SCIENCE

24 May 1963

Vol. 140, No. 3569

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

ROMAN MAUSOLEUM

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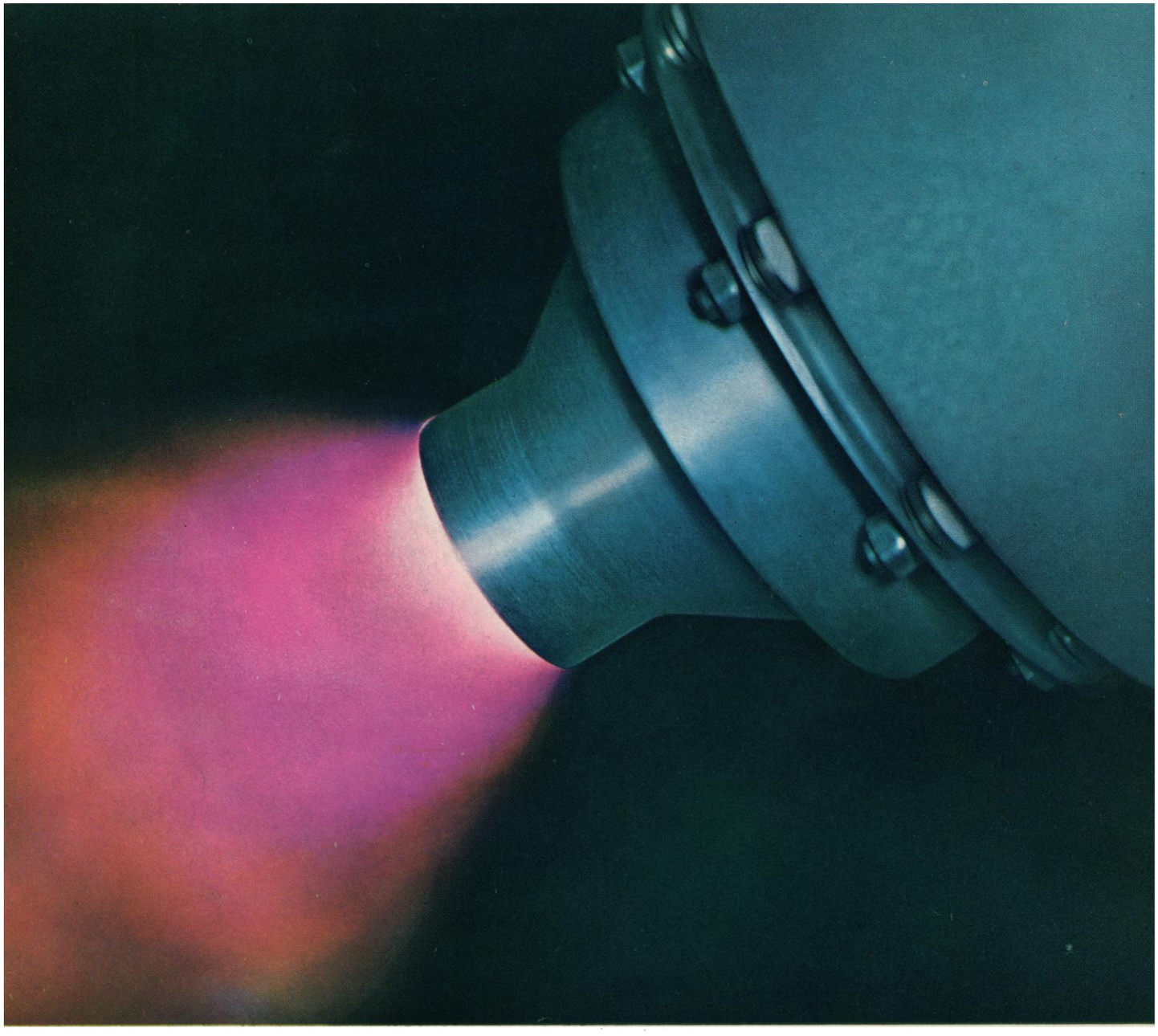

The one-piston, no-cylinder space engine that runs for a year on a pound of gas

This is the Republic pinch-pulse plasma engine. It is just 9 inches long and weighs 5 pounds.

Its "piston" is an invisible magnetic squeeze. Many times each second, it drives a small volume of ionized gas (plasma) through a narrow exhaust tube at high velocity. Each pulse of the piston accelerates the engine forward.

It may be powered by energy from the sun, nuclear reactors, or silver-cell batteries. This power is stored in a bank of capacitors and discharged into the plasma chamber at precisely timed intervals. With this controlled pulse rate, the engine has variable thrust and specific-impulse values. It can stop and start on command. Its simple design and construction make it intrinsically reliable. And it has already undergone extensive tests.

Complete with controls, fuel supply, test instruments and electrical power source, the engine system has been operated in an environmental test chamber simulating actual conditions of space. Control information is telemetered into the test chamber.

This pinch-pulse plasma engine was built by Republic under contract to the Office of Naval Research. It is the prototype of a family of engines for satellite propulsion, stabilization, attitude control and rendezvous-and-docking in orbit.

One day its descendants will drive ships out beyond orbit . . . deep into the black vacuum of space.

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NEW DEEP-SEA AMPLIFIER TRANSMITS 128 TELEPHONE CONVERSATIONS

Our engineers have developed a new amplifier which simultaneously transmits 128 telephone conversations in both directions over a single cable. It is designed to operate without repair or maintenance on the ocean floor for 20 years.

The new amplifier (illustration below) is an important advance in deep-sea communications technology.

To make a single amplifier operate in two directions, it was necessary to provide a precise, complex filter system to separate the signals. Signals traveling in one direction occupy a frequency band from 116 to 512 kc., and those traveling in the other direction, from 652 to 1052 kc.

The gain of each amplifier must accurately compensate for its share of cable loss. The total loss varies over the frequency band and, in a transatlantic system, reaches a maximum of 9000 decibels. Since there is no way to adjust an amplifier on the ocean floor, the performance of each one must be pre-established with extreme precision.

A 3600-mile cable link, with its 180 amplifiers, includes 36,000 electronic components. Each component has to be endowed with a reliability far in excess of the requirements of conventional land systems.

The casing and its seal to the cable must prevent minute water seepage at ocean bottom pressures. This could accumulate fatally over the years, and so production tests employing radioactive isotopes are used to search for any such microscopic leakage.

In bringing the new underseas system to production we worked closely with Western Electric, the manufacturing unit of the Bell System. Our joint objective was to create a system of high reliability that could be manufactured economically. The new amplifiers are being used first in the new deep-sea telephone link from Florida to Jamaica and Panama.

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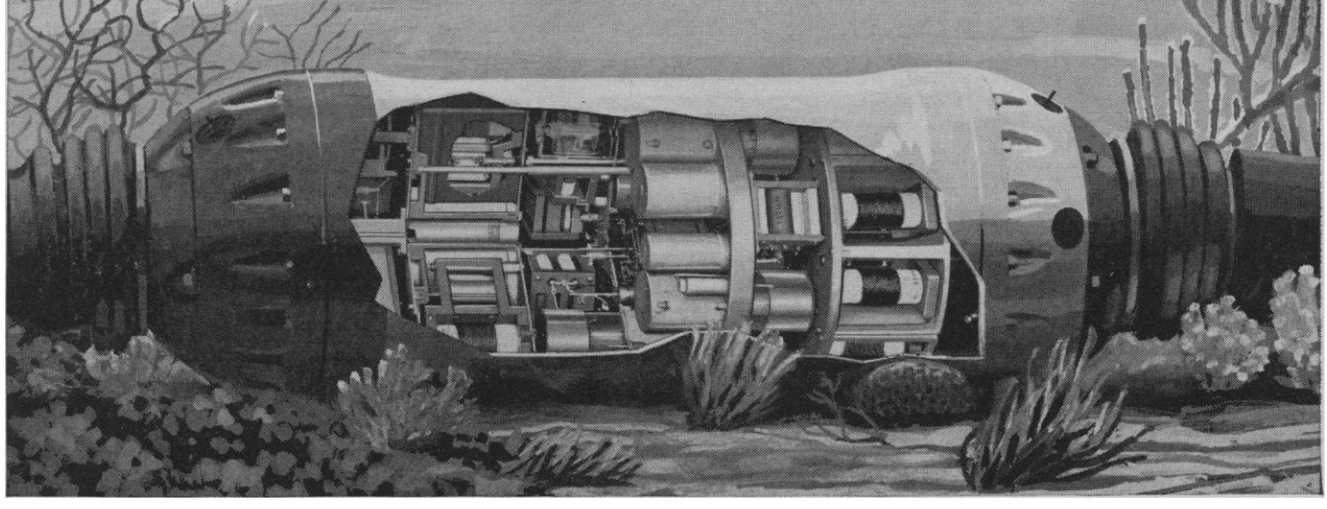

View of deep-sea amplifier with casing cut away. The casing is of noncorrosive beryllium copper, tested to withstand pressures up to 11,000 psi.

