SCIENCE

27 December 1963

Vol. 142, No. 3600

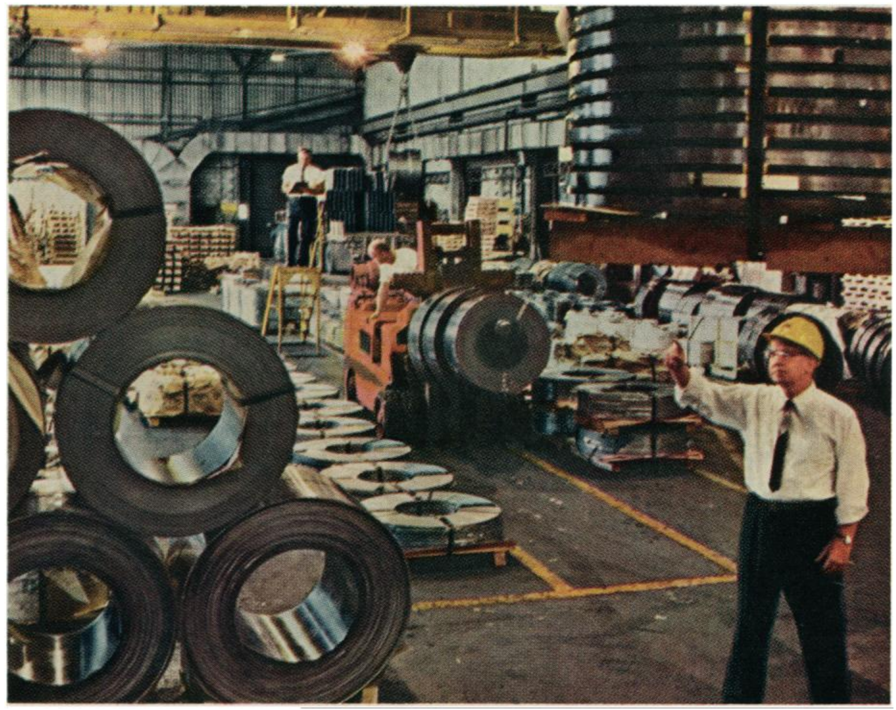
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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.

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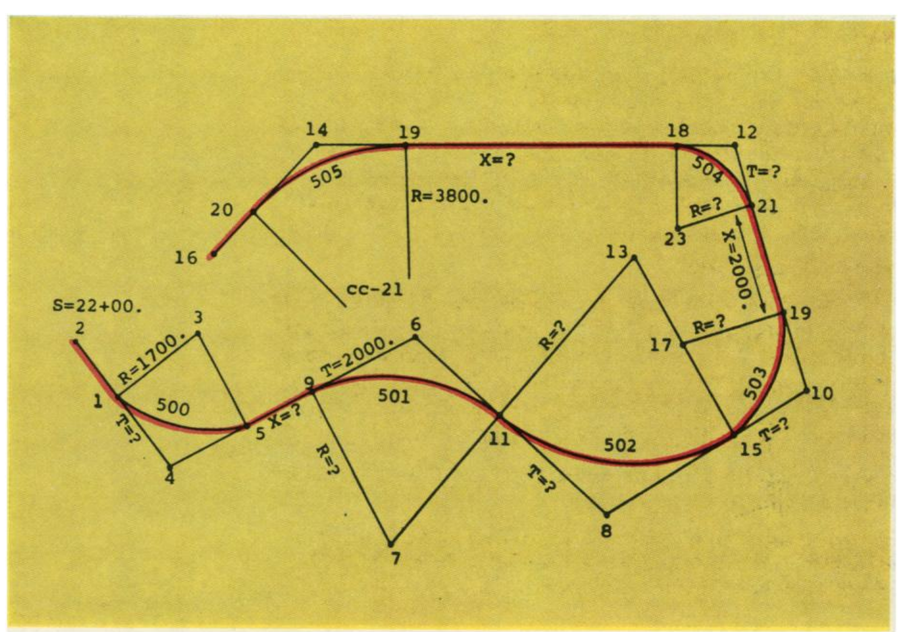

Here's another new IBM computer program—this one useful to anyone who designs bridges, builds roads, plans housing developments.

We call it COGO I. COGO I 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 I, 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.

