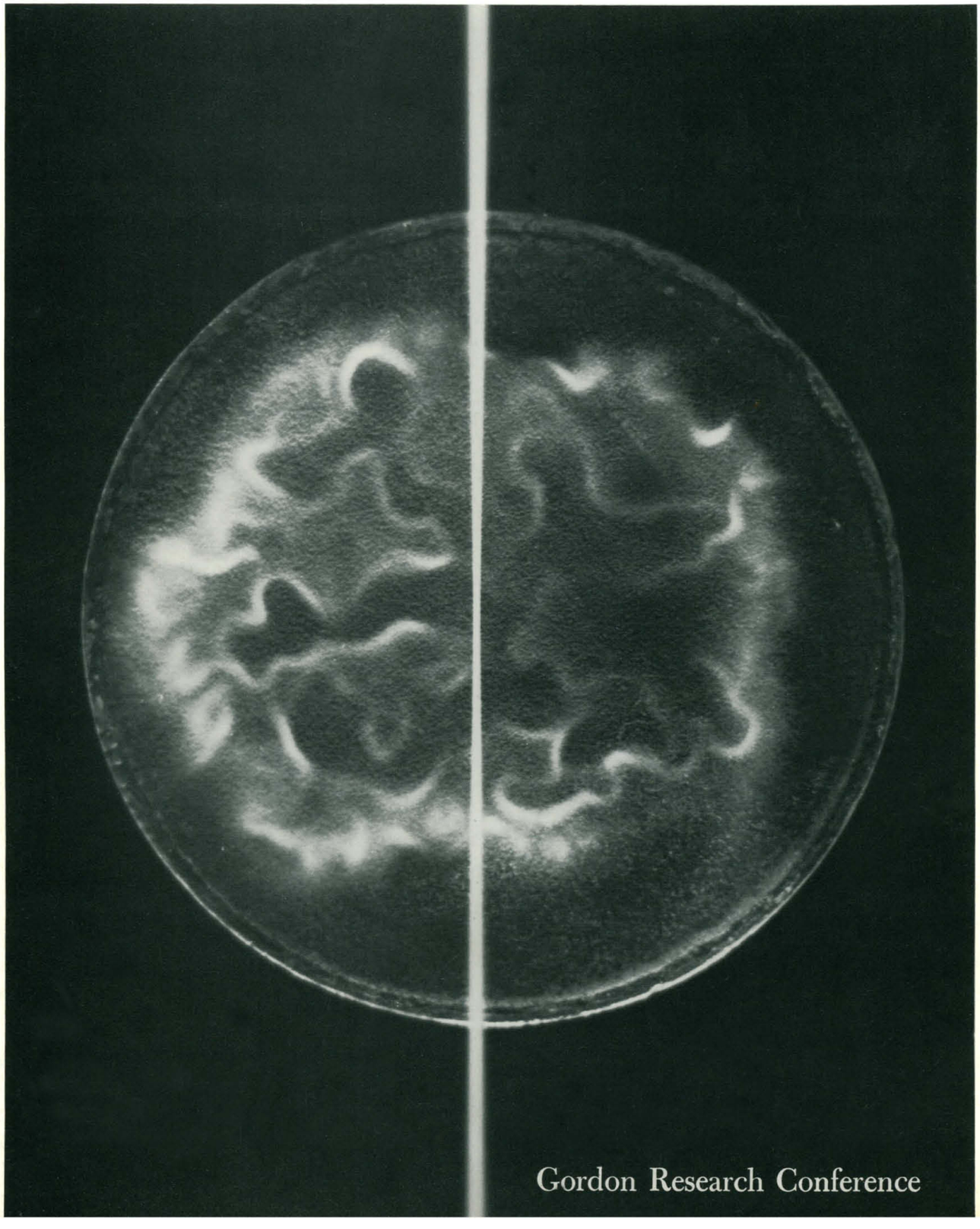
SCIENCE

10 March 1972

Vol. 175, No. 4026

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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The New HP Series 9800 is the best programmable calculator system now—and in the foreseeable future. Price. Performance. Simplicity of operation. No matter what criterion you use, there is absolutely no other system on the market that can match the Series 9800.

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To build your personal desk-top computing system, start with the Series 9800/Model 10 Programmable Calculator. Your basic Model 10 comes with standard equipment that is either not available, or available only as an extra-cost option, on other machines.

If bad experiences have taught you that basic is synonymous with stripped—have no fear. The *basic* Model 10 can perform a complete regression analysis, or solve a system of 10 simultaneous equations.

Only HP Offers You A Fully Modular Calculator

The unique, modular/plug-in architecture of the Model 10 lets you "design" your own problem-solving system. You can expand the memory, add peripherals, or change the keyboard of your existing Model 10, at any time.

Only HP Gives You A Fully Expandable Dual Memory

The Model 10 has a unique dual memory system —one memory for programs and one for data. You can expand from the basic 500 program steps *and* 51 data registers to 2036 program steps *and* 111 data registers.

Beware of simple number comparisons with other calculators. The refinements in the memory design and the keyboard make the Model 10 so efficient that in most cases it requires *fewer steps to execute a given problem.*

Only HP Lets You Design Your Own Keyboard

Interchangeable keyboard plug-in blocks give you a choice of powerful *Statistics* or *Mathematics* functions, complete with their own memories, under single keystroke command. Another option, the *User Definable Function* plug-in, lets *you* customize individual keys with operations uniquely important to *you.*

Only HP Offers An Alphanumeric Printer

By simply inserting the *exclusive HP Alphanumeric Printer Plug-in,* you can automatically generate labels, program instructions, or messages—in English—right on the printer tape.

Only HP Gives You A Wide Choice of Sophisticated Peripherals

The I/O bus of the Model 10 lets you plug-in a Marked Card Reader, Paper Tape Reader, Digitizer, Typewriter, Tape Cassette, or the *exclusive* X-Y Plotter that plots linear, log-log, semi-log, or polar plots, and writes alphanumerics.

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The Series 9800 is no paper tiger. It's available now to free you from the drudgery of problem-solving so you can get on with your job of innovative thinking and designing. For more information or a "hands-on demonstration" at your desk, write: Hewlett-Packard, P.O. Box 301, Loveland, Colorado 80537. In Europe: 1217 Meyrin-Geneva Switzerland.

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CALCULATOR PRODUCTS

10 March 1972

Vol. 175, No. 4026

SCIENCE

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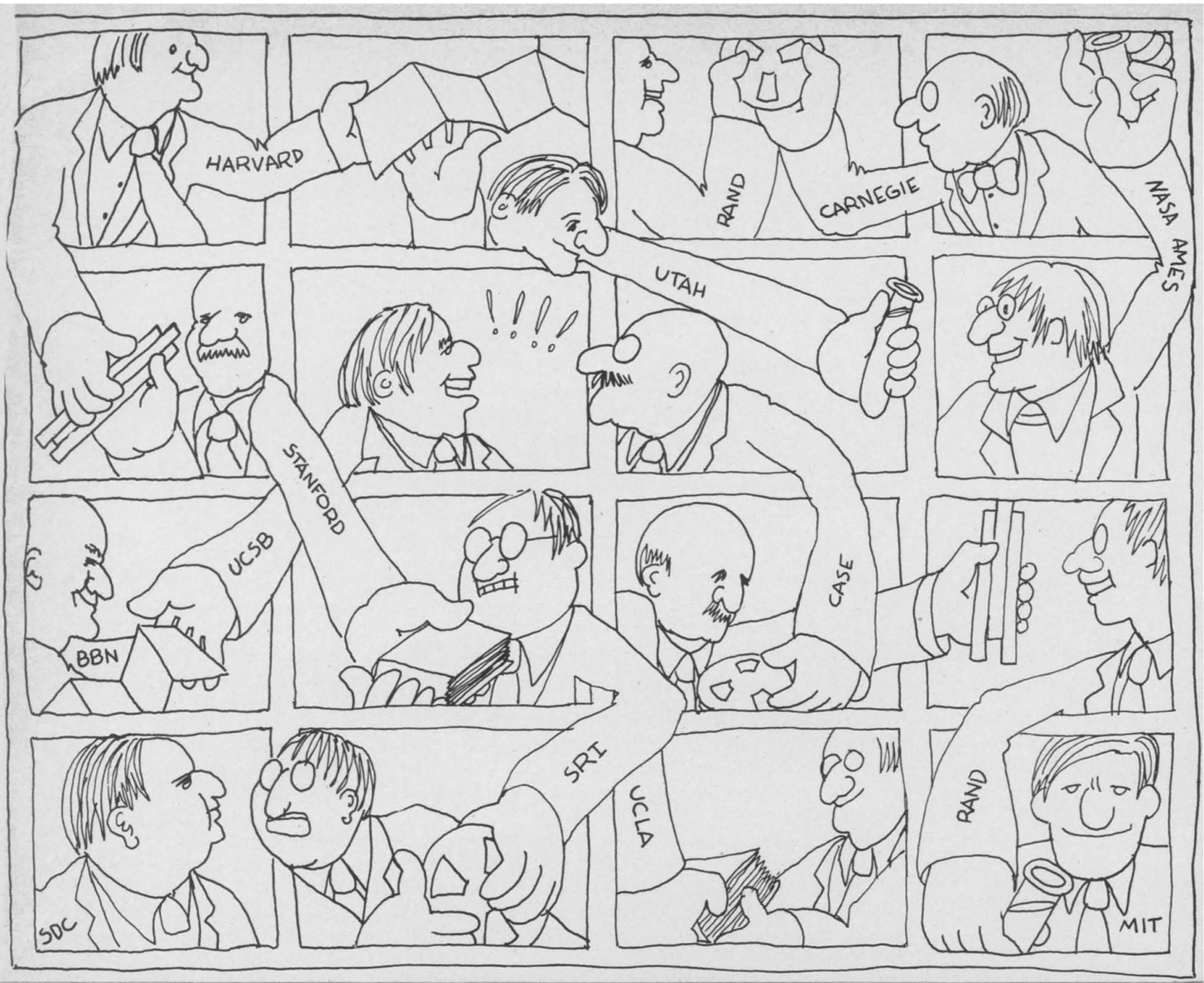
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

End view of a flame burning horizontally on a porous plug burner (2.5 centimeters in diameter). A focused laser beam is passing vertically through the flame for Raman scattering experiments. See page 1112. [S. W. Blanchard, Graphics Unit, General Electric Co., Corporate Research and Development, Schenectady, New York]



ARPA has a network of Supercomputers.

There are two dozen huge computer systems in the Advanced Research Projects Agency network.

Over half of them are DECsystem-10s. Our Supercomputer. MIT has two. So does Utah. Then there's Harvard, BBN, Carnegie, Case, SRI, Stanford and Rand.

Which should give you some idea of how popular our DECsystem-10 really is.

In the ARPA network, DECsystem-10's are doing state-of-the-art research into weather forecasting, econometric studies, resource management, computer sciences, and much more. Everyone shares their computer and expertise with everyone else. Everyone comes out ahead.

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ARPA is one of the biggest brain trusts ever assembled. If half of its members have a DECsystem-10, you really ought to know about it.