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SCIENCE

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COVER

Core of a Roman mausoleum built about 50 A.D. on the road from Rome to Veii. The valley bottom at that time was about 1 meter above the present stream level. Since then, silt and sand have partially covered the mausoleum and buried the valley bottom to a depth of more than 4 meters. Younger buildings on either side of the mausoleum were occupied at least until the early 3rd century A.D. Survey rods are 1½ meters long. See page 898. [C. T. Stifter, American Academy in Rome]

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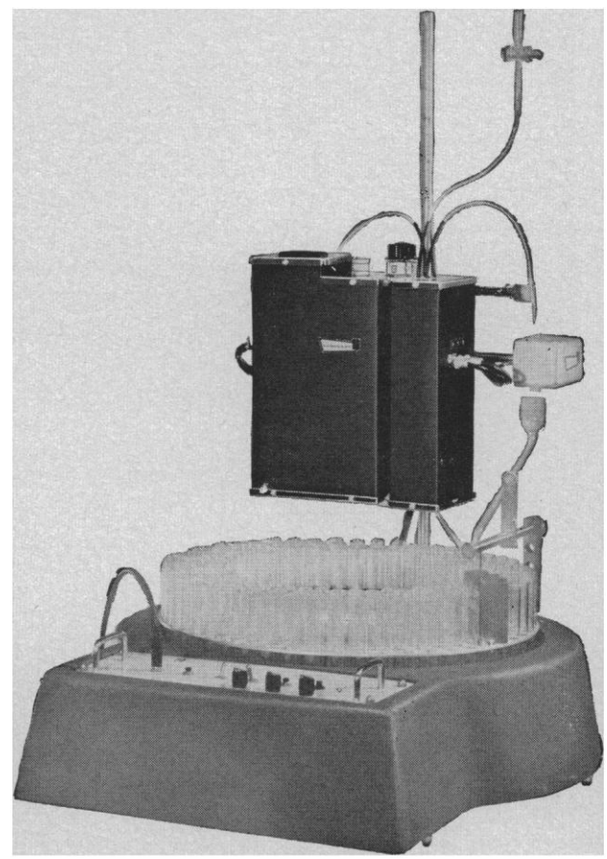

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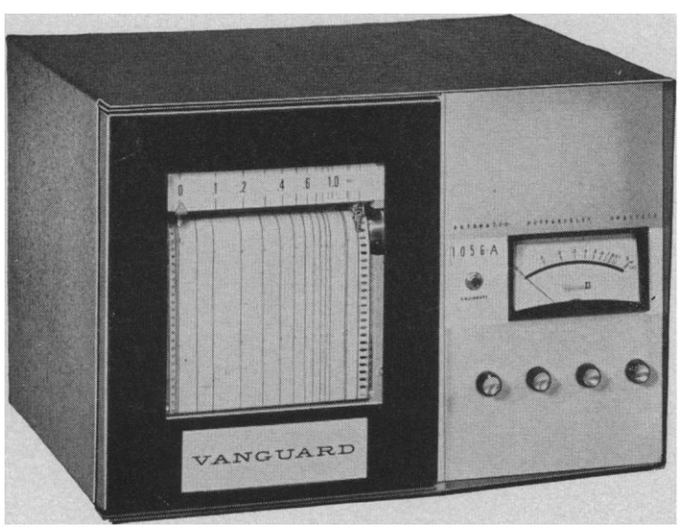

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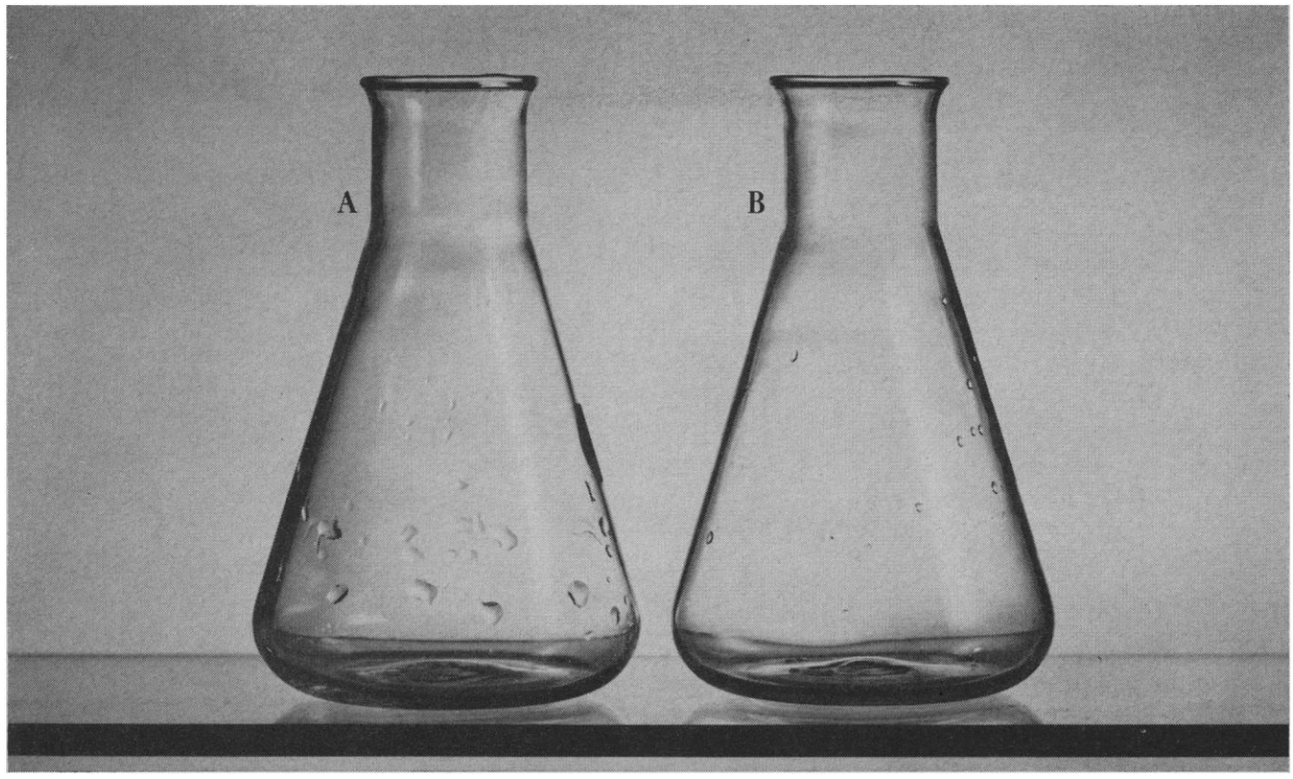
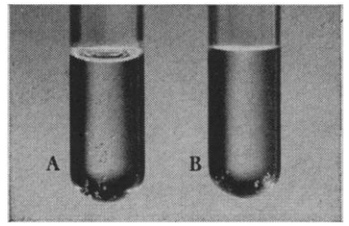


Why is it easier to work with flask B?

Because it's coated with Siliclad, the soluble silicone that sheds liquids, makes cleaning easier and faster, and prevents sticking of rubber or glass stoppers. *And* Siliclad significantly reduces glassware breakage. Glassware coated with Siliclad resists surface scratches, the major cause of breakage.

Easier in the laboratory

Siliclad-treated surfaces repel water, blood, mucus, and most organic materials. With the use of Siliclad blood clotting is reduced, more clear serum is obtained, and less hemolysis is found. More accurate determinations are possible because treated cylinders and pipettes deliver full content, do not retain droplets.* Siliclad can also be used to lubricate glass stoppers to prevent fusing, to coat glass apparatus to prevent meniscus formation in fluids, to prevent freezing of glass plungers in hypodermic syringes, and to prevent violent chemical foaming reactions.[1]



Just where is the surface of the liquid in tube A? With ordinary meniscus surface you can't be sure. In Siliclad-treated tube B liquid forms flat surface, allows more accurate determination.

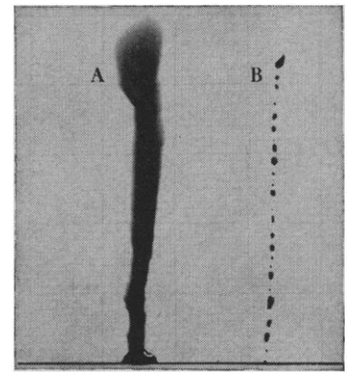
Easier in the hospital

In the hospital, Siliclad can be used to treat tubing and catheters... needles for I.V. applications... I.V. sets... replacement-transfusion sets ...blood reconditioning apparatus... artificial kidneys. In chest drainage tubes, silicone-treated tubes maintain patency and make drainage failure a rarity... add to the ease and safety of postoperative care.[2] Patients have found Siliclad-treated tubing far more comfortable than untreated tubing... less irritating to mucosa.[3] Hospital equipment treated with Siliclad is much easier to clean after use.[3] Siliclad added to sterilizing solutions prevents dulling of sharp instruments and wear and tear of movable parts.[1]

Siliclad-treated surfaces resist heat, moisture, and most common chemicals. Use it for treating ceramic, metal, and plastic surfaces and also for glass and rubber. Siliclad coating resists extreme temperature changes and oxidation. It is nontoxic to body tissues.

Siliclad, when diluted with ordinary tap water, makes 25 pints of solution.

**Note:* Siliclad should not be used for glass items which depend on capillary action or adhesion to perform properly.



ACTUAL PHOTOGRAPH

Equal amounts of blood dropped simultaneously on glass plate at 90° angle.
A. Blood on untreated surface clings to glass, spreads slowly down glass, pools at bottom edge.
B. Blood on Siliclad-treated surface runs down glass plate immediately. Does not cling, stick, or pool at bottom edge of plate. Gentle tapping of glass plate removes few "beads" remaining.

References: (1) Levin, H. L.: Milit. Med. *121*:397 (Dec.) 1957. (2) Harkins, G. A.: J. Thoracic & Cardiovas. Surg. *40*:549 (Oct.) 1960. (3) Cantor, M. O.: Am. J. Surg. *100*:584 (Oct.) 1960.