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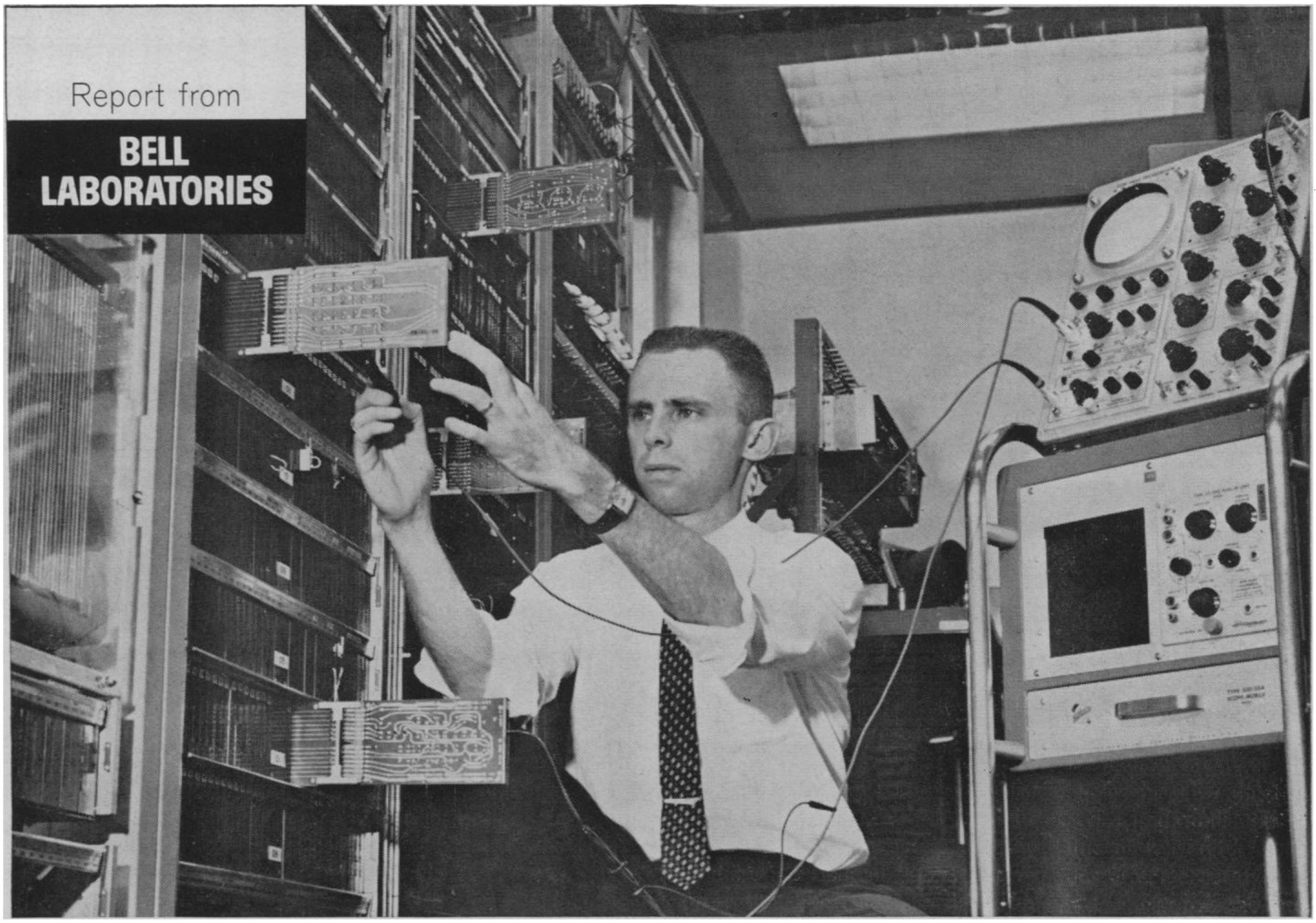
ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone 212-PE 6-1858.

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.



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.