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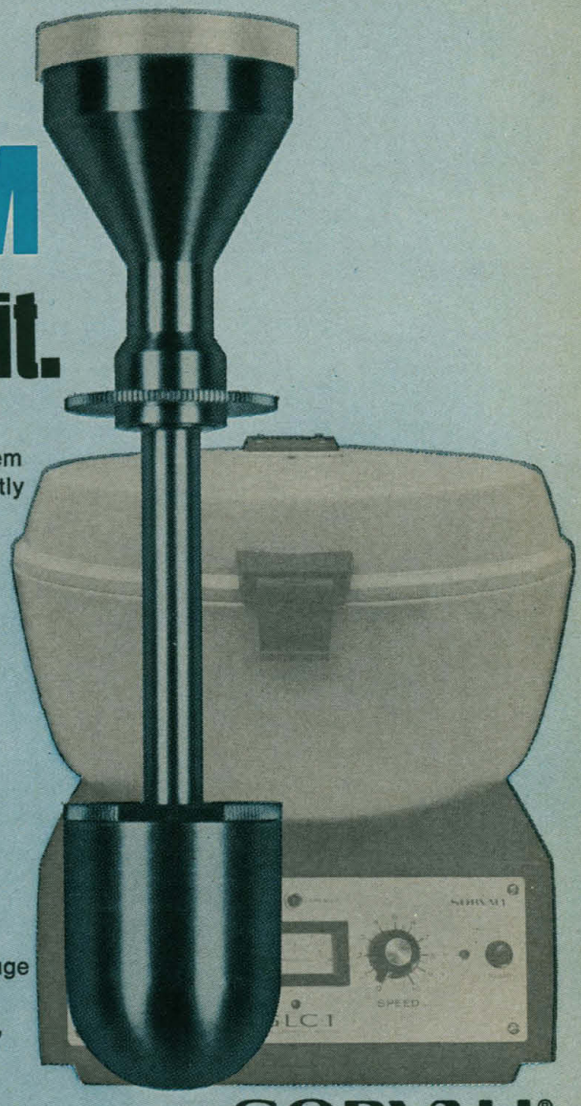

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Separation of triglycerides
2,500 x G — 15 mins.

Separation of pesticides
2,500 x G — 5 mins.

Separation of 17-keto androstanes
1,500 x G — 7 mins.

This is an example of CENTRI-CHROM reproducibility. The first five chromatograms were run with individual components. These five components were then run again as one sample. Note the relative band positions.

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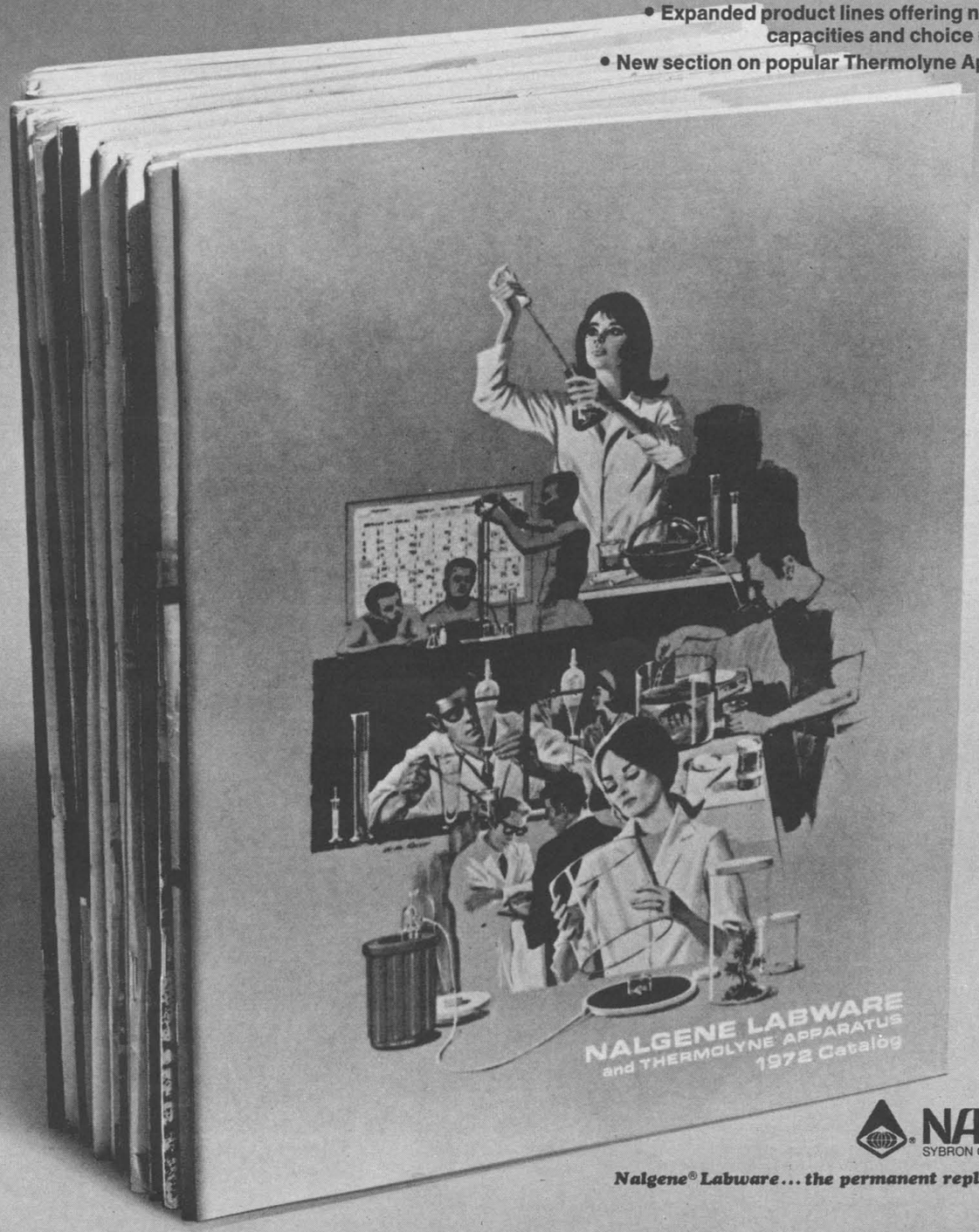

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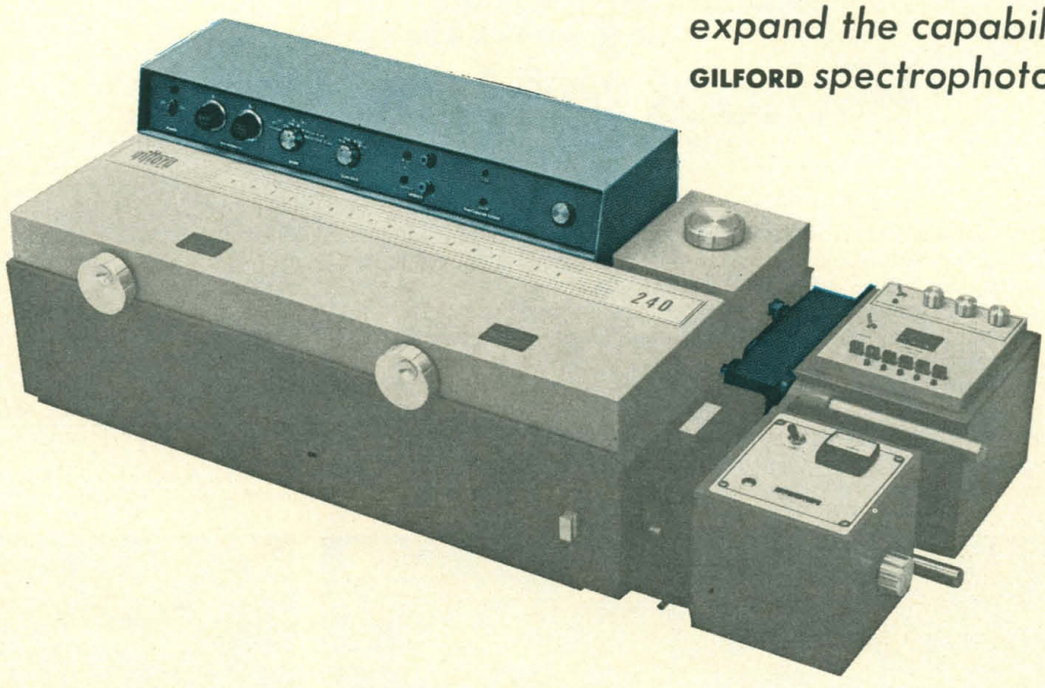

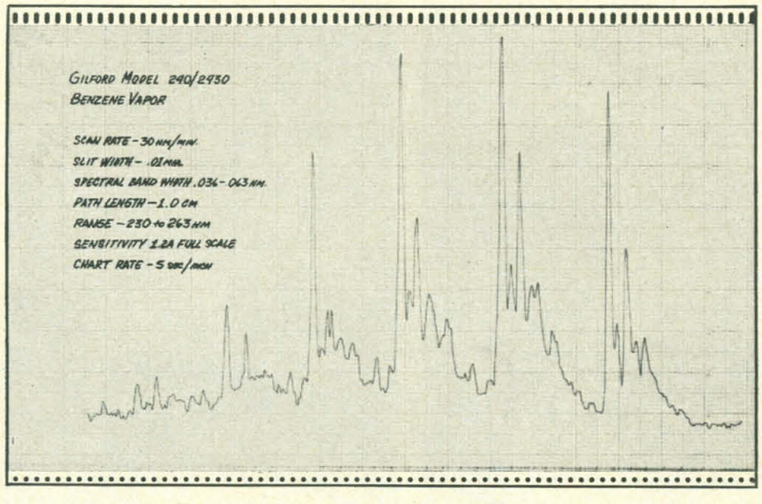

Spectral scanning is only one of the many capabilities of the Model 240. Unlike instruments designed primarily for scanning, the Model 240 continues to offer uncompromised performance for the many other essential needs of the laboratory. The basic philosophy of Gilford's design permits you to expand instrument capability to spectral scanning, gel scanning, sucrose gradient density scanning to name but a few of our growing group of high performance accessories. With any of our accessories you can buy now or add later; a real advantage when funds are scarce.