Price: Siliclad Concentrate, 4-oz. bottle, each $4.00; 1 doz. 4-oz. bottles, $40.00.

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TELEMETRY DOWN TO EARTH!

THE HONEYWELL VISICORDER MEASURES STRAIN ON A ROTATING SCRUBBER MILL

* * * * * * * * * * * * *

Telemetry is usually thought of as signal transmission across tremendous voids. Allis-Chalmers uses the Honeywell Visicorder oscillograph to bring telemetry down to earth.

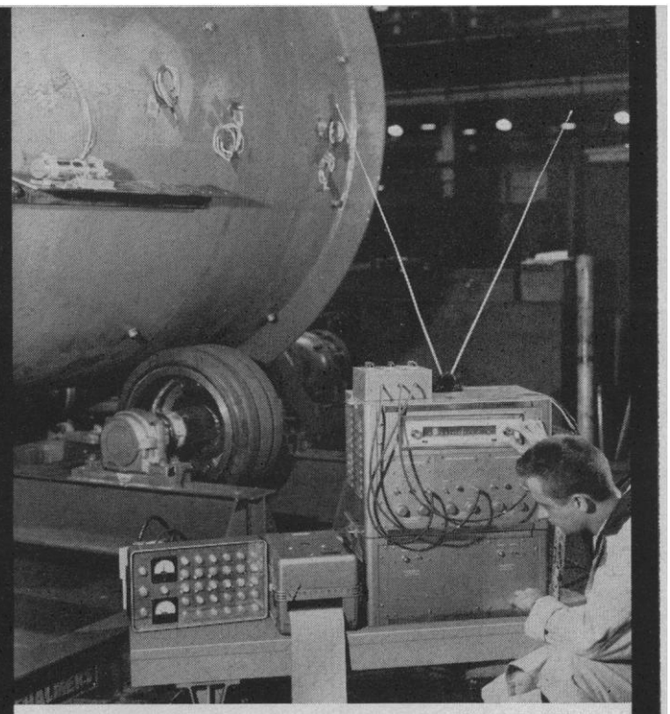
At the Allis-Chalmers processing machinery department in Milwaukee, design engineers wanted to measure grinding mill stresses while the huge machines process metal ore, taconite, cement, and other materials. Large, costly slip rings and dismantling of the machinery had to be avoided, and if possible, all tests were to be made under actual operating conditions in the user's plant.

The problem was neatly solved with a telemetry system built around a Honeywell 906 Visicorder oscillograph and a Honeywell Bridge Balance Unit. With this system, stresses on the shell of the mill, torque on the shaft, and strain on the entire mill can be measured with the mill in operation, and with a minimum of inconvenience to the customer.

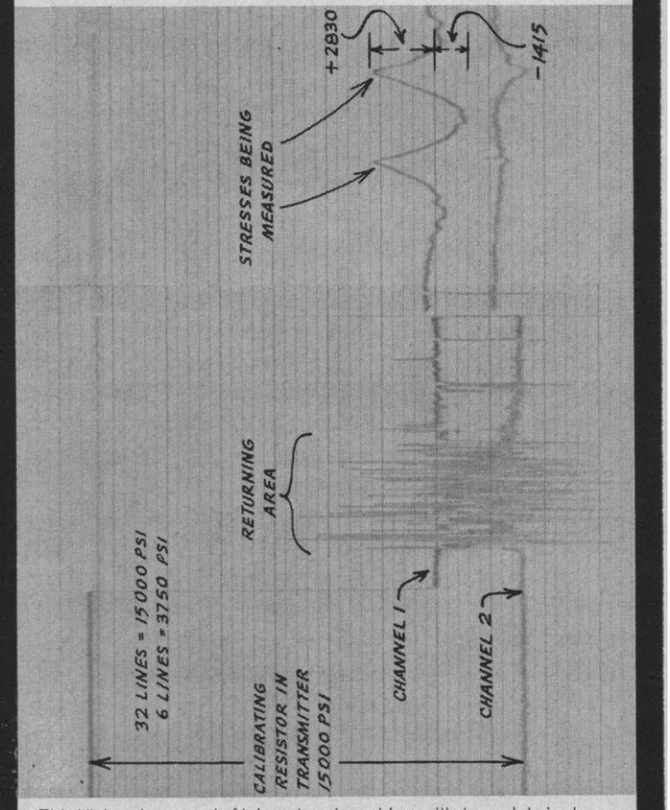
Strain gages are placed on the mill at points where stresses are to be measured. Multiplexed data from the gages are broadcast by an FM transmitter attached to the rotating mill, and are picked up by an FM receiving unit. The multiplexed signal is 'sorted out' by audio filters and discriminators, and sub-frequencies and frequency variations are changed to a varying DC voltage.

The Honeywell Visicorder was selected to record the data because Allis-Chalmers engineers wanted to measure even the slightest variation at high frequencies (in this case, as high as 1800 cps), and to measure and record all three data channels simultaneously. In addition, the immediately-readable record produced by the Visicorder gave the engineers an on-the-spot reading of stress variations as well as a permanent record for later use.

There is a Honeywell Visicorder to fit your test requirements. Six models offer frequency response from DC to 5000 cps, with paper speeds from .1 inch per hour to 160 inches per second. For complete specifications on all Visicorder oscillographs, call your nearest Honeywell Industrial Products Group office, or write: Honeywell, Denver Division, Denver 10, Colorado, where our number is: 303-794-4311. In Canada, contact Honeywell Controls, Ltd., Toronto 17.



The Honeywell Model 906 Visicorder oscillograph and Honeywell Bridge Balance Unit used in a telemetry system for measuring stresses on a rotary scrubber mill manufactured by Allis-Chalmers, Milwaukee.



This Visicorder record of telemetered scrubber mill stress data is shown one-half actual size. Records of this type enable A-C to make necessary changes in their formulae for stresses on mill shells and heads.

DATA HANDLING SYSTEMS

Honeywell

The IEC HR-1... Highest Speeds Highest G's and now CONTINUOUS FLOW!

If you demand extraordinary performance and versatility plus continuous flow capabilities in a high speed centrifuge, you can significantly increase your lab's output and capacity by adding an IEC HR-1.

With the exclusive new **Helixtractor** continuous flow unit, the HR-1 separates micro-deposits from large volumes with efficiency gains up to 300/400%. Further, the Helixtractor is completely aerosol free; can be removed and autoclaved as a unit, so it is ideal for centrifuging infectious materials.

HR-1 delivers 18,500 rpm. Forces to 41,320 x G. Holds any temperature between −20°C to +10°C within 1°C. It offers 5 high-G angle heads and 70 accessories including a Maxiforce Ring that permits spinning 250 ml plastic bottles to 26,300 x G.

If you presently own an HR-1, the Helixtractor is available to you right now. Demand a demonstration.

If you are considering a high speed centrifuge the HR-1 is easily the most reliable, versatile, high performance instrument in the standard price range.

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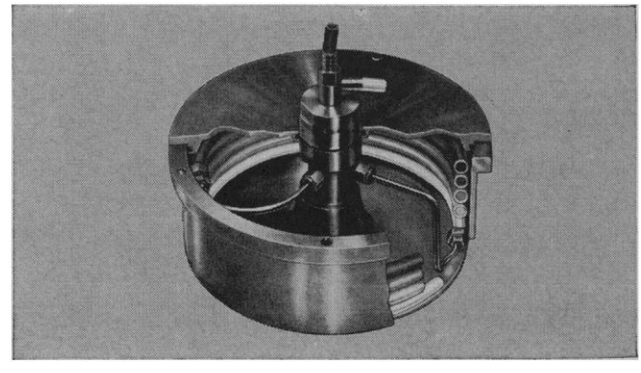
Helical separation takes place in a transparent plastic coil. Material is introduced into the spinning helix through a central stationary hub. Solids collect along the tubing wall as a paste. Different phases are easily identified and isolated simply by cutting the tubing.

Material passing through the tubing is subjected to the same G force for the same time. The liquid film is only a fraction of an inch thick so solids separate three to four times faster than conventional centrifugation because they travel a shorter distance to the tube wall.



