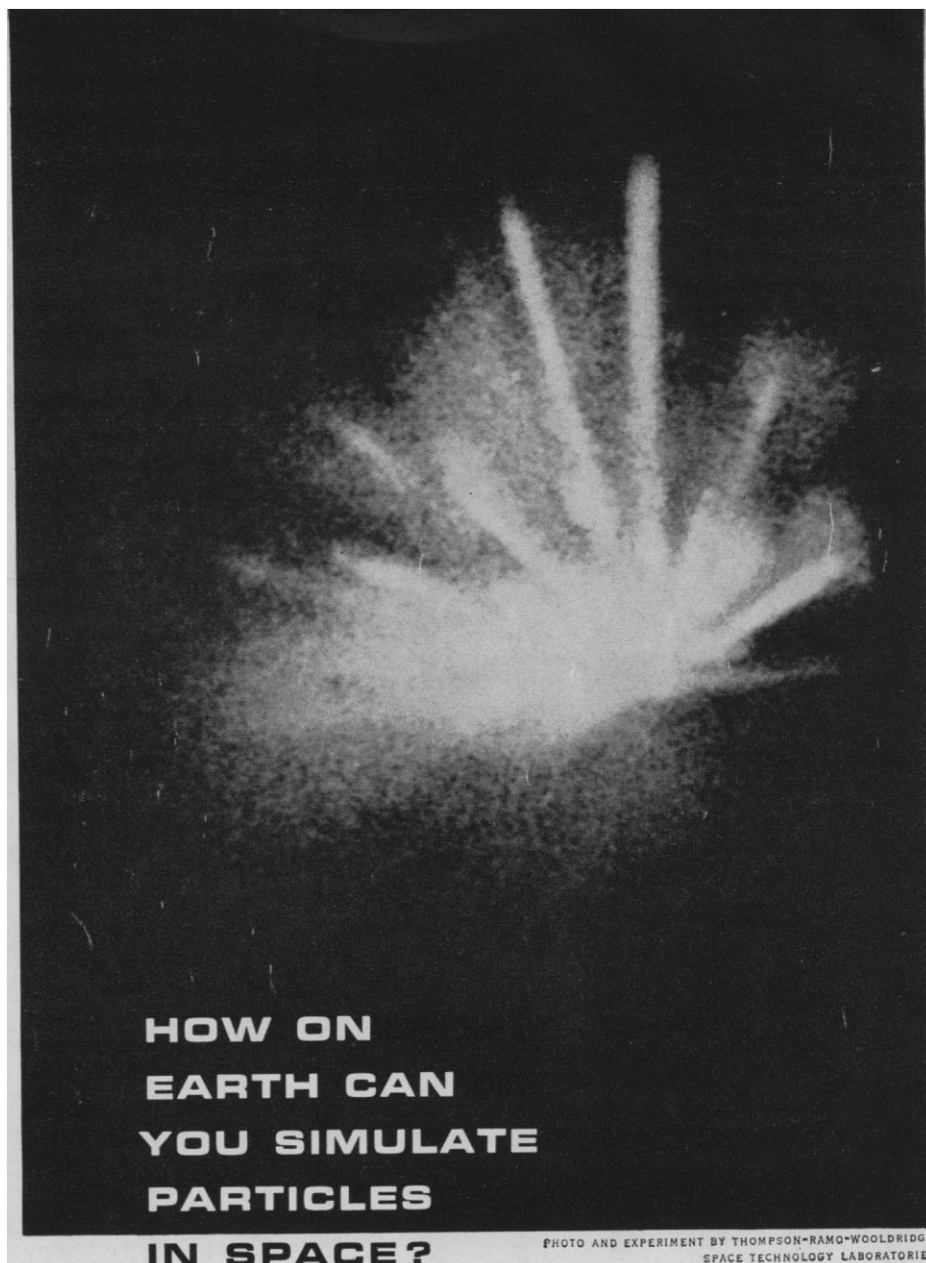
Take micrometeoroids, for example. A system now being assembled — with a 2 MeV Van de Graaff as its core — will accelerate micron-size particles of iron and other materials to the hypervelocities of space. This simulated "space dust" will impact on materials and equipment in vacuum. Physical, chemical, and other changes in targets will then be carefully determined.