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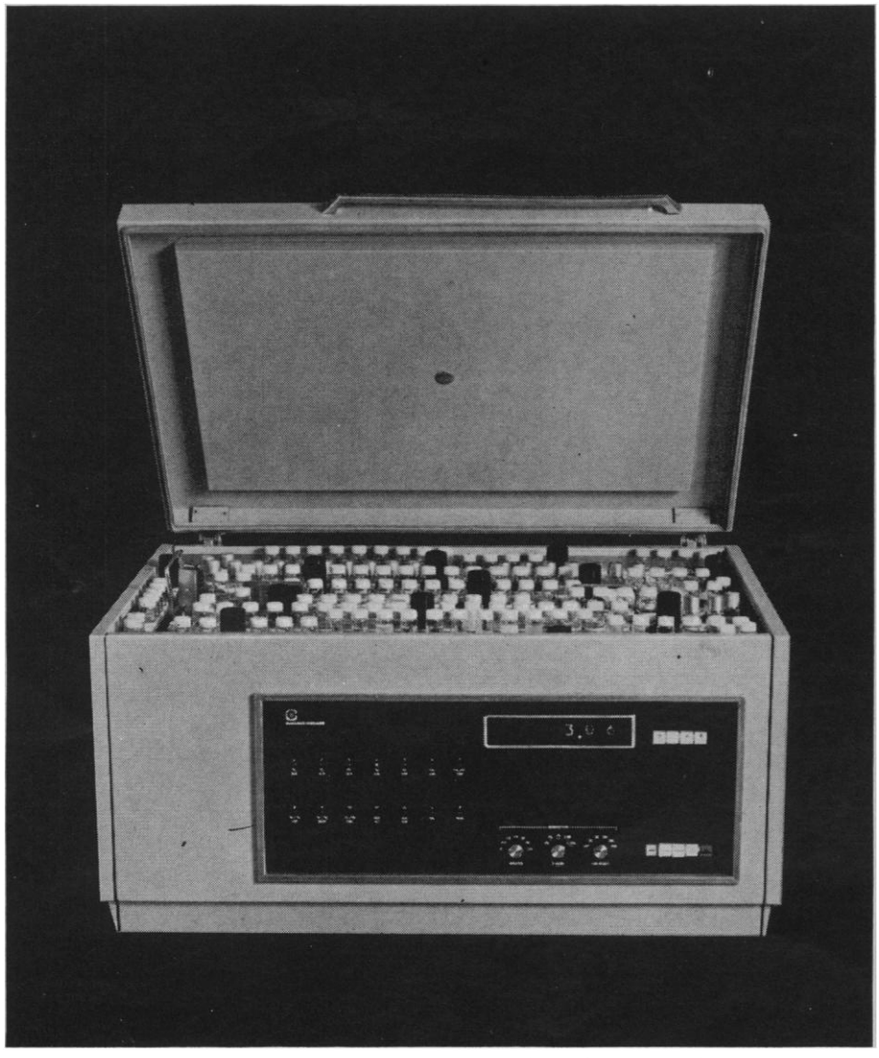

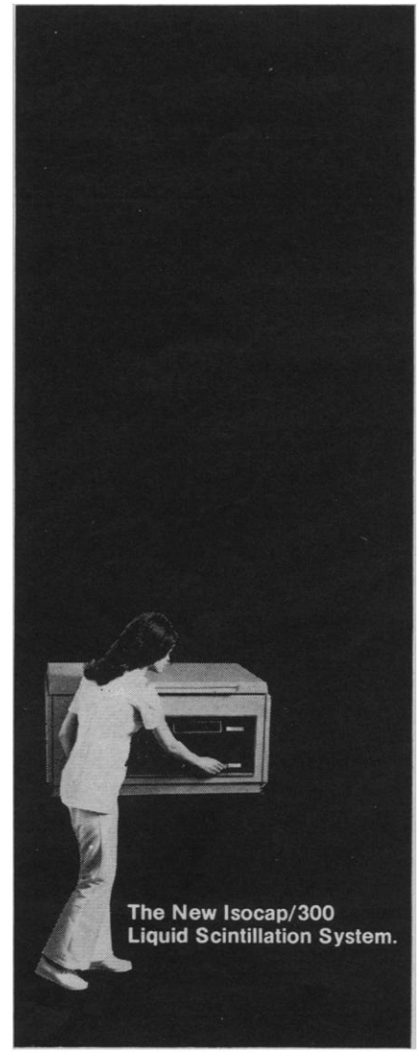

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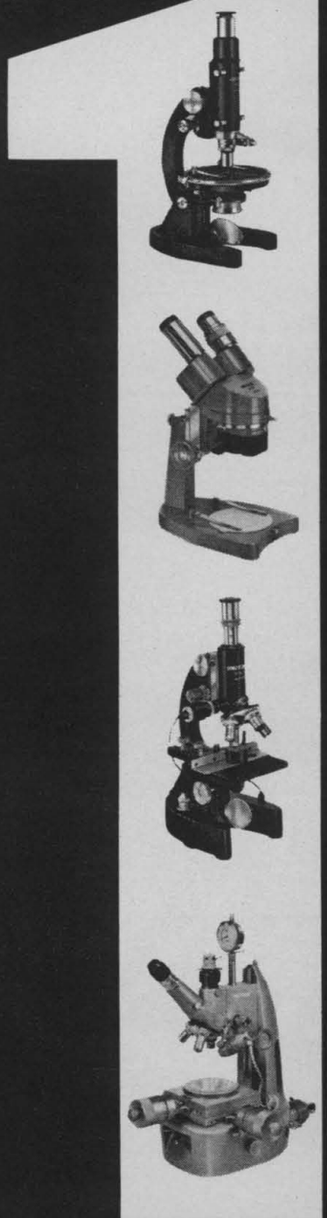

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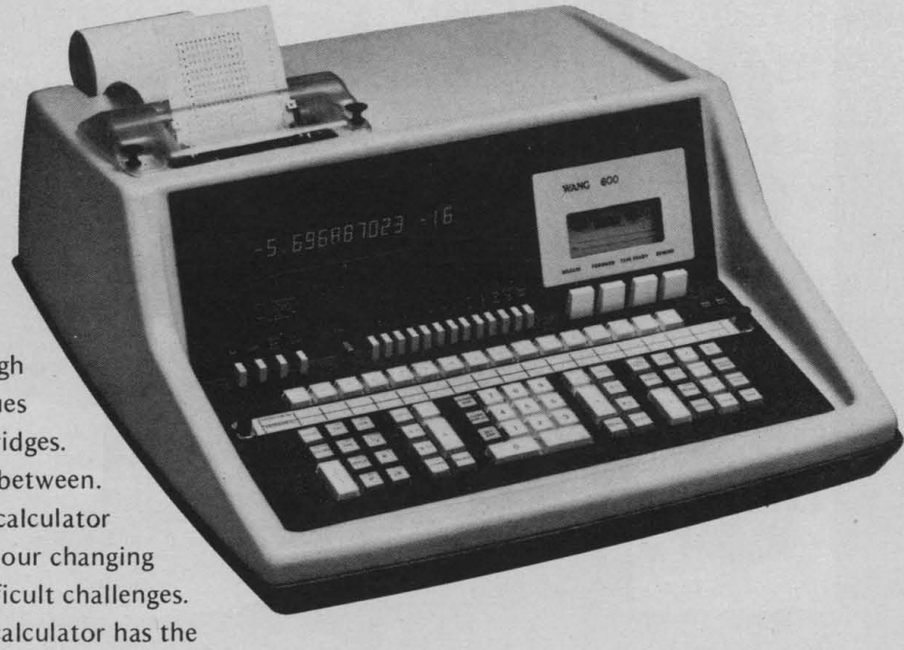
If you need more than just a simple answer.



Any calculator can give you answers. But if you need more — if you need solutions — then bring on your toughest problems and see what Wang calculators have to offer.

Power, for one thing. Power to whiz you through interest rates or static values of pre-stressed concrete bridges. Or just about anything in between.

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One line provides a considerably lower evaporation rate than the other. Select the one that's best for your lab job; they're priced accordingly. Rugged, lightweight, made to quality specifications.

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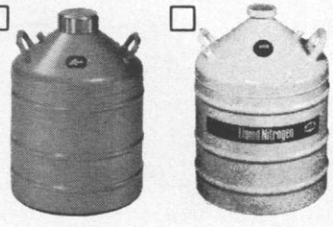

Evaporation rate (liters per day)	0.42	1.24
Capacity (liters)		
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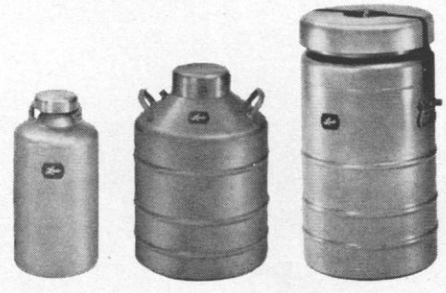
CRYOGENIC REFRIGERATORS:
for dependable storage

There are LINDE refrigerators for every need, including portable ones ranging in size from 10 to 50 liters. Specimens can be refrigerated up to 60 days without a liquid nitrogen refill. Also available: larger stationary units for immersion storage or vapor-phase refrigeration. ☐



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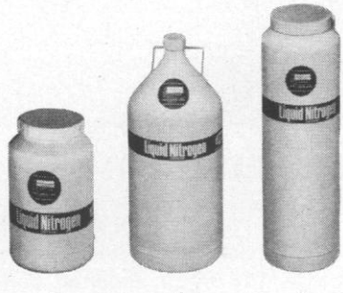

Capacity (liters)	2	4	4

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large, portable

Available in three convenient sizes for storing, transporting, refilling, or dispensing liquid nitrogen. All can be easily moved by one person with dolly or cylinder truck. Two larger containers equipped for withdrawal of LN_2; withdrawal accessories available for smaller containers.

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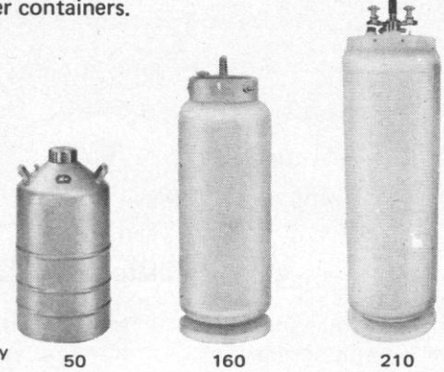