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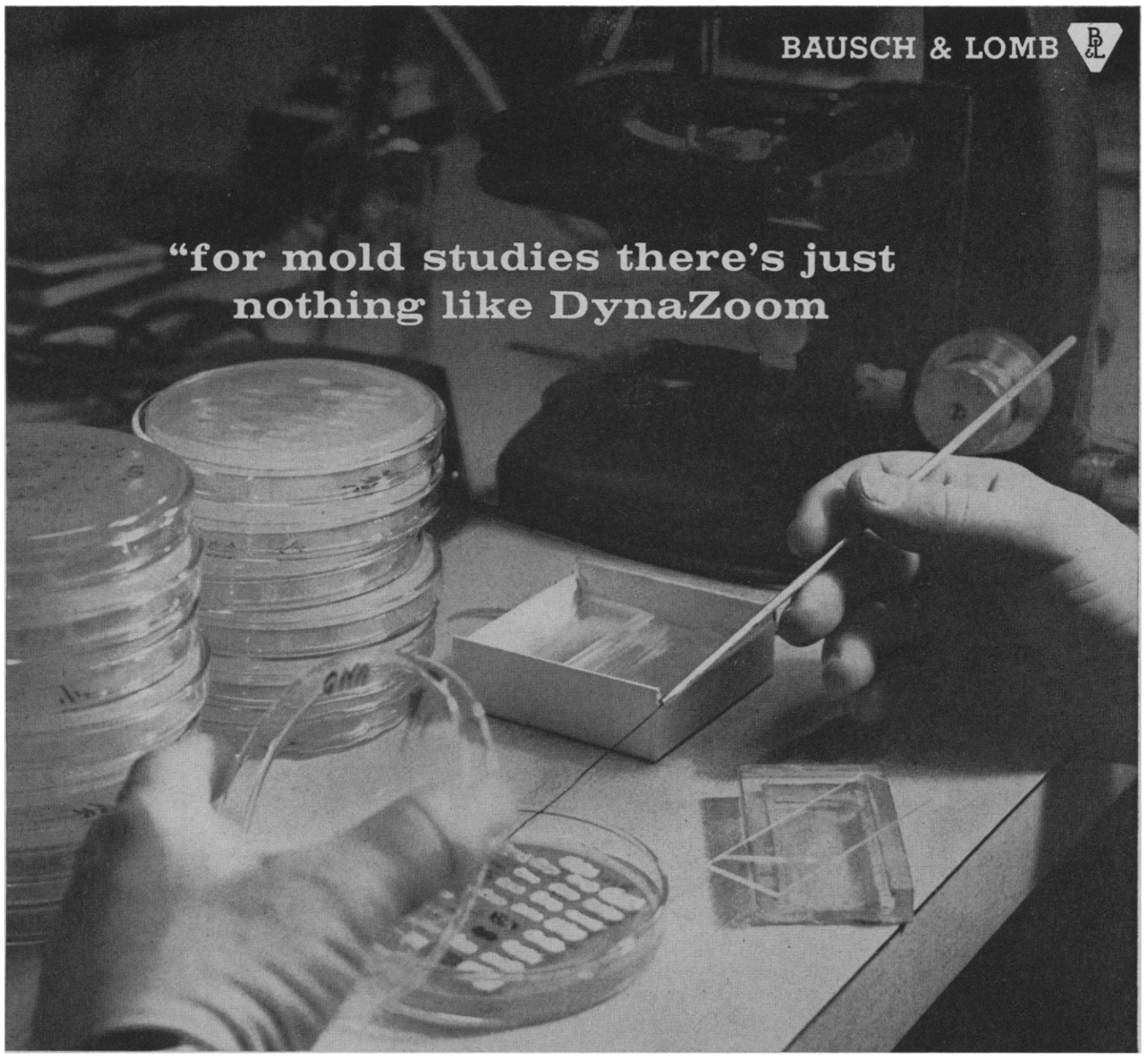

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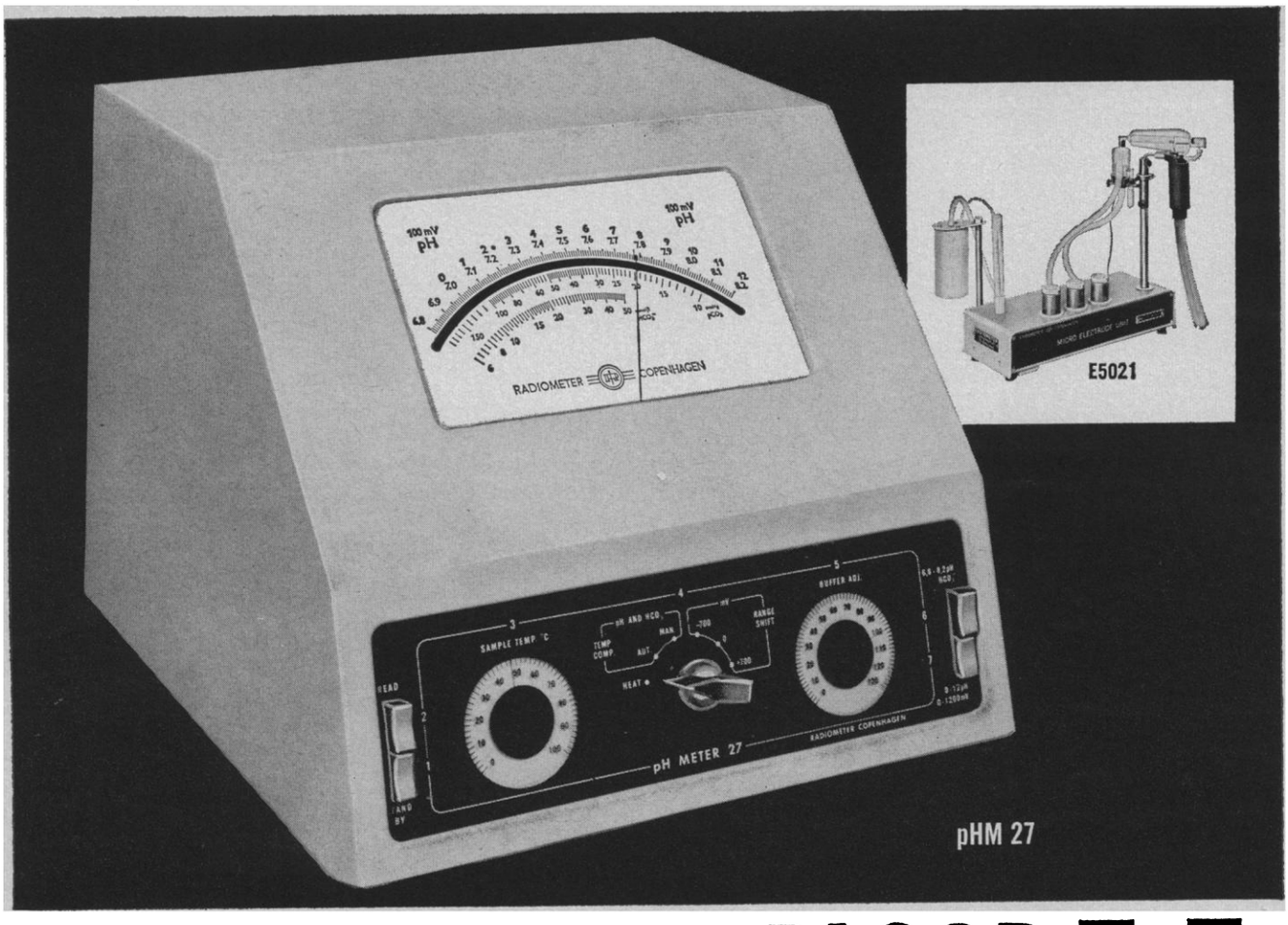

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pHM 27 is a radically new approach to pH instrumentation and designed to function on a modular basis, with a host of accessories to cover blood gas tension measurements (either by direct electrodes or by the Astrup Method), or complete Acid-Base determinations. If you require complete reliability and flexibility of present or future application, **you can't afford to consider any other instrument.** *Write for complete details*

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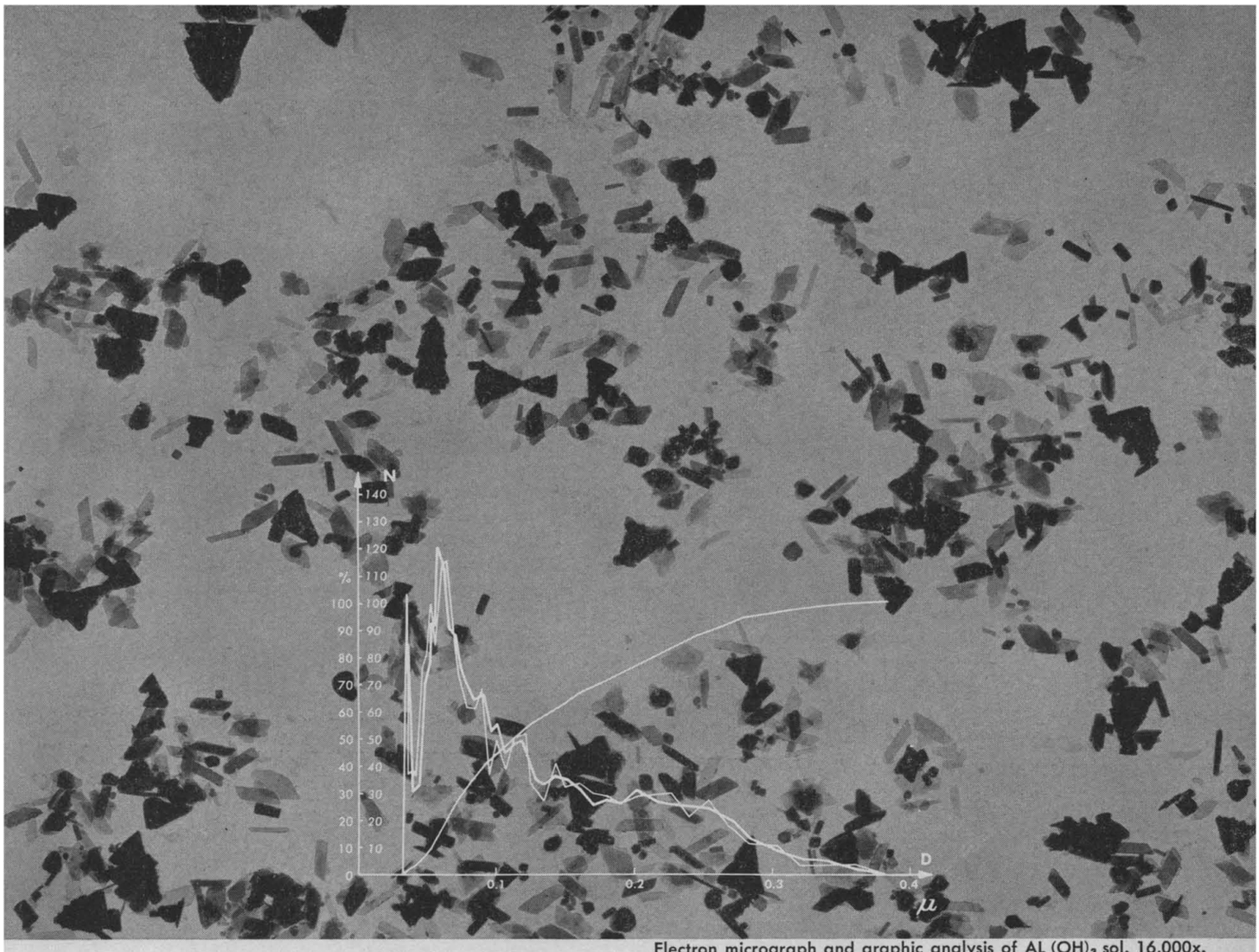