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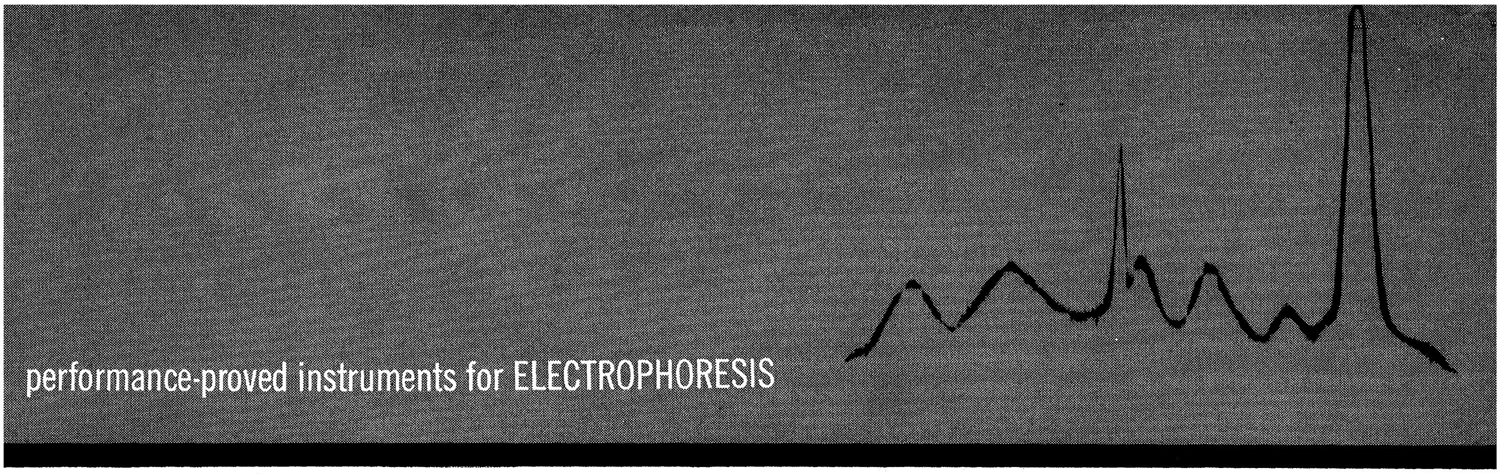

Electrophoresis diagram (above) from a descending limb obtained by using the half-wave phaseplate as the schlieren diaphragm. Electrophoresis diagram (lower left) of same serum as that represented above, but made by combining interference and phaseplate schlieren optics. Another electrophoresis diagram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