Capacity (liters)	50	160	210
Filled Weight (pounds)	130	503	625

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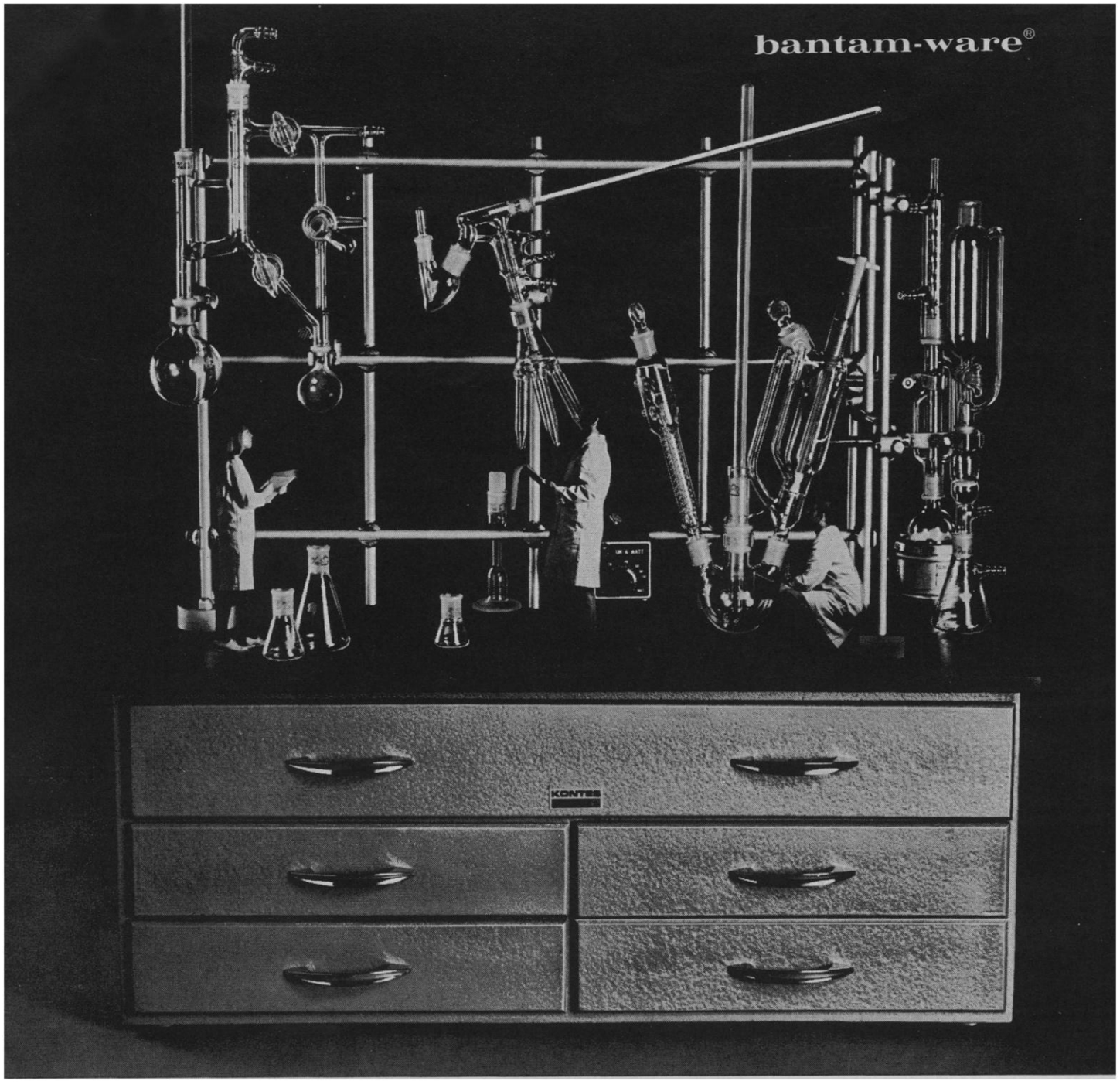

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All you need is 2.5 square feet of bench space to set up a complete organic laboratory. Then think as big as you like because all the components included are interchangeable with over three hundred other items in the Bantam-ware line.

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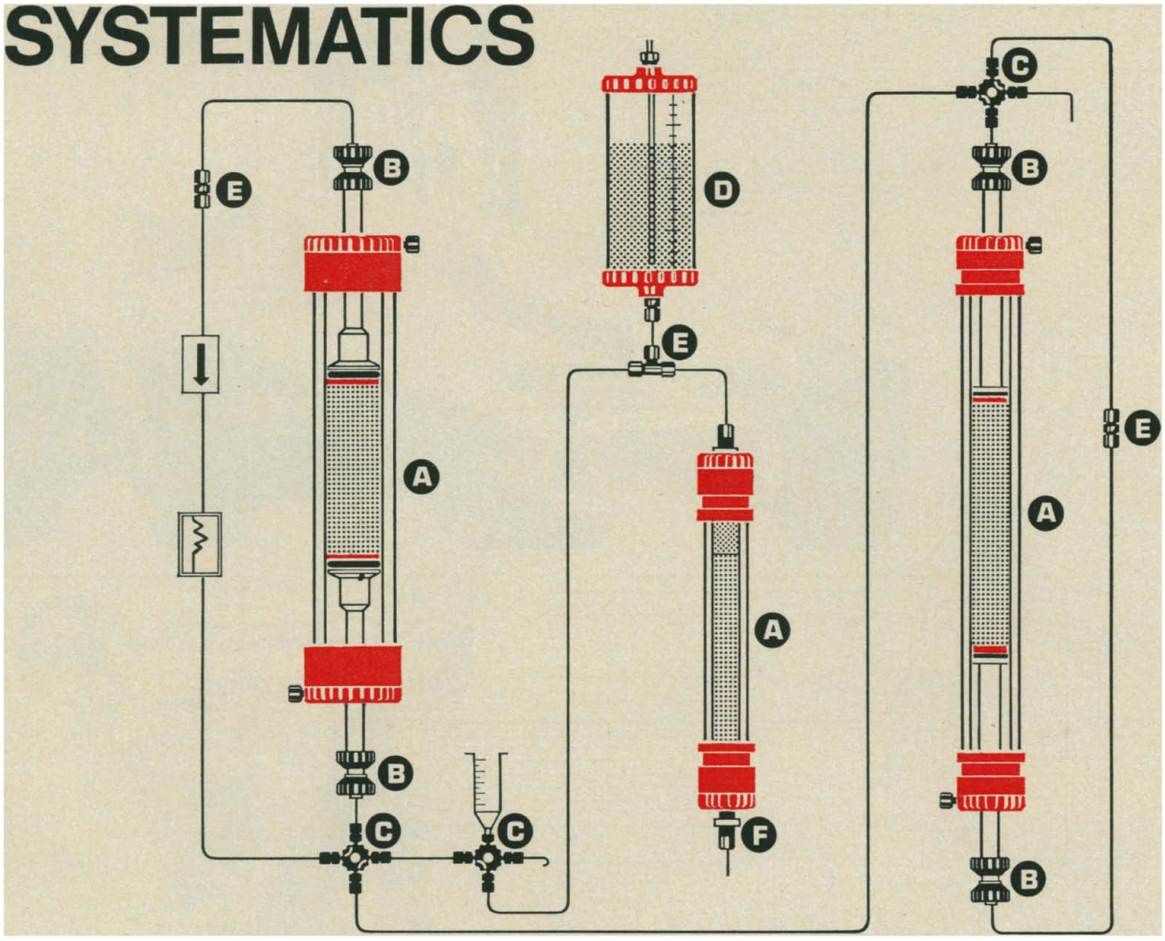
SYSTEMATICS



A Systematic approach to chromatography
All components for complete systems

Pharmacia Fine Chemicals offers a wide range of compatible components for a variety of gel filtration and ion exchange chromatographic systems.

A COLUMNS. A comprehensive range of jacketed and unjacketed columns available in diameters from 0.9 to 21.5 cm. Lengths from 15 to 100 cm. Special solvent resistant columns also available in diameter 2.5 cm. Lengths 45 and 100 cm.

B FLOW ADAPTORS. Permit upward flow elution, sample application, recycling, flow reversal, etc.

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Jacketed columns with new design. Diameters 1.6 and 2.6 cm (K16 and K26).
Lengths 40, 70 and 100 cm. Special 1.6x20 cm column for ion exchange chromatography.
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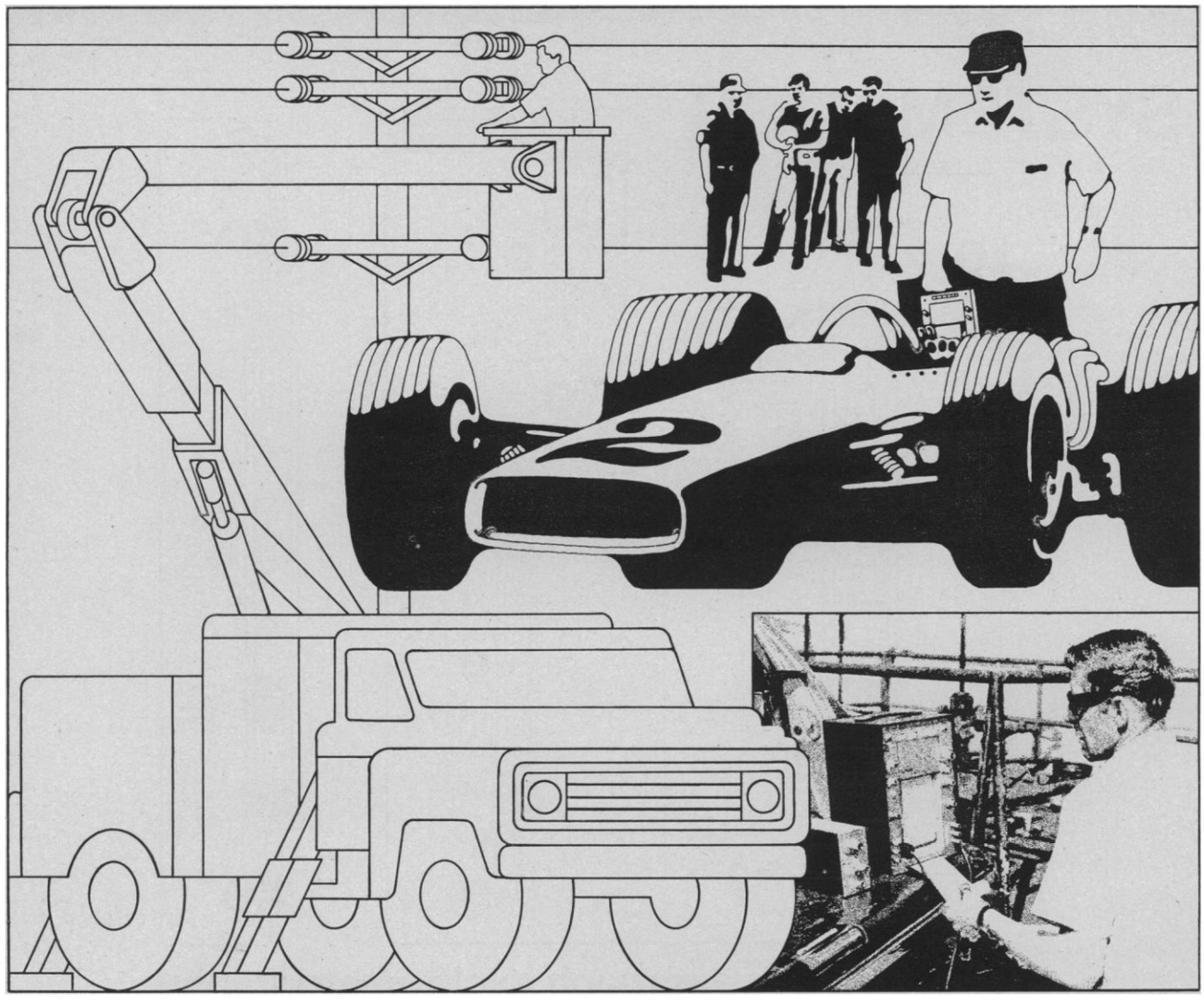
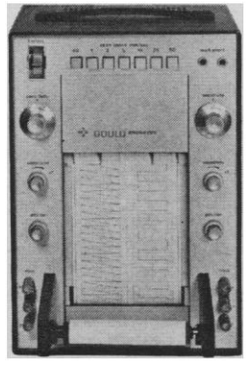


The Brush 222. It works where you need it.

In fact, it works anywhere. Because this rugged, two-channel recorder holds its own signal conditioners, internal battery supply and charger. So it's completely portable, completely self-contained.