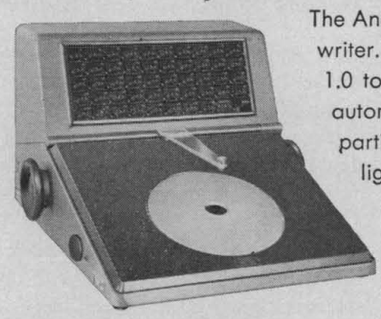
Electron micrograph and graphic analysis of AL $(OH)_3$ sol. 16,000x.

How to get an accurate picture of particle size distribution quickly

The Carl Zeiss Particle Size Analyzer TGZ3 is basically a combination projector and electrical counting device. It is easy to operate: Place the enlarged photomicrograph or electron micrograph on the stage of the instrument. Turn a knob until the round, bright spot of light has the same area as the selected particle. Then press a foot pedal. A signal pulses to one of the 48 counters, determined by the size of the image of the iris diaphragm forming the spot. At the same time a punch descends and puts a minute hole in the counted particle to prevent repetition of a count.

With this instrument you can count and classify approximately 1000 particles in less than 15 minutes. Fatigue is reduced and accuracy improved.

The circular shape of the bright spot makes it easy to estimate sizes, also length and width of rod-shaped particles. Step widths can be recorded as absolutely constant or exponentially increasing and as either a distribution or summation curve.



The Analyzer is about the size and weight of a typewriter. It offers two particle-image measuring ranges: 1.0 to 9.2mm and 1.2 to 27.7mm. Since it is semi-automatic you can also count agglomerations of particles. A knob allows you to adjust background light for comfortable contrast. Fields in which this instrument is successfully used are: rubber, pigments, films, abrasives, etc. Write to us for further details. **Complete service facilities available.**

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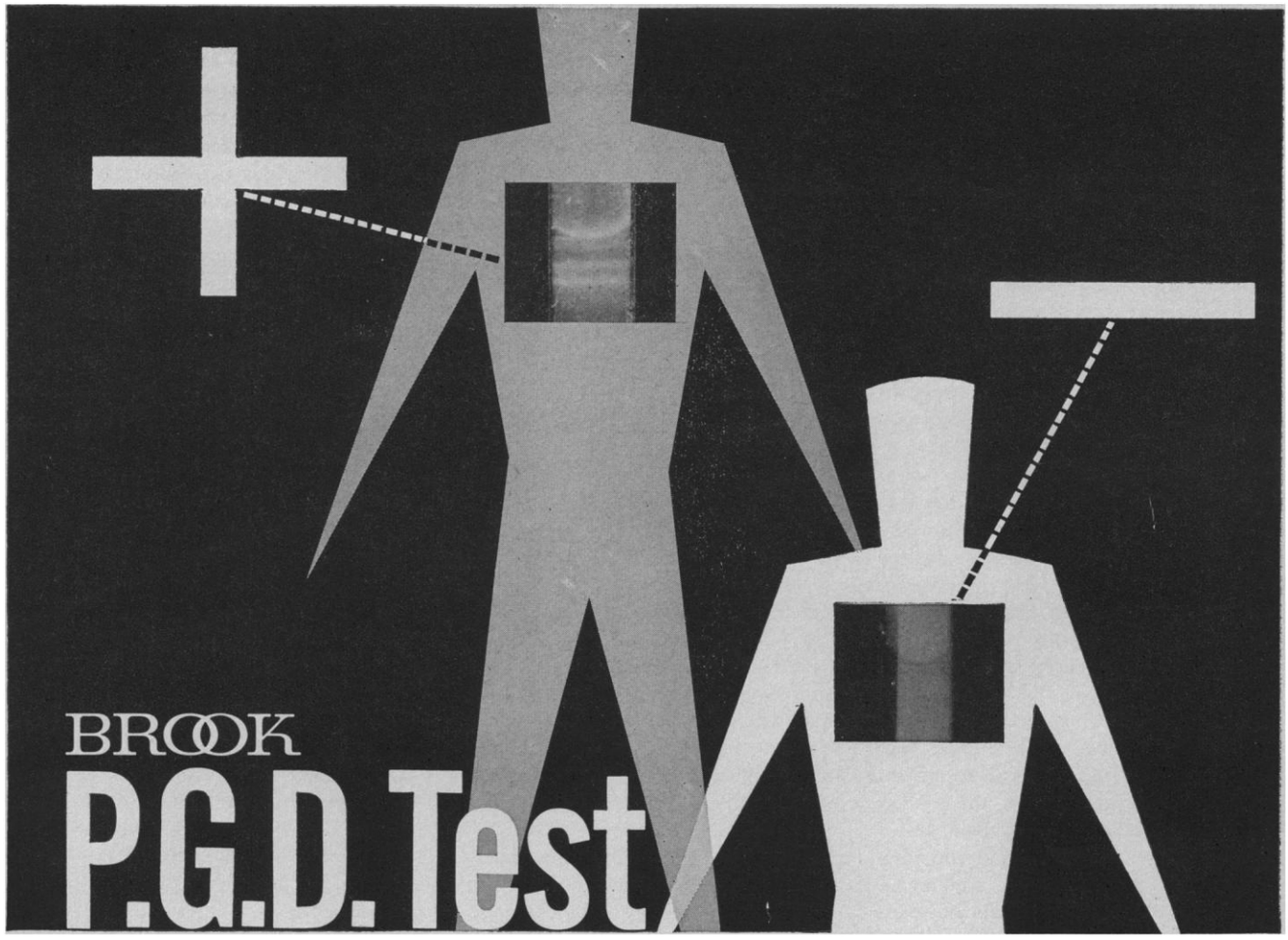
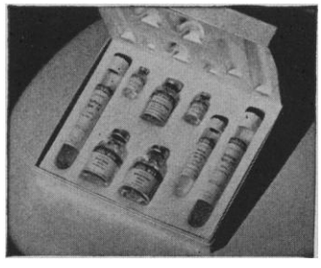


. . . the Latest advance in the practical serological diagnosis of TB

The Parlett Gel Double Diffusion (P.G.D.) Test represents a definite step forward in the detection of tuberculosis. More selective than skin sensitivity tests, it is simple, inexpensive and capable of use as either a screening procedure or a diagnostic aid.

The test utilizes the most basic of all serological procedures — the appearance of a visible precipitate when specific antigen and antibody combine. Yet careful development of experimental conditions and materials — including highly purified reagents, buffer-control of pH and special gels serving as reaction media — have been combined to transform this common physiological phenomenon into a technique having 80 to 90% efficiency in detecting mycobacterial antibody in human serum.

For details see your Aloe Scientific representative or write Aloe Scientific, ⊠ Division of Brunswick, 1831 Olive Street, St. Louis 3, Missouri.



VX-25290 Brook P.G.D. Test Kit. Includes reagents and materials for 30 P.G.D. tests (antigen, agars, buffer, diluent, positive and negative control sera, gel diffusion tubes, capillary pipettes and tube holders).
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planus of the oral mucous membrane; the effect of vitamins in the treatment of desquamating glossitis; the loci of uptake of sulfur-labeled methionine in the mandible; and (with Garazha) the occurrence, in purulent disease of the lung, of similar changes in the terminal phalanges and in the parodontium, where the changes characteristic of chronic parodontal disease accompany pulmonary disease of a chronic purulent type in a large percentage of cases. Platonov, a very experienced clinical investigator, has published neuropathological findings that suggest a neurotrophic factor in parodontal disease.

Sniakin, the physiologist, who teaches in the institute but has his laboratory elsewhere, has been studying the change in responsiveness of the nerve endings of the oral mucosa in various conditions and has shown that change in the "mobility" of these receptors is a very early occurrence in parodontal disease.

Kurliandski, oral surgeon and prosthetic specialist, has done a great deal of research on the surgical treatment of parodontal disease, has made very meticulous studies of the balance of forces between the teeth and the jaws in relation to prosthetic appliances, and has made a striking study of stress patterns in the mandible as demonstrated by optical stress patterns observed with polarized light.

It may be seen from this account that there is a common effort in clinical research on parodontal disease—the condition which, with caries, is the most costly of all stomatological conditions (its cost in the United States is about $1 billion a year).