Actually, High Voltage Accelerators are more widely used for creating the basic radiations of space. The 4 MeV Van de Graaff unit, for example, can produce a substantial portion of the energy spectrum — electrons, x-rays, positive ions, and neutrons — under controlled conditions in the laboratory.*

The same machine can be used for materials evaluation, radiation calibration, dosimetry studies, sterilization, activation analysis, radiation chemistry, and basic research.

Perhaps you should investigate the value of an Accelerator in your test program?

*Write for Space Radiation Simulation Chart.



In this picture — taken of a simulated micrometeoroid impacting on a wire target — a particle accelerator helped do the job. Accelerating a micron-size particle to the hyper-velocities associated with space.

Actually, High Voltage accelerators are more widely used for creating the basic radiations of space. Take the 4 MeV Van de Graaff unit, for example. It can produce a substantial portion of the energy spectrum — electrons, x-rays, positive ions and neutrons — under **controlled** conditions in the laboratory.*

The same machine can be used for materials evaluation, radiation calibration, dosimetry studies, activation, analysis, radiation chemistry, and basic research.

Single-purpose Van de Graaff units can also be used for specialized space applications such as providing intense (2×10^{12}) fast neutrons for burst simulation.

High Voltage Engineering particle accelerators are at work on a score of aerospace research programs in the United States. Why not investigate the value of an accelerator in your environmental test program? High Voltage Engineering Corporation, Burlington, Mass. **Subsidiaries: Ion Physics Corporation; Electronized Chemicals Corporation, Burlington, Mass.; High Voltage Engineering (Europa) N.V., Amersfoort, The Netherlands.**

*Write for space radiation simulation chart.



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The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

Vannevar Bush Speaks

The spectacular success of applied research during the war led to a fallacy entertained by many. It is that any problem can be solved by gathering enough scientists and giving them enough money. To solve the problem of the common cold assemble a great institution, fill it with scientists and money, and soon we will have no more colds! It is folly to thus proceed. The great scientific steps forward originate in the minds of gifted scientists, not in the minds of promoters. The best way to proceed is to be sure that really inspired scientists have what they need to work with, and leave them alone.

A man sitting at a desk and thinking is not an expensive proposition. A scientist directing a team and operating an expensive array of apparatus is. The costs of research go up very rapidly when one gets into hardware. When money comes easily there is a tendency to rush into use of complex equipment too fast and too far. We may be making this mistake.

If the country pours enough money into research, it will inevitably support the trivial and the mediocre. The supply of scientific manpower is not unlimited.

In any broad program of research the key word in regard to any one aspect of the program is relevance. It is a good word to have in mind in examining any research program. Competent directors of research know what it means. Probably "conducive to progress toward the main object of a program" is as good a definition as any. Just finding out something new is not by itself sufficient justification for research. It needs to mean something when we find it.

It makes sense to ask a young researcher in basic research what he is trying to find out, what sort of knowledge he hopes to have at the end of his program which does not now exist. Surprisingly often the answer will be hard to extract. But it makes no sense to ask him just how he is going to do it, what it will cost, or how long it will take. If he knew the answers it would not be basic research.

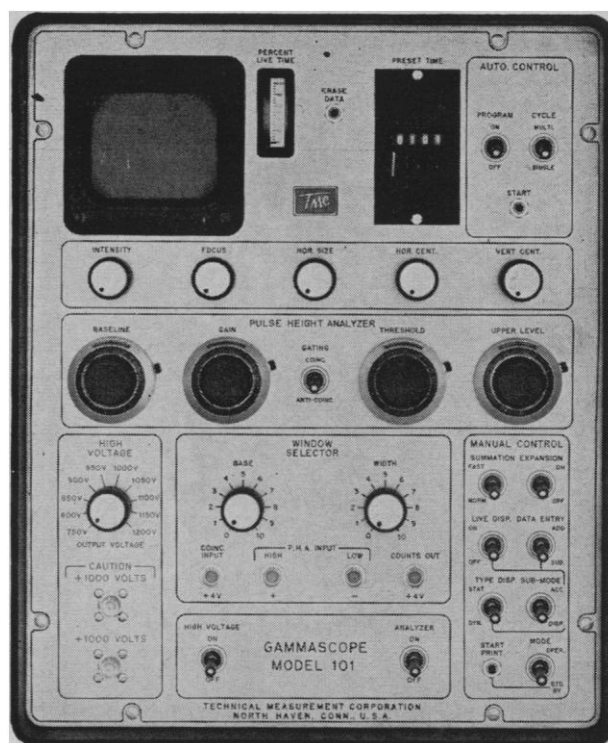
When scientific programs are judged by popular acclaim we inevitably have overemphasis on the spectacular. That is just what we have today. The deeply important scientific advances moving today are not easy to understand. If they were they would have been accomplished long ago. Outstanding scientific progress, which will most affect the lives and health of our children, is not grasped by many.