Which means you can count on information-on-the-spot. And the Brush pressurized ink system gives you traces that are always crisp, clear, and smudgeproof. And the Metrisite®, our own servo loop feedback system means you can also count on 99½% linearity.



The Brush 222 also gives you two 40mm channels and two event markers. Built-in preamps with a measurement range of 1mV per division to 500 V full scale. Plus balanced, floating, and guarded inputs. And a frequency response to 35 Hz.

The two sealed Gould Gelyte® batteries give you 12 hrs. of continuous operation. Up to 6,000 hrs. of total operating life. And you can completely recharge the batteries in just 16 hrs. All you do is plug the Brush 222 into an a.c. outlet overnight.

The Brush 222. It's a born troubleshooter. And well worth looking into. For more information, write Gould Inc., Instrument Systems Division, 3631 Perkins Avenue, Cleveland, Ohio 44114. Or Rue Van Boeckel 38, Brussels 1140 Belgium.

BRUSH INSTRUMENTS

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This is the table of Contents from the new Whatman Products Catalog.

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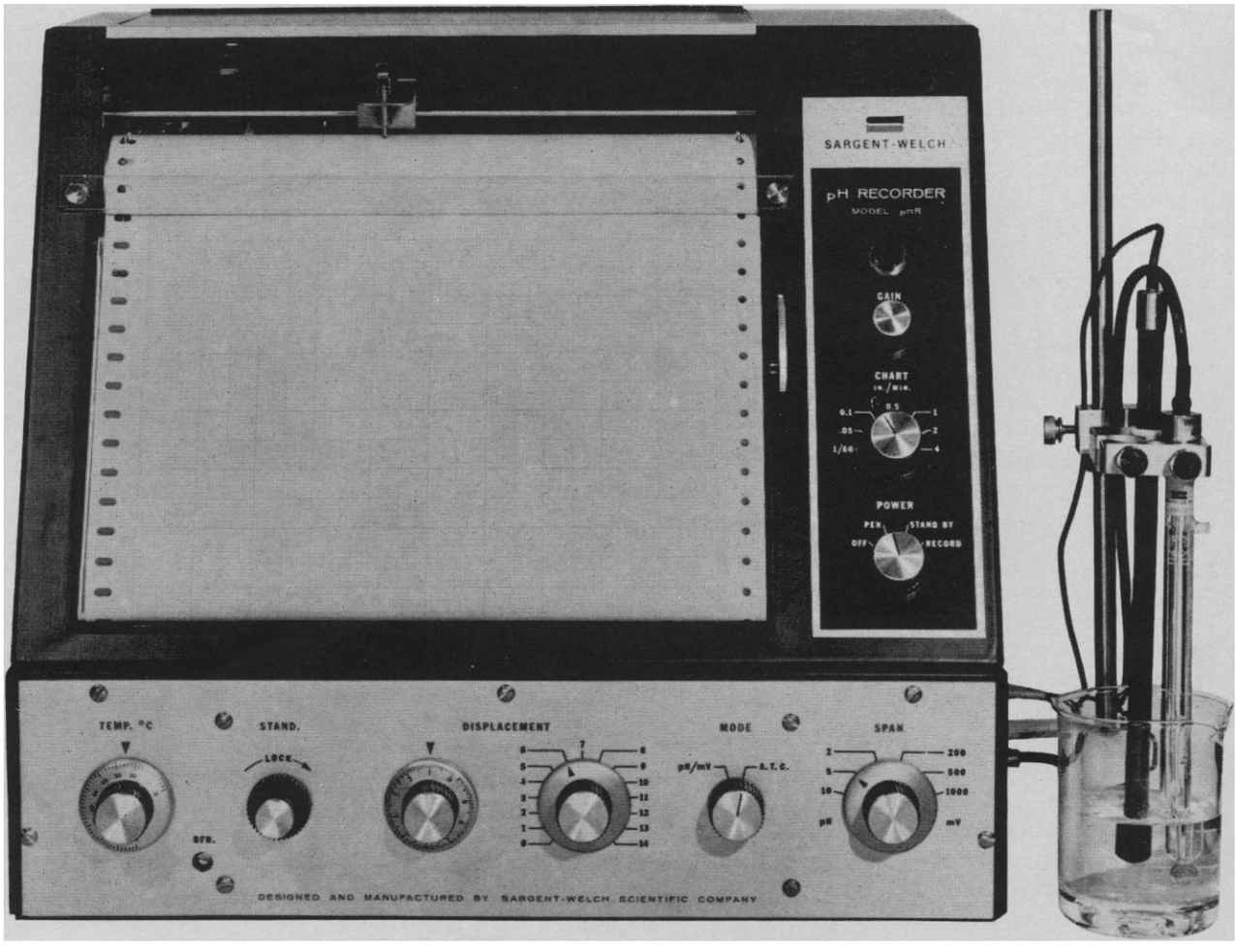

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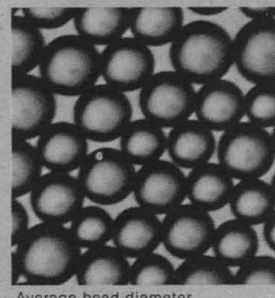

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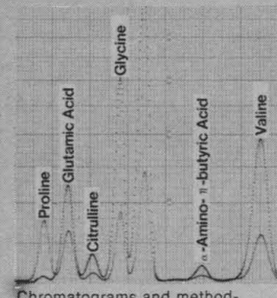

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B. Richard Siebring and Mary Ellen Schaff, both of the University of Wisconsin, Milwaukee
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Presenting modern chemistry in such a manner that average students in the terminal course will be able to understand it, the text also gives them an appreciation of both the methods and the philosophy of science. Investigations of cause-and-effect relationships in the physical world reveal certain patterns among its phenomena and the authors attempt in their work to communicate the value of science in bringing about these insights. And by the same authors:

SUPPLEMENTARY EXERCISES TO ACCOMPANY CHEMISTRY: A BASIC APPROACH,
1972, 156 pages, (057352-2), $2.95

IONS IN AQUEOUS SYSTEMS

Therald Moeller, Arizona State University, and Rod O'Connor, University of Arizona
1972, 367 pages, (042647-3), $6.50

This text introduces the student to equilibrium reactions in aqueous solutions through a detailed study of the behaviors of representative anions and cations under diverse conditions. The first section provides a rigorous, modern treatment of subjects of major theoretical importance and parallels the second section, containing a pertinent set of laboratory exercises. Simultaneous assignments from both sections maximize integration of observed phenomena and theoretical constructs.

ENZYME KENETICS

Kent Plowman, Virginia Polytechnic Institute/***McGraw-Hill Series in Advanced Chemistry***
1972, 171 pages, (050347-8), $9.95

A clear, simple, step-by-step development of theoretical concepts in enzyme kinetics, this book demonstrates the relationships between various rate equations, allowing the reader to predict kinetic patterns by inspection of the mechanism and to understand these predictions in terms of rate equations.

ELECTRON SPIN RESONANCE

John E. Wertz, University of Minnesota, and James R. Bolton, University of Western Ontario, London, Canada/***McGraw-Hill Series in Advanced Chemistry***
1972, 480 pages, (069454-0), $22.50

Uniquely self-contained and providing very detailed presentations, this book enables even the reader unfamiliar with the field to analyze and interpret a variety of spectra for himself. An abundance of practical problems—even in the appendices—enables the reader to test his understanding and acquire some proficiency in interpretation. A large body of supplementary material on mathematical techniques and elementary quantum mechanics is covered in separate appendices.

INTRODUCTORY EXPERIMENTAL CHEMISTRY

Lavier J. Lokke and William B. Sulzbach, both of San Diego Mesa College
1971, 224 pages, (038600-5), $4.95

Written for students with no high school chemistry or those who need to refresh their background before taking the traditional freshman course, this text incorporates a variety of techniques for use in the laboratory and for the manipulation of data. In addition to explanations of various mathematical techniques, the authors have provided pre-experiment exercises to familiarize the student with the necessary methods and vocabulary.

TOWARD A GENERAL SCIENCE OF VIABLE SYSTEMS

Arthur Iberall, President and Chief Scientist, General Technical Services, Inc.
1972, 414 pages, (031672-4), $14.50

Provides, in one text, an introduction to a science that attempts to unify man's understanding of the operation of all autonomous viable systems whether natural, organic, or man-made. This essentially new subject is developed against a background of physical principles. It assumes a natural law philosophy, based largely on 19th and 20th century physics and logic.

CONTEMPORARY PHYSICS: An Introduction for the Nonscientist

Jerome Pine, California Institute of Technology
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Alpheus W. Smith, and John N. Cooper, U.S. Naval Postgraduate School
1972, 674 pages (tent.), (058631-4), $11.95 (tent.)

Designed for students having a broad range of technological and professional interests but lacking calculus. Extensive treatment of classical physics and ten chapters of modern physics provide these students with a thorough introduction to the fundamental laws and concepts of the field, while emphasizing applications in such fields as medicine, biology, and engineering.

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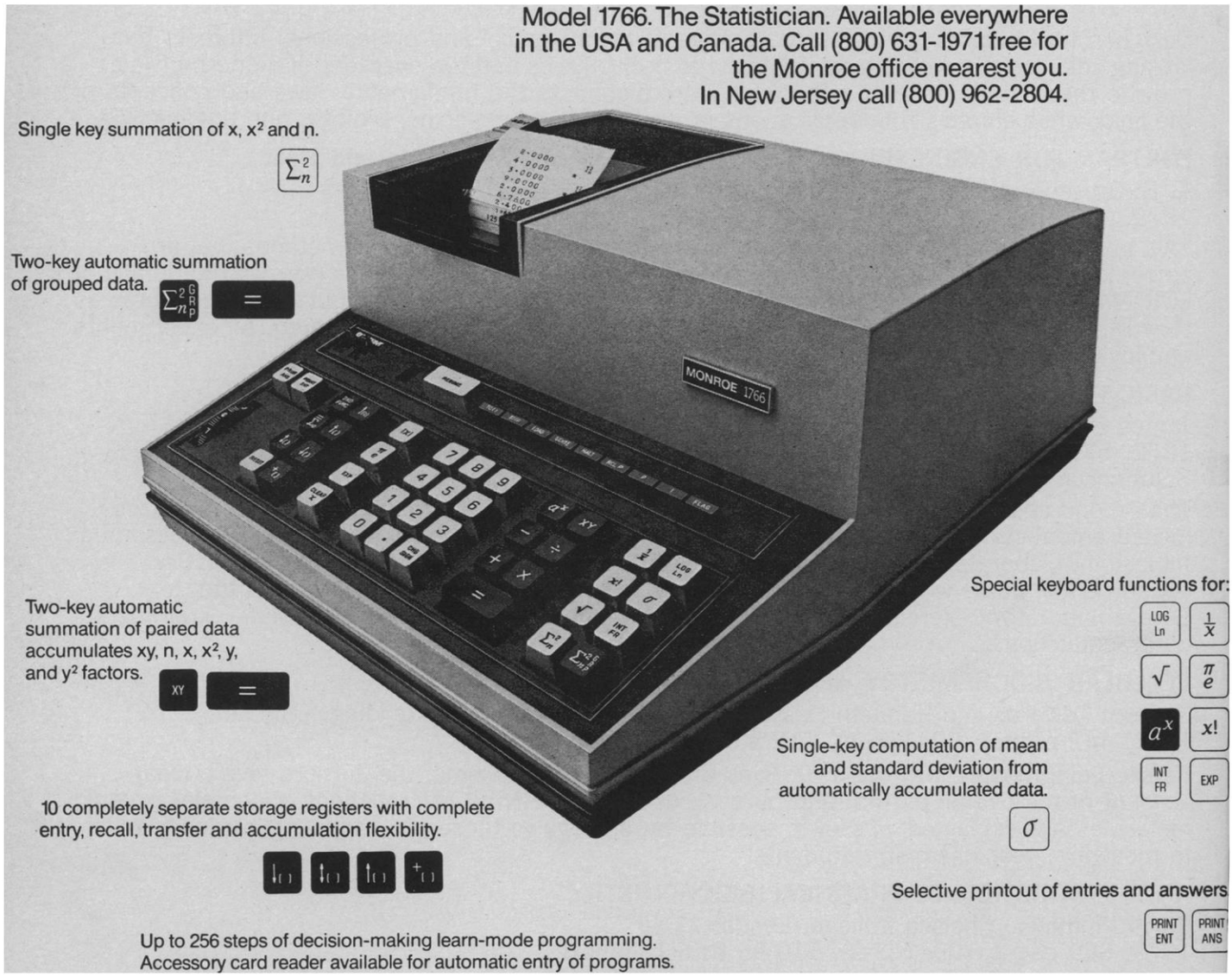