Perhaps the most exciting work on parodontal disease is that done by Evdokimov and Prokhonchukov, the latter often working in collaboration with Federov. Evdokimov, founder of the institute, who has been, successively, peasant, feldsher, dentist, surgeon, and head of the Moscow Medical Stomatological Institute, has demonstrated, in my opinion, that the primary change in parodontal disease is an insufficiency of the smaller vessels of the parodontium—an insufficiency which is at first latent and then becomes visible as a sclerotic change with swelling of the endothelium; this change leads to occlusion of the vessels and is accompanied in many cases by perivascular infiltration. Evdokimov and his associate showed me very beautiful slides from autopsy material of persons with parodontal disease. This work on the changes in naturally occurring parodontal disease is paralleled by the very interesting work of Prokhonchukov, one of the younger men of the institute, who, besides working on human clinical parodontal disease, has (with Federov) produced in rats, through repeated doses of whole-body radiation, parodontal disease closely similar to that in human beings. Prokhonchukov's observations in this area have been repeated in the United States by Greulich.

THOMAS B. COOLIDGE
Department of Biochemistry and
Zoller Dental Clinic, University of Chicago, Chicago, Illinois

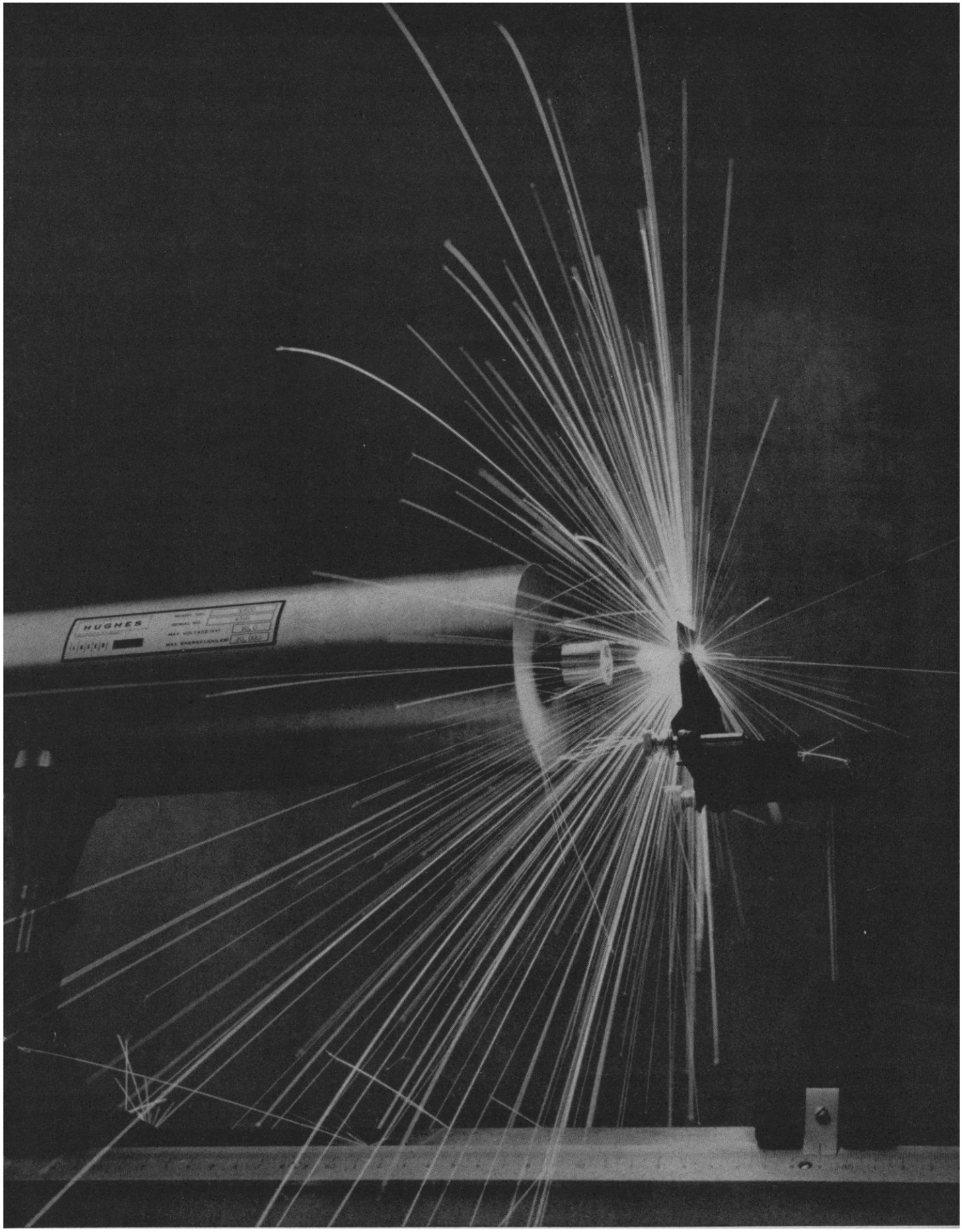
Weinberg Report

Perhaps many scientists should read the Weinberg report, but I suspect that most will read your editorial on "Science, government, and information," and be influenced by your critique. . . . [*Science* **139**, 1015 (15 March 1963)].

Authors and reviewers that I know are honored and highly respected. It is true that these men have proved themselves competent scientists at some time and often remain active in the laboratory after they have become editors and critics. The other side of the coin, which you are recommending be implemented—"that some scientists and engineers 'commit themselves deeply to the job of . . . reviewing' "—deserves ardent consideration on one obvious score: Who will judge the scientific aspects of the manuscripts submitted to a journal if the reviewers and critics of the new breed have not been tried and proved by creative laboratory effort? The referee system is presumably designed to overcome this hurdle at present. Doesn't it work satisfactorily? Is it not a just compromise?

. . . It is better to encourage more, not less, laboratory effort as well as writing, and more of everything that goes with writing—rewriting, editing, and growth for all concerned. The excuse that there is not enough of some particular component in the work chain cannot be answered by cutting at the heart of the whole effort—those who do the laboratory work and write the "first drafts."

STANLEY MARCUS
College of Medicine,
University of Utah, Salt Lake City



Larry Foster of Hughes Aircraft Company had a fully developed negative and positive just 20 seconds after he took this picture of a laser beam piercing a sheet of tantalum. He used a Graphic view camera and **Polaroid Land 55 P/N 4x5 Film.**

24 May 1963, Volume 140, Number 3569 **SCIENCE**

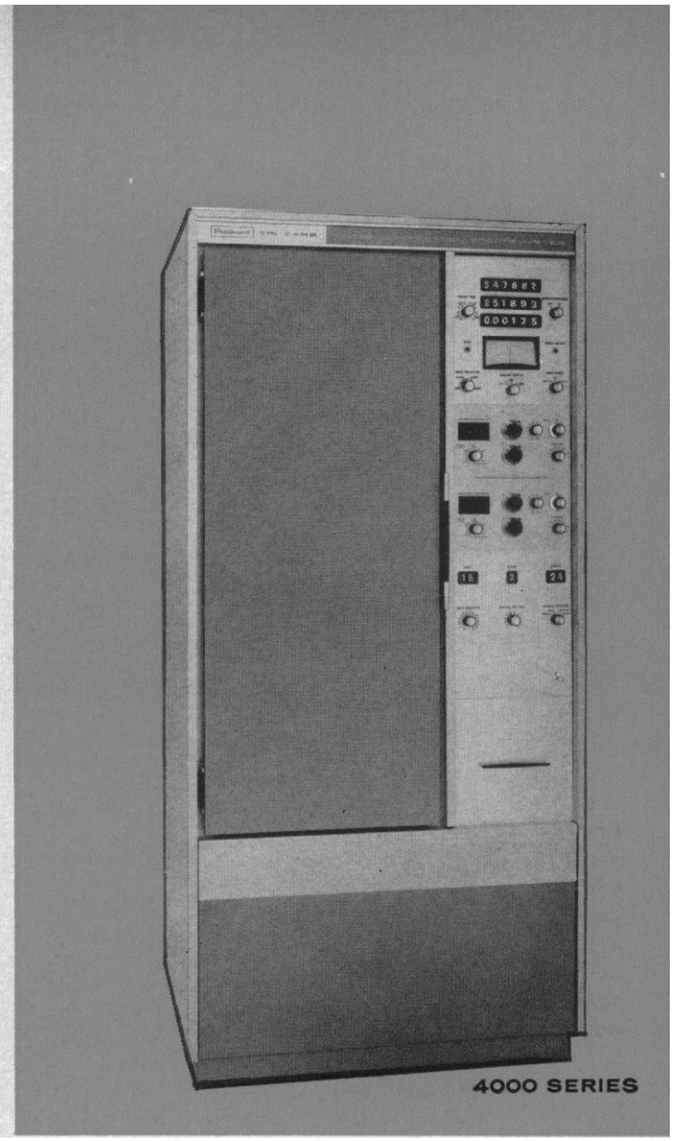
University Responsibility

In administering large amounts of money for research, government agencies have successfully avoided government control of higher education. But in the process, government officials and scientists have fostered another kind of external control over universities—control by panels representing the special interests of particular fields of science. Under a system that is now well established, Professor X of, say, biochemistry at Y University submits a request for support of his research to a government agency. On the advice of a panel of biochemists, the agency makes a grant for which Y University is fiscally responsible but which in a quite major sense is made to Professor X rather than to the university. Its continuation may be contingent upon his remaining in charge, and a change in research direction may require approval of the granting agency. Thus we have the curious situation in which a major development at Y University is decided upon by a group of biochemists none of whom may ever have been or may ever be at Y University.

This system has a number of advantages. Scientists like it, for most of them prefer to have research plans judged by their professional colleagues rather than by their deans and presidents. Government officials like it, for they can say that decisions concerning research support are made by those best qualified—research scientists in the fields involved. The specter of government control is avoided. And good research is accomplished.