Since the war we have seen a strange, and to my mind dangerous, development. The armed services have called upon universities to manage great programs of research and development, involving secrecy, and often calling for business judgment. Some of this has been avoided by the creation of independent non-profit organizations. We ought to find a better way. The universities will respond, when called upon by government to undertake burdens in the public interest. But management of secret programs is not their proper business, and they should not be thus utilized. We ought to be ingenious enough to avoid loading our universities with tasks which may interfere with their proper function of turning out educated men and women.

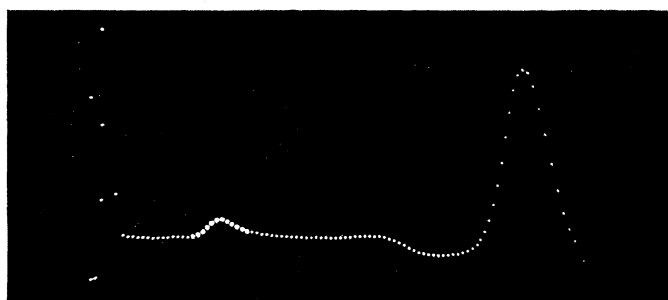
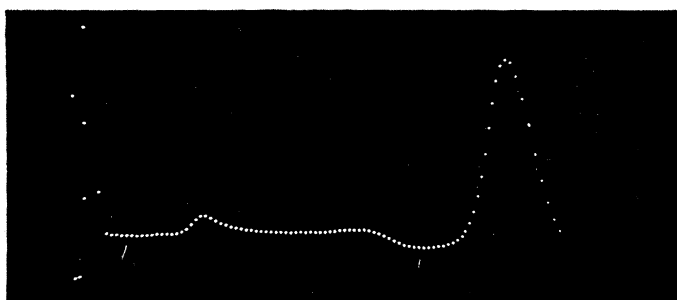
It should never be forgotten that the main task of the universities is to educate men. The country will need skilled professional men in the future as much as it will need new knowledge. As we now go we are not meeting this challenge sufficiently. Every research program placed in a university should be so ordered that its product is not only new knowledge but skilled educated men.

(Excerpts from a statement given by Professor Bush before the Select Committee on Government Research of the U.S. House of Representatives, 21 November 1963. A report of the hearings will be published by the Committee after the first of the year.)

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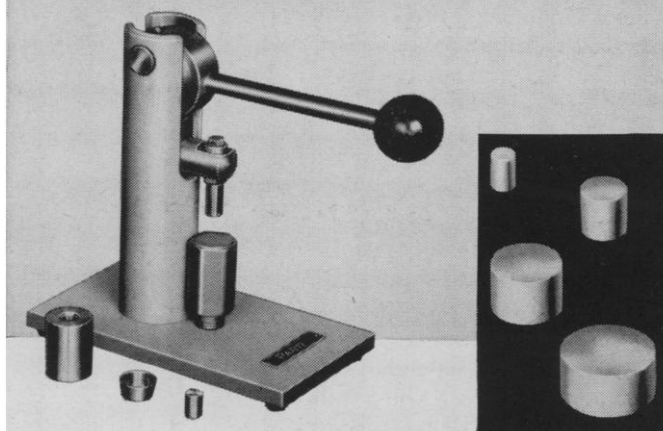
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ing phytoplankton. Pure cultures in artificial sea water are being used to study the secretion process and experimental conversion of the material to particulate matter.