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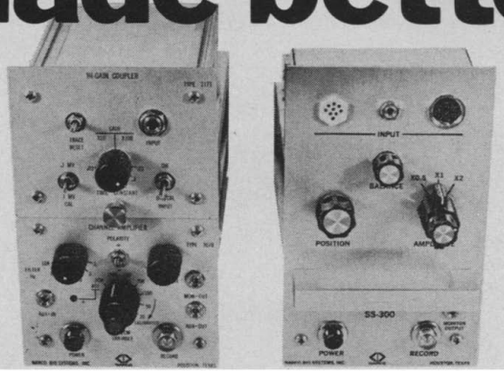

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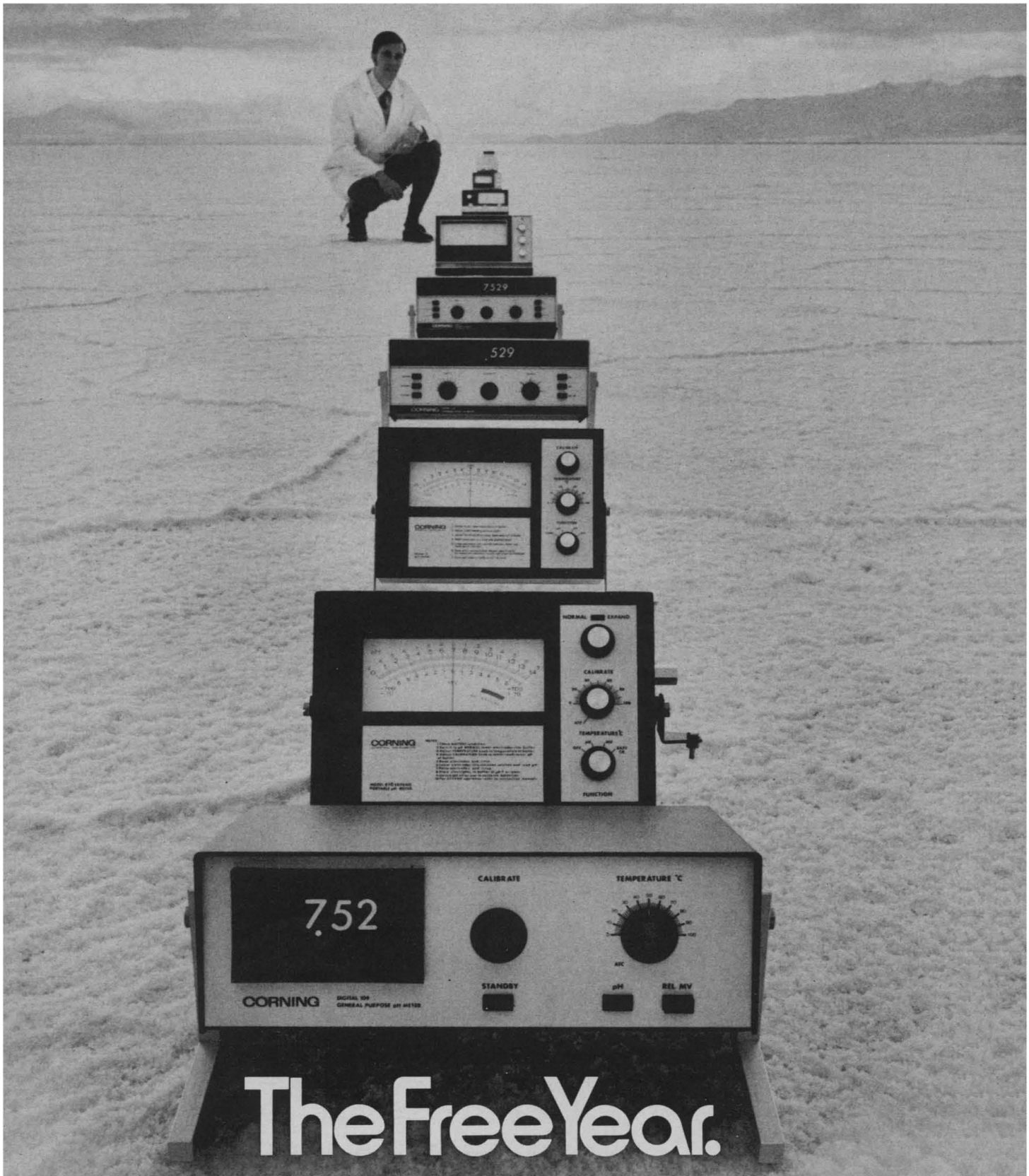

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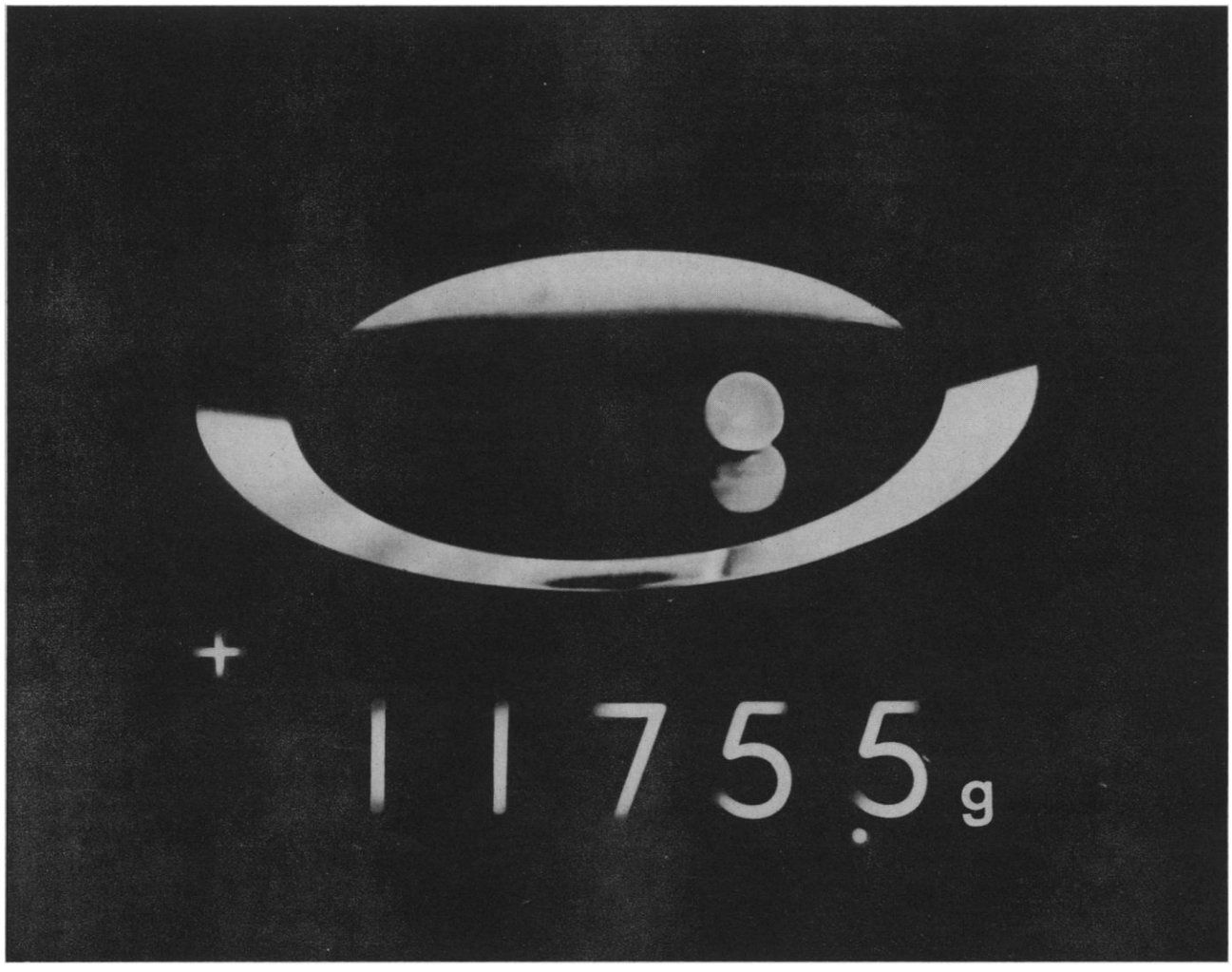

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We now come to the question of why pension plans do not pay their accumulated funds to retirees in a single sum. The main reason corporations and institutions throughout the country—whether commercial or nonprofit, public or private—do not make lump-sum settlements of accumulated benefits upon retirement is the conviction that their pension obligation to a retired employee lasts as long as the employee does, and that their pension plan must therefore pay the maximum possible *lifetime* income—an income that retired employees cannot outlive or lose through poor investments or incapacity in old age.

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Reference

1. *Standard and Poor's Trade and Securities Statistics, Security Price Index Record* (Standard and Poor, New York, 1970), pp. 167–184; *Standard and Poor's Trade and Securities Statistics, Security and Price Index Record, Current Statistics Supplement* (Standard and Poor, New York, Jan. 1972), pp. 50–51.

Ph.D.'s with Husbands

Susan M. Ervin-Tripp (Letters, 24 Dec., p. 1281) describes a recipe for determining whether the hiring of Ph.D.'s discriminates against women: ". . . multiply by .91 [the percentage of women with doctorates working in the last decade . . .] the percentage of Ph.D.'s that were given to women scientists in the top five departments in each field. . . ." Unless an institution or department has the resulting percentage of women at each rank it doesn't qualify as discrimination-free.