But the system also has the bad effects of eroding university responsibility and of shifting faculty loyalty away from the university and toward the supporting agency and the government-science machinery that made the grant. The university as a collection of scholars responsible for the development and welfare of the university has in part given way to a collection of individuals supported by outside agencies and each loyal to his own source of support.

A new set of administrative choices is now to be made. Plans are being formulated for substantial federal grants to support major university improvements and developments rather than particular research projects or programs. And plans are being made for an expanded graduate fellowship program under which many fellows will be selected locally rather than nationally. Will these programs be supported on a department-by-department basis, with decisions made by panels representing individual fields of science? Or will they be handled on a university basis? The department of biochemistry at Y University would probably prefer to have its requests evaluated by a panel of biochemists than to trust the university faculty or officers to decide how best to use a grant made to the university as a whole. Making grants to individual departments would undoubtedly be popular and would represent a safe and cautious extension of an established system. But this course would further erode university responsibility. And this, we hold, is the wrong trend, not good for the university as an institution or, in the long run, for the grant recipient or the granting agency. The present system of supporting projects is unlikely to be changed. But in the newer programs there is an opportunity to restore balance and to strengthen the universities. Future scientific advances and the success of many national programs depend heavily upon the universities and will be best assured by strong universities capable of exercising responsible judgment over their activities.—D.W.



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can Anthropological Association and the *American Dietetic Association* is considering a joint program on "Cultural Influence on the Diet" of interest to anthropologists and psychologists, probably the morning of 28 December.

Psychology (I)

The primary program of Section I (Frank W. Finger, University of Virginia) will consist of four symposia and the vice-presidential address. Ledyard R. Tucker (University of Illinois) has arranged a symposium for 29 December on "Investigation of Experimental Psychological Problems by Multivariate Techniques." Participants will include R. Darrell Bock (University of North Carolina), "Behavioral applications of multivariate analysis of variance"; Maurice Lev (Northwestern University and University of Chicago) and H. J. A. Rimoldi (Loyola University, Chicago), "Application of multivariate analysis to the study of pathology of the heart"; J. E. Keith Smith (Massachusetts Institute of Technology), "Multidimensional analysis of similarity."

On the same day will be held a session on "Learning Research Related to Educational Improvement," arranged by Lee J. Cronbach (University of Illinois); the vice-presidential address by Lloyd Humphreys (University of Illinois) which is entitled "Problems posed to experimental psychology by the evidence for trait instability."

Topics for the symposia on 30 December are "The Development of Visual Perception in Children" arranged by Herschel Leibowitz (Pennsylvania State University) and "Engineering Psychology: Contributions of an Infant Science" arranged by Lowell Schipper (Pennsylvania State University).

Social and Economic Sciences (K)

Section K (Ithiel de Sola Pool, Massachusetts Institute of Technology) has the responsibility this year of arranging the interdisciplinary symposium, "Biological and Sociological Research on the Effects of Human Reproduction Control," for the morning of 28 December. The vice-presidential address of Kingsley Davis (University of California, Berkeley) is expected to be one of the papers of this program. The

section may also arrange one or two specialized sessions.

The *American Economic Association* (Bert F. Hoselitz, University of Chicago) will have a program of invited papers, cosponsored by Section K, on "The Economics of Medicine." This is scheduled early in the meeting (26 Dec.) so that AEA members may attend both the AAAS meeting and their own national meeting, to be held in Boston, Mass., from 27 to 29 December.

The *American Political Science Association* (Evron M. Kirkpatrick, APSA), it is anticipated, will have its customary special program (27 Dec.) cosponsored by Section K.

The national meeting of the *American Society of Criminology* (Donal E. J. MacNamara, New York Institute of Criminology), which has as its general theme "Quo Vadis in Criminology?", will open on 29 December with a session on "Experimental programs in crime control and crime prevention" and one on "Analysis and evaluation of delinquency prediction devices." Other sessions (30 Dec.) will be on "Improving the administration of criminal justice" and a "Seminar: university curricula in criminology and corrections." The annual awards and memorial session of the Society will be held on the evening of 29 December; the presentation will be preceded by the annual business meeting.

The *American Sociological Association* (Janice H. Hopper, American Sociological Association, New York) will have two symposia (29 Dec.), cosponsored by Section K.

Details of the programs of the *Metric Association* (Robert P. Fischelis, Washington, D.C.) are not yet available.

History and Philosophy of Science (L)

Details of the program of Section L (Norwood Russell Hanson, Indiana University; Adolf Grünbaum, University of Pittsburgh) are incomplete, but there will be five or six sessions in the two areas of interest of its members. In addition to "Philosophical Aspects of Present-day Cosmogony and Cosmology," discussed under *General Sessions*, there will be symposia and papers as follows: "The Relation of Physics to the New Biology"; W. M. Elsasser (Princeton University), "The natural philosophy of automation," "The Analytic-Synthetic Distinction in its Bearing on the Philosophy of Mathe-

matics"; J. G. Kemeny (Dartmouth College), "Philosophy and Scientific Revolutions"; P. K. Feyerabend (University of California, Berkeley), "A philosophy of revolutionary scientific development," "The Logic of Statistical Explanation"; Wesley C. Salmon (Indiana University), "The status of prior probabilities in statistical explanation," "Philosophical Issues in Economics"; F. Machlup (Princeton University), title to be announced, and G. Tintner (University of Pittsburgh), "Methodological questions of econometrics." The sectional vice-presidential address will be given by Adolf Grünbaum.

The ninth annual meeting of the *Society for General Systems Research* (Milton D. Rubin, Mitre Corporation) will have a session for contributed papers and a session for invited papers on "General Systems and the Two Cultures." (27 Dec.).

The plans of the *Philosophy of Science Association* (Lewis K. Zerby, Michigan State University) are not yet available.

Engineering (M)

The program of Section M (L. K. Wheelock, Engineers Joint Council) is still in a planning stage.

Medical Sciences (N)

The annual program of *Alpha Epsilon Delta* (Maurice L. Moore, national secretary) on career opportunities in medicine and dentistry will consist of a luncheon and address and a tour of local medical facilities.

As in previous years, Section N will have a four-session symposium (29–30 Dec.) with participants from all parts of the country. This year's subject is chemical suppression of cellular synthesis and mitosis and is being organized by Francis D. Moore (Harvard University) and Oscar Touster (Vanderbilt University). George Hitchings (Burroughs Wellcome Research Laboratory, Tuckahoe, N.Y.), Arnold D. Welch (Yale University), and Rupert E. Billingham (Wistar Institute of Anatomy) are collaborating in the program planning. The papers will deal with the regulation of DNA action, inhibition of nucleic acid production, cancer chemotherapy, and immuno-suppression in transplantation. Francis D. Moore will give the vice-presidential address. Sec-

tion N will also cosponsor the AAAS interdisciplinary symposium on developmental aspects of immunity as well as other appropriate programs.

The *American Physiological Society* and the Bioscience Programs of the Office of Space Sciences of the National Aeronautics and Space Administration will jointly sponsor a symposium on space biology and medicine. Coordinators are Robert E. Smith (UCLA Medical Center), and Orr E. Reynolds (director of Bioscience Programs, NASA.

Details of the annual symposium at the AAAS meeting sponsored by the *American Psychiatric Association Committee on Research* (Milton Greenblatt, Massachusetts Mental Health Center and Harvard Medical School) are not yet available.

Dentistry (Nd)

Section Nd (Seymour J. Kreshover, National Institute of Dental Research) will have a three-session symposium "Growth and Development of the Face, Teeth, and Jaws," arranged by Stanley M. Garn (Fels Research Institute), 26–27 December. The symposium will be cosponsored by the AAAS section on Anthropology (H), the American Dental Association; the International Association for Dental Research, North American Division; and the American College of Dentists.

The program will cover the determinants of dental and facial growth, including the genetic determinants, endocrine determinants, nutrition determinants, and abnormal determinants of growth and size. An attempt will be made, then, to consider normal variation in the development of the teeth and the supporting structures and the face as a whole. The speakers will represent a broad range of backgrounds being drawn from experimental pathology, radiology, genetics, enzymology, nutrition, and primate research, and in this way it is expected that the growth of the teeth and jaws will be put in broad perspective. Speakers and their papers are: Opening remarks and welcome by Paul E. Boyle (Western Reserve University; vice president of Section Nd) with B. Holly Broadbent (Western Reserve University) presiding; Introduction to the symposium, Stanley M. Garn (Fels Research Institute); "Evolutionary background of dental and facial growth," Albert A. Dahlberg (Zoller Memorial Dental Clinic, Uni-

versity of Chicago); "Normal variations in dental facial growth," Coenraad F. A. Moorrees (Forsyth Dental Infirmary for Children, Boston, Mass.); "Genetic parameters of dental facial growth," Richard Osborne (Sloan-Kettering Institute for Cancer Research). Carl J. Witkop (National Institute of Dental Research) will preside at the second session scheduled for the afternoon of 26 December. Speakers and their papers are: "Prenatal factors and their evaluation," Uwe Stave (Fels Research Institute); "Dental and facial growth in chromosomal abnormalities," M. Michael Cohen (School of Dental Medicine, Tufts University); "Growth of the face in developmental defects," Frederic N. Silverman (Children's Hospital Research Foundation, Cincinnati); "Genetics of tooth formation," Stanley M. Garn and Arthur Lewis (Fels Research Institute). A third session with Seymour J. Kreshover presiding is scheduled for the morning of 27 December. Speakers and papers are: "Endocrine factors in tooth formation," Stanley M. Garn, and Arthur Lewis (Fels Research Institute) and Robert Blizzard (School of Medicine, Johns Hopkins University); "Nutritional modification of dental development," Lawrence R. Fess (School of Public Health, Tulane University); "Genetic carrier of dento-facial disease," Robert J. Gorlin (School of Dentistry, University of Minnesota); "Primate odontogenesis," Daris R. Schwindler (Medical College of South Carolina); Summary and concluding remarks, Stanley M. Garn. A fourth session on another general educational subject will complete the Section's program.