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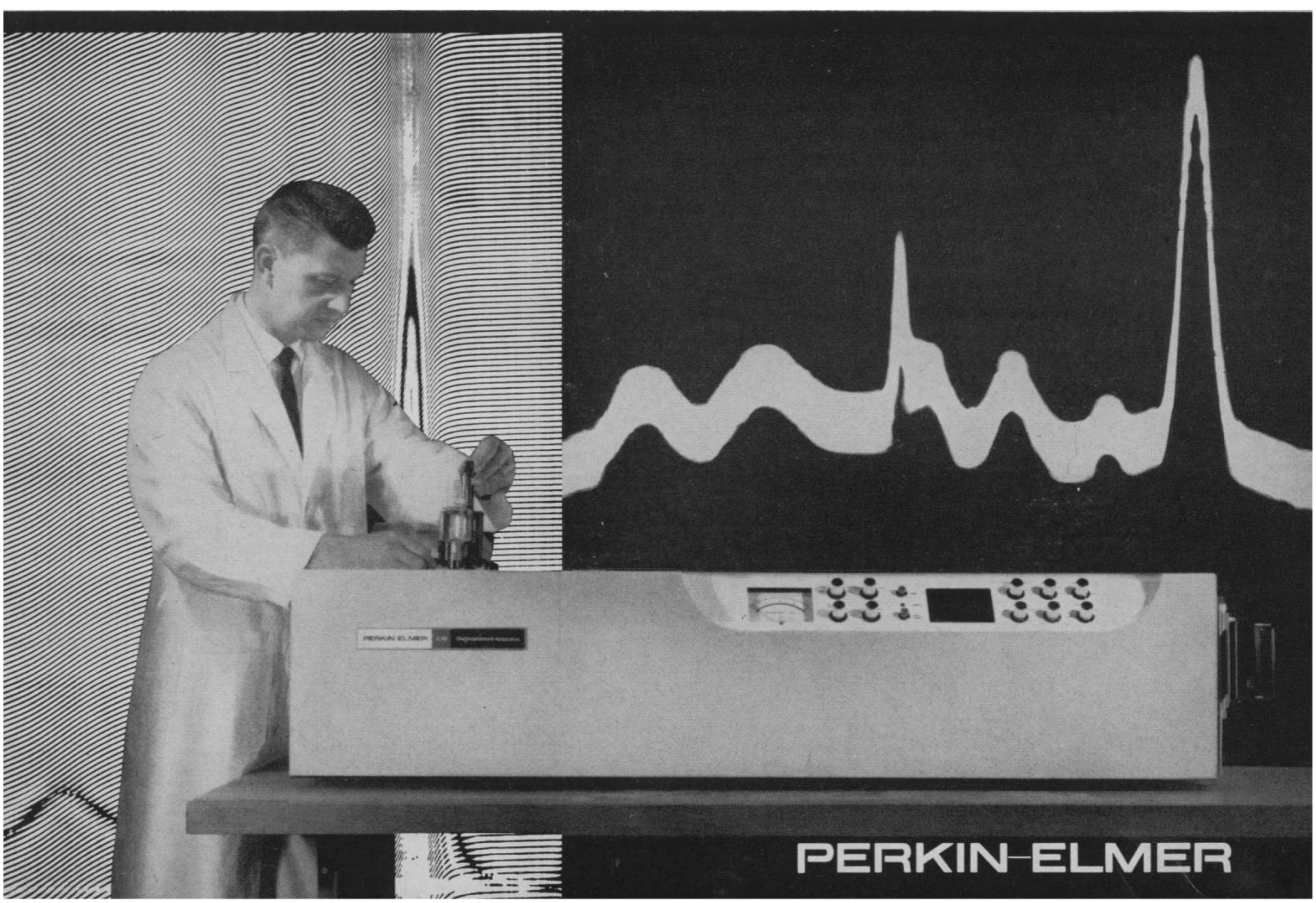
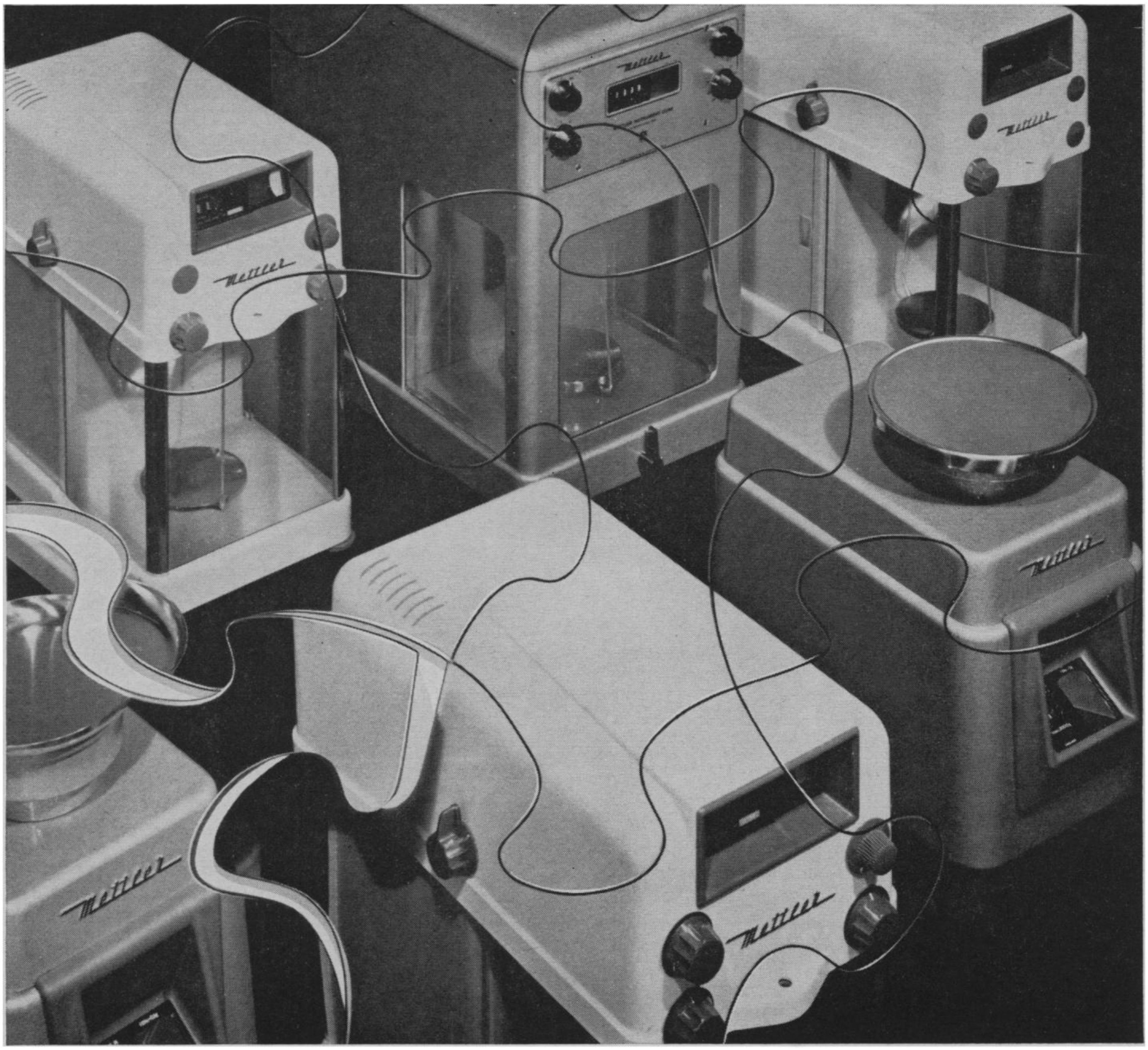
Wouldn't now be a good time to consider up-dating your electrophoresis facilities? For further Model 238 information, write to Instrument Division, Perkin-Elmer Corporation, 910 Main Avenue, Norwalk, Connecticut.