This hypothesis has much to recommend it, and Ervin-Tripp in all likelihood has stated a suitable zeroth-order approximation to the problem. Unfortunately she has neglected several first and second order corrections that may be comparable in magnitude to the term she cites. Her proposal actually gives an upper bound which may be several times larger than a true nondiscriminatory level of employment and which might mislead some into practices that discriminate seriously against men.

The corrections are necessary because Ervin-Tripp makes the implicit assumption that for the purposes of employment the mobility of women is identical to that of men. This may be reasonably valid for unmarried women. However, marriage places a constraint on the mobility of both men and women and limits their joint opportunities for careers, the limitation being more severe if they elect to live in a small, nondiversified community. For the sake of simplifying the analysis, let us divide the married women into two fractions, f_l and f_e, liberated and enslaved, depending on whether the woman or her husband determines where they both live.

In these terms, the percentage calculated by Ervin-Tripp's formula should be multiplied by the quantity

$$Q = [F_u + F_m (f_l + f_e P_h)] \quad (1)$$

in which F_u and F_m are the fractions of women with Ph.D.'s who are unmarried and married. The quantity P_h is the probability of an enslaved, married woman Ph.D. having a husband whose work takes them to a community that has an academic position suitable to her talents.

Insofar as I know, there have been no very detailed studies of what governs P_h, or of its impact upon the employment of women Ph.D.'s. However, for those in a large metropolitan area one would expect P_h to be larger than for a smaller, college-dominated town. My limited experience with employment of women Ph.D.'s on our faculty and with the placement of our own graduates leads me to believe that the effective value of P_h for an institution and community such as ours may be as small as $\frac{1}{5}$ in some disciplines. In Eq. 1, F_u and f_l are substantially less than $\frac{1}{4}$, so to a good approximation, $Q \simeq P_h$. Therefore, the Ervin-Tripp approach overestimates the nondiscriminatory level of academic employment of women Ph.D.'s by the factor $1/P_h$, which may be severalfold.

H. S. GUTOWSKY
School of Chemical Sciences, University of Illinois at Champaign, Urbana 61801

Special Virus Cancer Program

Nicholas Wade's report on the Special Virus Cancer Program (SVCP) at the National Cancer Institute (News and Comment, 24 Dec., p. 1306) needed to be written, was well researched, and represents a good overview. However, I reject criticism by "a virologist acquainted with NIH affairs," "a virologist under contract to the SVCP," "academic scien-

tists," "one well-known virologist," "many outside scientists," "a prominent critic of the SVCP," and other assorted virologists. I am distressed that so many of my colleagues are apprehensive about expressing their views. *Science* should thoroughly investigate and document this "fear." It may represent a problem of far greater significance than the SVCP and administrative aspects of science.

I share a number of the criticisms of the SVCP, but what is "worthless junk" to some represents an important attempt to others. For example, who was prepared some years ago to discount the possibility that material from human cancer patients might produce neoplasms in subhuman primates? This expensive undertaking was a failure, but even the nonelegant attempt represented an important extension of knowledge. The theater-like press conference to announce scientific findings and the concentration of large amounts of money in the hands of a few are certainly areas where constructive criticism by knowledgeable scientists may influence future events in a positive manner. However, the former is not restricted to scientists connected with the SVCP.

We should strive for high standards and maintain a posture that allows constructive criticism. I would urge my "hidden" scientific colleagues not to be so fearful. Some of us are friends.

FRED RAPP

Department of Microbiology, College of Medicine, Milton S. Hershey Medical Center, Pennsylvania State University, Hershey 17033

Wade's report on the SVCP is a poor example of scientific reporting on two grounds: extensive quotations of anonymous opinions and lack of objectivity.

It is inadmissible for a serious journal to accept the statements of scientists who, hiding behind anonymity, publicly express severe judgments toward their colleagues. Anonymous statements tend to be irresponsible; they cannot be evaluated by the public, who do not know how qualified the "eminent virologist" or the "distinguished cancer researcher" are. The lack of objectivity is evident in Wade's failure to report more favorable opinions and to compare the scientific output of the SVCP with other programs.

RENATO DULBECCO

Salk Institute, San Diego, California 92112

. . . any scientist who expresses his opinions of a particular program should not be ashamed or afraid to have his name

published. If a particular scientist does not feel sufficiently competent in his research and is afraid criticism of the SVCP would affect his grant or the renewal of his contract, then he should honestly reply "No comment" to the interviewer's questions. However, if a scientist who is doing competent research and whose work is esteemed by others, were to have his research funds canceled by the National Cancer Institute (NCI) because he expressed his views, he would have an extremely good case in the scientific community for action against the NCI and the SVCP program. Grant programs have contributed greatly to cancer research but have not yet found the solutions. As urgent as the cancer problem is, other approaches are necessary to obtain rapid answers; the contract system is one such means. Under such a system, there will be deficiencies and duplications of effort in certain areas. This also occurs with grants, but I feel there is more sharing of ideas and more cooperation among contractees than there is among grantees.

J. EARLE OFFICER
Department of Pathology,
School of Medicine,
University of Southern California,
Los Angeles 90033

Accelerator at Argonne

In her report "High energy physics . . ." (News and Comment, 3 Sept., p. 897), Deborah Shapley suggests that the 12.5-Gev zero gradient proton synchrotron (ZGS) at the Argonne National Laboratory could be in line to be shut down. The arguments leading to that conclusion are derived from inadequate information and place the ZGS in an unfavorable light.

The highly competitive research program at the ZGS operates with the strong participation of university-based research teams. From the point of view of the Argonne Universities Association, which represents 30 major universities and is responsible for formulating, reviewing, and approving Argonne's policies and programs, the program is an excellent example of successful university participation in research at Argonne. Some 400 high energy physicists, mainly from midwestern universities, are actively participating in the ZGS program. In 1970, 20 experiments were completed at the ZGS, and 60 scientific papers were published based on the data taken in these or in previous experiments at the ZGS.

A severe shortage of funds has resulted in a substantial decrease in the operating budget of the ZGS for the past 4 years. As a result, the pace of research has had to be slowed, despite continuous pressure from ZGS users for more accelerator time. A steady flow of new proposals for topical experiments is received by the ZGS Program Committee. The schedule of approved experiments is crowded, and an 18-month backlog now exists.

Shapley reports that the phrase "useful but older" was used to describe several accelerators, including the ZGS. This epithet misses the mark widely in the case of ZGS, which has been in operation for only 8 years. No other accelerator has exceeded the ZGS in the simultaneous operation of many experiments. Beam handling and detector facilities at the ZGS are modern, and every known elementary particle can be produced. An ingenious, new, and far-reaching program to improve internal beam intensity is now well under way. Shapley does not mention the development at the ZGS of the largest bubble chamber in the world—12 feet in diameter; the unmatched pioneering work in the application of superconductivity to high energy physics research; and the exceptional versatility and cost-effectiveness of the accelerator, which allow many experiments to provide data simultaneously.

The ZGS and its related research program are making unique contributions to physics at the present time and give every promise of doing so for many years.

PHILIP N. POWERS
Argonne Universities Association,
535 North Michigan Avenue,
Chicago, Illinois 60611

Shapley reviews the serious problems now facing the national high energy physics program and performs a service in pointing out the need for new, more comprehensive procedures to assess priorities in science funding. However, we believe the opinions expressed in her report do not accurately represent the current feeling among high energy physicists. Although the laboratory administrators interviewed by Shapley are highly respected individuals within the field, a more balanced sampling of the entire high energy physics community would have been desirable. Unfortunately, the opinions of the many university physicists who have a

vital interest in the operation of the high energy accelerators were not represented.

We are also distressed at the manner in which Shapley identifies the ZGS as the accelerator least likely to continue in operation. She makes no mention of the many reasons why the ZGS is important to the nation's high energy physics program and should therefore continue to operate.

The energy range that is accessible for study at the ZGS—from low energies up to 12.5 Gev—is an extremely complex and interesting region in the study of particle physics. Resonance phenomena dominate the lower portion of this energy region and there is good reason to believe that smooth high energy characteristics are dominant in the higher portion. Because the transition from low energy to high energy behavior may well occur in this range, this region is very likely to be the proving ground for many new theoretical ideas. Experiments at the ZGS continue to play an important role in this respect and in the future could play a crucial role in the further development of our understanding of the strong interactions. Energies of a few Gev are also ideal for answering many of the completely unsettled questions that relate to weak decay proceses.

Because of the high demand for the continued use of the ZGS for high energy physics research, diversification of the accelerator program has never been seriously considered. Accelerator and apparatus development at Argonne have been sharply focused on enhancing the performance of the machine as a high energy physics accelerator. A program is also in progress to exploit those features of the ZGS which uniquely suit it for the acceleration of polarized protons, a capability which promises to open up an exciting new area for research in high energy physics.

The shutdown of any of the AEC's five major operating high energy accelerators would be an extremely serious event. Each of these accelerators has contributed substantially to progress in high energy physics in the last decade, and none of them is close to the end of its productive life. An exciting weak interactions experiment was done at the Berkeley Bevatron last year, and a pioneering experiment on neutrino nucleon interactions in hydrogen is now in operation at the ZGS.

No accelerator should be shut down until all conceivable attempts to ob-

tain adequate funds have failed and all possible alternatives have been eliminated. Those responsible for making such a determination should do so in a careful and considered manner, mindful of the profound impact this action can have on the future of high energy physics in this country.

THOMAS H. GROVES
Argonne National Laboratory, Argonne, Illinois 60439
HOMER A. NEAL
Department of Physics, Indiana University, Bloomington 47401
THOMAS A. ROMANOWSKI
Argonne National Laboratory and *Department of Physics, Ohio State University, Columbus 43210*

Open Admissions

As a supporter of the view that the implementation of open admissions programs in higher education is essential to the survival of our civilization, I think Bazell's report (News and Comment, 7 Jan., p. 38) fails to present a balanced appraisal of the problems and social benefits of this program at the City College of New York (CCNY). He does not present the students' perceptions of this program and places undue weight on the anxieties and frustrations of the faculty members who are resisting change in the educational processes, and in the philosophy and content of their courses, that must come with open admissions.

One cannot help asking how many students have entered CCNY under open admissions, and how many of these are Blacks and Puerto Ricans. Furthermore, in view of the crunch, to what extent has the composition of the CCNY faculty changed, and how much has the current faculty reeducated itself about the philosophical and educational requirements that we face today? In order to move toward achieving the goals of higher education, CCNY, like all universities and colleges in this country, needs a public policy of commitment of dollars to back up change through bold experimentation and research in teaching and learning. In this respect, the federal and state governments have the obligation, not just to bail out, but to infuse new life into higher education.

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*Counting efficiency determined on Nuclear-Chicago Mark II Liquid Scintillation Counter, Model 6844 at 12.5° C.

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10 March 1972, Volume 175, Number 4026 **SCIENCE**

CACTAL: Cooperation for Progress

The specialized Conference on the Application of Science and Technology to the Development of Latin America (CACTAL) will be held in Brasilia from 12 to 19 May 1972.