Peter J. Wangersky has recently demonstrated that particulate matter can be produced experimentally by bubbling air through artificial sea water containing traces of amino acids. The material so formed has a molecular weight in excess of 3500 and appears to be true polypeptide. In considering the organic syntheses that may have preceded the origin of life, earlier work by Miller and Abelson has shown that production of amino acids from inorganic materials is feasible under supposedly "natural" conditions, but further synthesis to polypeptides has been accomplished only with large concentrations of materials and at relatively high temperatures. Thus, Wangersky's experiment, which incidentally is effective only in a salt solution and yields negative results with an amino acid solution in distilled water, is of very considerable interest.

GORDON A. RILEY

*Bingham Oceanographic Laboratory,
Yale University, New Haven,
Connecticut*

References

1. W. H. Sutcliffe, E. R. Baylor, D. W. Menzel, *Deep-Sea Res.* **10**, 233 (1963).
2. E. R. Baylor and W. H. Sutcliffe, *Limnol. Oceanogr.* **8**, 369 (1963).
3. G. A. Riley, *ibid.*, p. 372.

Forthcoming Events

January

19-24. **American Chemical Soc.**, 146th natl. meeting, Denver, Colo. (ACS, 1155 16th St. NW, Washington, D.C.)

20-15. Commission for **Aeronautical Meteorology**, World Meteorological Organization, 3rd. Paris, France. (WMO, 41 Ave. Giuseppe-Motta, Geneva, Switzerland)

20-22. American Inst. of **Aeronautics and Astronautics**, aerospace sciences mtg., New York, N.Y. (R. R. Dexter, AIAA, 2 E. 64 St., New York 21)

20-23. **Cardiovascular Drug Therapy**, symp., Philadelphia, Pa. (S. Rosen, Dept. of Medicine, Hahnemann Medical College and Hospital, 230 N. Broad St., Philadelphia 2)

20-24. **American Mathematical Soc.**, Miami, Fla. (AMS, 190 Hope St., Providence 6, R.I.)

20-24. **Australian and New Zealand Assoc. for the Advancement of Science**, Canberra (J. R. A. MacMillan, Faculty of Agriculture, Univ. of Sydney, N.S.W., Australia)

20-27. **Agricultural Film Competition**, 3rd intern., Berlin, Germany. (Congress Hall, John Foster Dulles Allee, Berlin N.W. 21)

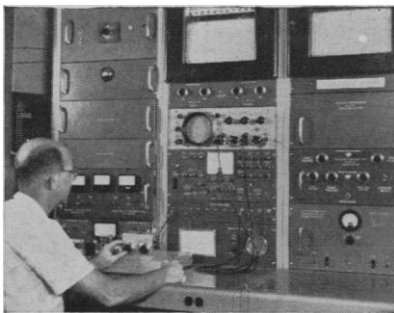
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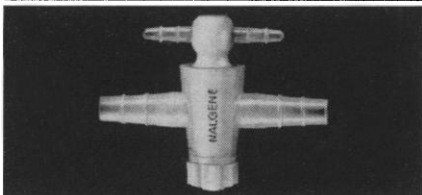
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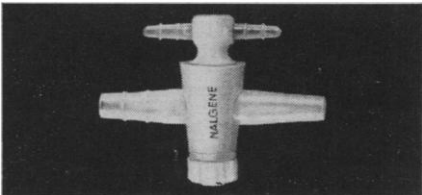


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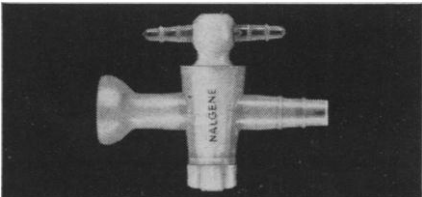
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22-25. **American Physical Soc.**, New York, N.Y. (APS, Columbia Univ., New York, N.Y.)