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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.

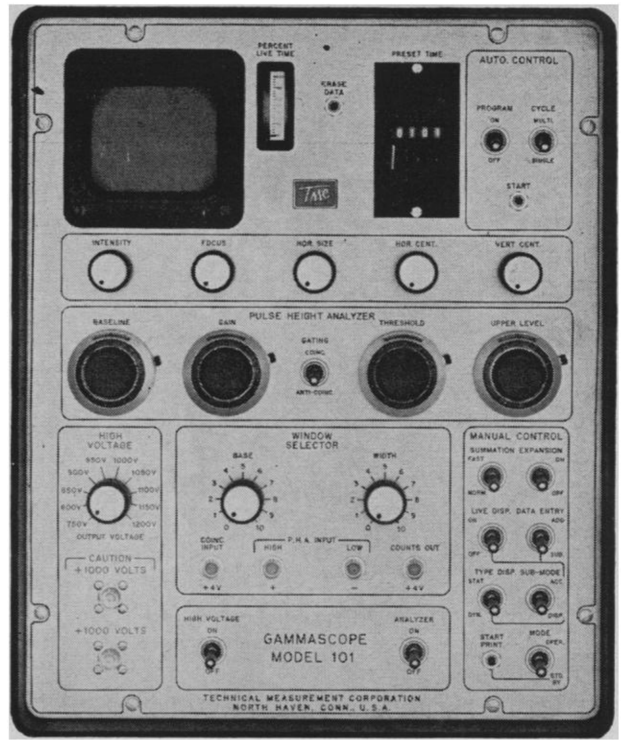
It makes sense to ask a young researcher in basic research what he is trying to find out, what sort of knowledge he hopes to have at the end of his program which does not now exist. Surprisingly often the answer will be hard to extract. But it makes no sense to ask him just how he is going to do it,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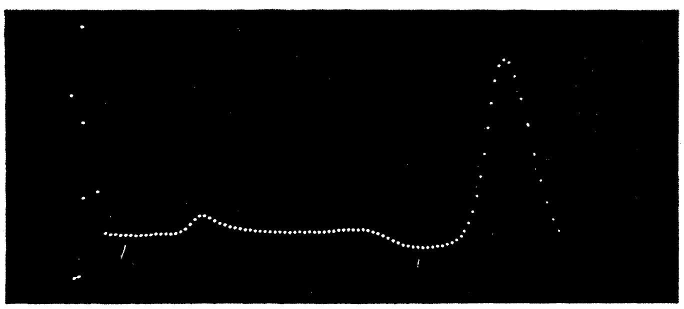

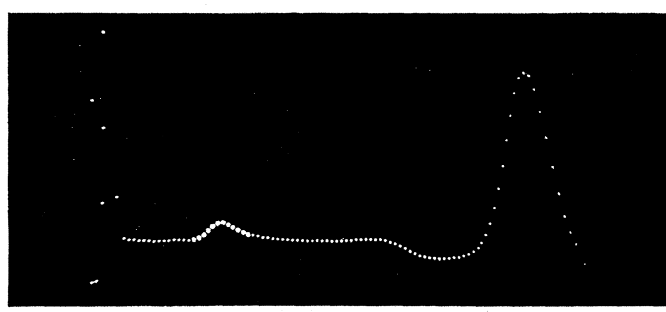

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ing phytoplankton. Pure cultures in artificial sea water are being used to study the secretion process and experimental conversion of the material to particulate matter.

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)

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, AICE, 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 Produttivita, Viale Regina Margherita, 84d, Rome)

3–4. Society of **Rheology**, Claremont, Calif. (T. L. Smth, 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.)