Pharmaceutical Sciences (Np)

The program of Section Np (Joseph P. Buckley, University of Pittsburgh) is expected to include sessions for contributed papers in hospital pharmacy, other sessions for contributed papers, and a symposium. There will be a section luncheon with the vice-presidential address by Don E. Francke (American Society of Hospital Pharmacists) and a dinner.

Section Np's entire program will be cosponsored by the *American Association of Colleges of Pharmacy*, the *American College of Apothecaries*, the *American Society of Hospital Pharmacists*, the *American Pharmaceutical Association, Scientific Section*, and the *National Association of Boards of Pharmacy*.

Agriculture (O)

Section O (A. H. Moseman, Rockefeller Foundation) will have a four-session symposium on "Agricultural Sciences for Newly Developing Nations." The sequence of topics is: (i) Characteristics of agricultural systems in emerging nations; (ii) Research to devise and adapt innovations; (iii) Education and development of human resources; and (iv) Establishing indigenous institutions to serve advancing agriculture. It is hoped that the review of agricultural science in advancing nations will be of broad interest to scientists and educators at the universities, government agencies, and private organizations that have participated in such programs during the past decade or more.

Industrial Science (P)

Section P (Allen T. Bonnell, Drexel Institute) will have its annual symposium of particular interest to executives in industry. Past vice president Henry F. Dever (Minneapolis-Honeywell Regulator Company) will give the vice-presidential address at the annual luncheon. The Section will also confer the 1963 Industrial Award and cosponsor appropriate programs. The program of *The Institute of Management Sciences* (Burton V. Dean, Case Institute of Technology) is yet to be arranged.

Education (Q)

The program of Section Q (Herbert A. Smith, Pennsylvania State University) includes two joint sessions with the *Council for Exceptional Children* (26–27 Dec.); two joint sessions with the *American Educational Research Association* (30 Dec.); three or more sessions for contributed papers (29–30 Dec.); a business meeting (28 Dec.); and the vice-presidential address of Harold E. Wise (University of Nebraska) (29 Dec.).

The four science teaching societies—ANSS, NABT, NARST, and NSTA—that regularly meet with the AAAS may be joined by a fifth, the Central Association of Science and Mathematics Teachers (CASMT). (The coordinator is Paul Loos, Bedford, Ohio.) There will be a joint session arranged by Ted Andrews (State Teachers College, Emporia, Kansas) (27 Dec.), three joint film sessions (27–29 Dec.) and a series of concurrent sessions similar to the

coordinated programs of recent years. A joint coffee hour and mixer will be held 27 December.

The national annual meeting of the *American Nature Study Society* (John W. Brainerd, Springfield College) will begin with the joint session of all science teaching societies (27 Dec.) followed by a session on observing nature. On 28 December there will be a symposium "Recording Nature: Sketching" and a session on nature photography. On 29 December there will be a two-session symposium, "Ohio Landscapes." The joint field trip with the National Association of Biology Teachers will be with the "Swamp Stompers" (30 Dec.).

The ANSS will sponsor a luncheon (28 Dec.) since the NABT will have a Silver Jubilee Banquet (29 Dec.).

The annual national meeting of the *National Association of Biology Teachers* (Ted F. Andrews, State Teachers College, Emporia, Kan.) this year will be its Silver Anniversary Celebration. The program will begin with a series of committee meetings on 26 December. There will be a second joint session of the science teaching societies and a concurrent symposium "Recent Developments in Cellular Biology" the afternoon of 27 December. On 28 December, concurrent with the morning business meeting and an afternoon tour, will be sessions on "Recent Developments in Organismal Biology" and "Recent Developments in Ecosystem Biology," respectively. The Silver Jubilee Program in the morning of 29 December has concurrent sessions on teaching biology and research activities in high schools; in the afternoon, the program deals with collegiate curricula for biology teachers.

The *National Science Teachers Association* (Robert H. Carleton, NSTA, Washington, D.C.), besides arranging three early morning film programs (27–29 Dec.), will have concurrent sessions on the afternoon of 27 December and a third session in the morning of 28 December.

Science Service (Leslie V. Watkins, Science Service) will sponsor a session on the interrelation of science youth activities (30 Dec.).

Information and Communication (T)

Section T's program (Phyllis V. Parkins, *Biological Abstracts*) will be somewhat diversified in its approach to problems of science information and communication. A one-day session, cosponsored by the American Society for Metals, with Marjorie R. Hyslop, Frank Foote, and Donald McCutcheon as cochairmen, is planned around the general topic "Control of metallurgical information and its interaction with other disciplines."

Correlated with this program, a visit to the Computer Center to view the American Society for Metals project will be arranged. Other programs, jointly sponsored by Section T and two affiliated societies, the National Association of Science Writers and the Society of Technical Writers and Publishers, are in the planning stage.

A luncheon featuring an outstanding speaker, a general business meeting for considering future policies and programs, and the vice-presidential address by Foster E. Mohrhardt (U.S. Department of Agriculture Library, Washington, D.C.) will conclude Section T's program for 1963.

The regular annual meeting of the *National Association of Science Writers* (Donald Dunham, Cleveland *Press*) with the AAAS will include a business session and a dinner. A feature of the latter will be the fifth presentation of the new series of the AAAS-George Westinghouse Science Writing Awards for excellence in science writing in newspapers and magazines (27 Dec.).

Statistics (U)

The program of Section U, Horace W. Norton (University of Illinois), chairman, will again consist largely of sessions prepared or cosponsored with other sections. The vice-presidential address will be given by Harold Hotelling (University of North Carolina); the proposed title is "Light on statistical teaching problems for recent mathematical research."

Sessions are being developed on statistical problems in geology, stochastic models in biology, multivariate methods in experimental psychology, and on problems of search and retrieval systems. Additional sessions are also planned for the presentation of results of recent significant statistical surveys. One on "Health statistics" will draw heavily on the findings of the National Health Survey. The other session will be built around a current study on how graduate students finance their education.

In addition, there will be a session for teachers of statistics and another session on new developments in applying statistics to novel domains of science. Morris B. Ullman, 7604 Cayuga Avenue, Bethesda, Md., is secretary for Section U.

The *American Statistical Association* will have a number of sessions sponsored jointly with Section U and perhaps others cosponsored by the Biometric Society and by Section K.

The *Biometric Society, Eastern North American Region* (T. A. Bancroft, Iowa State University of Science and Technology) is planning sessions but details are not yet available.

Science in General (X)

A number of organizations, too general in their interests to be placed in any sectional series or under any specific discipline, will constitute the "X" series in the printed *General Program.* In this preliminary synopsis, the programs of one of these—the Academy Conference—has already been mentioned, under "Other General Events."

The *American Geophysical Union* (Waldo Smith, AGU, Washington, D.C.) will cosponsor appropriate sessions.

The national convention of the *Scientific Research Society of America* (Donald B. Prentice, Yale University) is scheduled for 30 December. The award of the William Procter prize and the annual RESA address will follow the luncheon, to be held jointly with the Society of the Sigma Xi.

The annual meeting of *Sigma Delta Epsilon,* graduate women's scientific fraternity (Ernestine Thurman, National Institutes of Health) will include a luncheon for all women in science with Agnes Hansen (University of Minnesota) as speaker, and the grand chapter dinner and meeting. A headquarters room will be maintained throughout the meeting period (26–29 Dec.).

The 64th annual convention of the *Society of the Sigma Xi* (Thomas T. Holme, Society of the Sigma Xi, New Haven) will be held on 30 December after the joint luncheon with RESA. In the evening of 29 December, the Society will join with the *United Chapters of Phi Beta Kappa,* (Carl Billman, Phi Beta Kappa, Washington, D.C.) in sponsoring an address by Paul B. Sears (Yale University). Since the inauguration of the series in 1922, these distinguished lectures of interest to all participants have been a valued feature of the Association meeting.

Call for Papers by Sections

Five sections of the Association will arrange sessions for contributed papers at the Cleveland meeting. The secretaries or program chairmen to whom titles and abstracts of papers should be sent, *not later than 30 September,* are as follows:

E-GEOLOGY AND GEOGRAPHY. Richard H. Mahard, Department of Geology and Geography, Denison University, Granville, Ohio

G-BOTANICAL SCIENCES. Harriet B. Creighton, Department of Botany and Bacteriology, Wellesley College, Wellesley 81, Mass.

H-ANTHROPOLOGY. Eleanor Leacock, Bank Street College of Education, 69 Bank Street, New York 14, N.Y.

NP-PHARMACEUTICAL SCIENCES. Joseph P. Buckley, School of Pharmacy, University of Pittsburgh, Pittsburgh, Pa.

Q-EDUCATION. Herbert A. Smith, Room 168 Chambers Building, Pennsylvania State University, University Park, Pa.

Although the general deadline is 30 September, most sections, and subsequently the AAAS office, would be happy to receive titles in advance of that date.