22-25. **American Assoc. of Physics Teachers**, New York, N.Y. (E. U. Condon, Oberlin College, Oberlin, Ohio)

23. **Central Council for Health Education**, annual conf., London, England. (Director. CCHE, Tavistock House, Tavistock Sq., London, W.C.1)

23-24. **Industrial Water and Waste Conf.**, Austin, Tex. (J. B. Maline, Jr., 305 Engineering Laboratories Bldg., Univ. of Texas, Austin 12)

25. **Industrial Hygiene and Air Pollution**, 8th conf., Austin, Tex. (J. O. Ledbetter, 305 Engineering Laboratories Bldg., Univ. of Texas, Austin 12)

27-30. **Society of Plastics Engineers**, 20th annual technical conf., Atlantic City, N.J. (J. J. McGraw, Natl. Vulcanized Fibre Co., Philadelphia, Pa.)

27-31. **UNESCO**, working party on scientific translation and terminology, Rome, Italy. (UNESCO, Place de Fontenoy, Paris 7)

28-30. **Entomological Soc. of America**, southeastern branch, Asheville, N.C. (W. C. Nettles, Clemson College, Clemson, S.C. 29631)

29-31. **American Meteorological Soc.**, 44th annual, Los Angeles, Calif. (A. Court, 17168 Septo St., Northridge, Calif.)

29-1. **Southwestern Federation of Geological Societies**, 6th annual, Midland, Tex. (W. E. Wadsworth, AAPG, 1444 S. Boulder, P.O. Box 979, Tulsa 1, Okla.)

29-1. **Western Soc. for Clinical Research**, 17th annual, Carmel-by-the-Sea, Calif. (H. R. Warner, Latter-Day Saints Hospital, 325 Eighth Ave., Salt Lake City, Utah)

30-31. **Spontaneous and Experimental Comparative Atherosclerosis**, conf., Beverly Hills, Calif. (E. McCandless, Los Angeles County Heart Assoc., Los Angeles 57, Calif.)

February

2-5. **American Inst. of Chemical Engineers**, annual, Boston, Mass. (J. Henry, AIChE, 345 E. 47 St., New York, N.Y. 10021)

2-7. **Institute of Electrical and Electronics Engineers**, winter meeting, New York, N.Y. (A. P. Fughill, Detroit Edison Co., 2000 Second Ave., Detroit, Mich. 48226)

2-8. **Teratology**, workshop, Commission on Drug Safety, Gainesville, Fla. (D. C. Trexler, Commission on Drug Safety, 221 N. LaSalle St., Chicago, Ill. 60601)

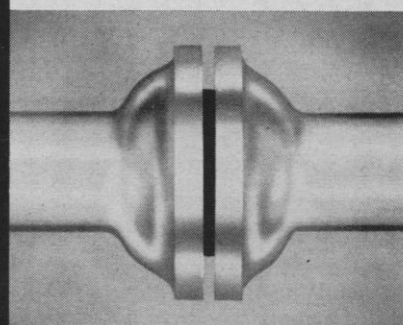
2-11. **Scientific-Technical Documentation and Information**, intern. congr., Rome, Italy. (I. M. Lombardo, La Produttività, Viale Regina Margherita, 84d, Rome)

3-4. **Society of Rheology**, Claremont, Calif. (T. L. Smith, Stanford Research Inst., Menlo Park, Calif.)

3-4. **Perspectives in Virology IV**, Gustav Stern symp., New York, N.Y. (M. Pollard, Lobund Laboratory, Univ. of Notre Dame, Notre Dame, Ind.)

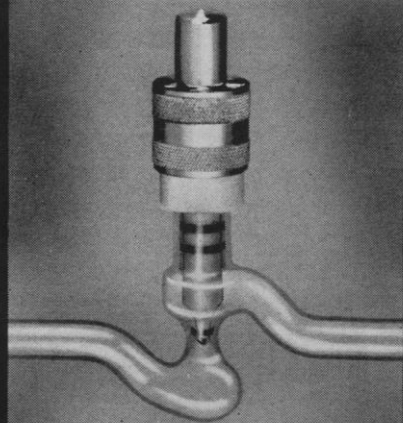
3-7. **Materials**, intern. conf., Philadelphia, Pa. (A. G. H. Dietz, Dept. of Building Engineering, Massachusetts Inst. of Technology, Cambridge, Mass.)

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