This government-level conference conducted by the Organization of American States results from a decision made at the First Regular Session of the OAS General Assembly (June and July 1970) and reflects the spirit of the "consensus of Viña del Mar" (May 1969). It will include representatives of the 23 member nations as well as a number of invited observers, and will bring together representatives of government and the economy from the several Latin American countries and persons of high-level technical competence from throughout the hemisphere. It will also provide an opportunity for members of the scientific and technological community to confer with members of other professional communities—social, political, industrial, and financial.

The focus of CACTAL, unlike that of earlier conferences, will be upon national and regional needs as they translate into scientific and technological requirements for effective ameliorative action. Its point of view will be that of the consumer rather than of the producer of science and technology. The major emphasis will be on concrete opportunities for the uses of science and technology and the strategies that will make such uses a reality. The agenda will deal with what C. P. Snow has called the primal things—years of life, freedom from hunger, survival for children—and those instrumentalities (better nutrition, health-care delivery, housing, education, and physical and social surroundings) needed to help ensure the primal things and make the difference between surviving and living. It not only will include a consideration of currently available technologies but will give attention to the creation of new technologies, the complex problems of scientific manpower and training, methods for more effective dissemination of scientific and technological information, the essential questions of finance in regard to technological development, and the evolution of new mechanisms of public policy.

The immediate goal of CACTAL is a final report that will identify ways in which OAS efforts in science and technology will aid in the realization of Latin American social and economic goals, and that will provide guidelines both for the cooperation of governments with international and regional organizations and for the involvement of private industry, labor and—to use Greenough's phrase—the Independent Sector: universities, foundations, and other philanthropic institutions. One may hope for a long-needed comprehensive inventory of scientific and technological resources. One would urge consideration of the implications of shifting industrial patterns from goods- to service-producing employment and the inevitable trade-off between the toward and the untoward consequences of technology.

Apart from the formal policy recommendations, the most important achievement of the conference could be the detailed national studies prepared at the request of the conference planners, along with keener appreciation of the importance of systematic planning in matters involving science and technology. In addition, personal associations between scientists and nonscientists which facilitate communication across national, institutional, and professional boundaries will have been established to the end of greater and more rapid social and economic progress.

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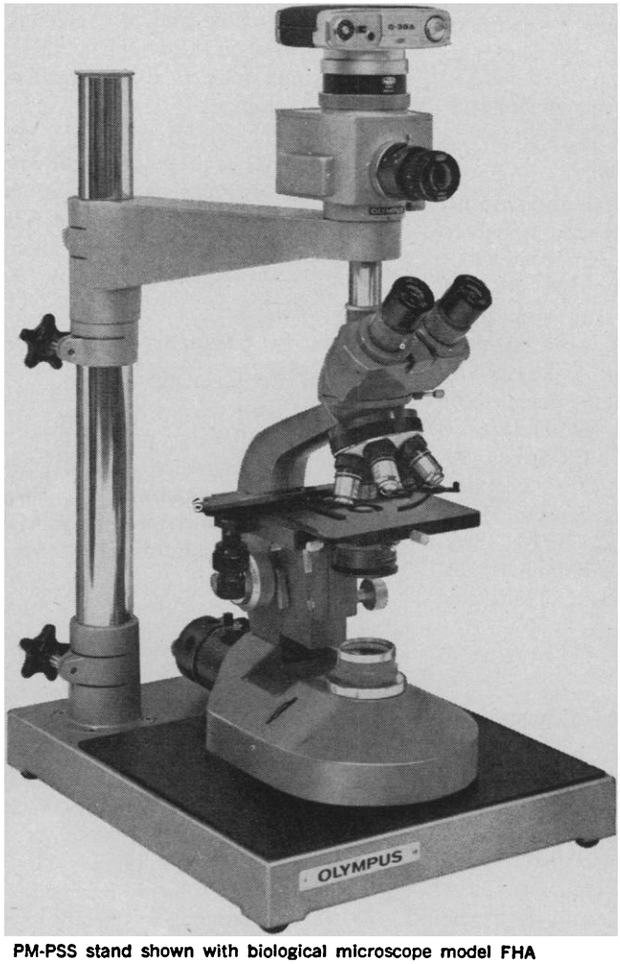

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2. Winer, A.D., J. Biol. chem., **239**, PC 3598 (1964)

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Structural Macromolecules: Collagen

(Kimball Union Academy)

Russell Ross, chairman; Darwin Prockop, co-chairman.

17 July. Chemistry and structure of collagen (Klaus Kuhn, discussion leader); Crosslinks in collagen (Paul Gallop, discussion leader).

18 July. Molecular packing of collagen (Andrew Miller, Art Veis, discussion leaders); Collagen biosynthesis-enzymatic steps (Darwin Prockop, discussion leader).

19 July. Collagen biosynthesis—intermediate forms (P. Bornstein, discussion leader); Elastic fibers (Russell Ross, discussion leader).

20 July. Biological role of connective tissue in development and morphogenesis (Robert Trelstad, discussion leader); Degradation and turnover of collagen (Art Eisen, John Harper, discussion leaders).

21 July. Pathophysiology of connective tissue (Ted Harris, discussion leader).

Chemistry and Biology of Tetrapyrroles

(Wayland Academy)

Lyonel G. Israels, chairman; June Lascelles, vice chairman.

7 August. Pyrrole chemistry: D. Mauzerall, D. Dolphin, P. George, C. Weiss. ALA and PGB biosynthesis: D. Shemin, S. Granick, D. Doyle, G. Kikuchi.

8 August. Heme biosynthesis: L. Bogorad, B. Frydman, E. Levin, U. Meyer. Porphyia—experimental and clinical: C. J. Watson, A. Kappas, G. Marks, G. Sweeney.

9 August. Mitochondrial and microsomal heme proteins: R. Estabrook, D. Wilson, E. Margoliash. Iron transport: B. Burnham, N. Brot, G. A. Snow.

10 August. Control of globin synthesis by tetrapyrroles: M. Rabinowitz, E. Herbert, T. Hunt, S. Wainwright. Bile pigment chemistry: R. Troxler, A. Bennet, A. Jackson, H. Jansen.

11 August. Bile pigment metabolism. R. Schmid, A. McDonagh, J. D. Ostrow.

Textiles: Fibrous Materials

(Wayland Academy)

Arnold M. Sookne, chairman; Harry R. Billica, vice chairman.

3 July. W. O. Statton, "Setting of polyamides and polyesters"; L. R. Rebenfeld, "Response of fibers to nonreactive chemical environments."

4 July. Ralph McGregor, "Sorption equilibria in ionic dyeing systems"; Max Feughelman, "Mechanical hysteresis of wool fibers and its relationship to molecular structure."

5 July. N. R. S. Hollies, "Roles of moisture and surface properties in the comfort of clothing"; H. R. Billica, "Fabric appearance factors."

6 July. P. Grosberg, "Relationships between structure and other properties of woven compared with knitted fabrics"; R. H. Butler, G. E. R. Lamb and D. C. Prevorsek, "The influence of fiber properties on the wrinkling behavior of fabrics."

7 July. J. W. S. Hearle and A. R. Bunsell, "Fatigue of textile fibers."

Thin Films

(Kimball Union Academy)

John B. Hudson, chairman; Helmut Poppa, vice chairman.

The Film—Substrate Interface

21 August. (T. E. Hutchinson, discussion leader): J. R. Schrieffer, "Physical and chemical nature of bonds at interfaces"; R. A. Hoffman, "Nature and origin of stresses at interfaces." (P. A. Tick, discussion leader): B. Perrson, "Equilibrium configuration of polyatomic clusters on surfaces."

22 August. (H. Poppa, discussion leader): A. K. Green, "The influence of defects and impurities on the nucleation and growth of oriented films by evaporation"; H. F. Winters, "The influence of surface properties on the characteristics of reactively sputtered films." (J. B. Hudson, discussion leader): A. Y. Cho, "Electrical properties of molecular beam apitaxial GaAs and the effect of the film-substrate interface."

23 August. (R. A. Hoffman, discussion leader): D. L. Feucht, "Formation and properties of thin, vapor-grown layers of Ge on GaAs and GaAs on Ge"; P. J. Besser, "Stress and strain in heteroepitaxial magnetic oxide films." (J. F. Freedman, discussion leader): P. Chaudhari, "Stress relief in thin films."

24 August. (A. Yelon, discussion leader): E. Kooi, "The Si-SiO_2 interface"; H. Juretschke, "Conduction electron scattering at charged metal-insulator interfaces." (R. B. Marcus, discussion leader): C. A. Mead,

"Fundamental limitations of microelectronic devices."

25 August. (F. A. Mayadas, discussion leader): D. F. Barbe, "The determination of the density of states in thin films by small signal capacitance-conductance measurements on metal-insulator-semiconductor structures"; J. E. Goell and R. M. Standley, "Integrated optical circuits—the interface problem."

Toxicology and Safety Evaluations

(Kimball Union Academy)

Leon Golberg, chairman; Harold C. Grice, vice chairman.

31 July. Subcellular organelles in toxicology (James W. Newberne, discussion leader): A. C. Allison, "The significance of the lysosome in toxicology"; Rajender Abraham, "New directions in lysosome research." (Harold M. Peck, discussion leader): Harry V. Gelboin, "The role of aryl hydrocarbon hydroxylase in polycyclic hydrocarbon toxicity and carcinogenesis."

1 August. Carcinogenesis and mutagenesis (William D'Aguanno, discussion leader): Charles Heidelberger, "Cell culture tests for the carcinogenic and mutagenic potential of chemicals"; William Lijinsky, "Evaluation of the safety of amines, including drugs, that might interact with nitrite in the gut." (D. J. Kilian, discussion leader): Walderico M. Generoso, "Evaluation of genetic hazards of chemicals in mice."

2 August. Sensitization to chemicals: problems and prospects (Francis N. Marzulli, discussion leader): Henry C. Maguire, "The bioassay of contact allergens in the guinea pig"; Howard I. Maibach, "Human predictive patch testing: problems and validations." (Fred H. Snyder, discussion leader): Donald L. Opdyke, "New concepts of sensitization potential." (Merrill W. Chase, principal discussant.

3 August. Adverse effects of inhaled materials (R. J. Rubin, discussion leader): Yves Alarie, "Investigation of the mechanism of sensory irritation by inhaled chemical agents"; Robert J. Stephens, "The early and long-term response of lung tissue to low levels of nitrogen dioxide and ozone." (Leon Golberg, discussion leader): Vaun A. Newill, "Critical environmental health issues of concern to the Environmental Protection Agency."

4 August. (Harold C. Grice, discussion leader): George C. Cotzias, "Susceptibility to manganese intoxication."

Physics and Chemistry of Water and Aqueous Solutions

(Holderness School)

Harold L. Friedman, chairman; George J. Safford, vice chairman.

21 August. (B. E. Conway, session chairman): M. Newton, "Energetics and configurations of $(H_2O)_n$ with proton excess or defect. Implications for proton mobility in water"; D. Irish, "Measurement of 'ultrafast' proton transfer; G. Morand, "Measurement of the hall effect in very dilute solution." (G. Walrafen, session chairman): W. A. P. Luck, "Advantages of near IR for determination of the structure of water and aqueous solutions"; J. Desnoyers, "Heat capacities of dilute electrolyte solutions."

22 August. (H. G. Hertz, session chairman): R. H. Wood, "Electrolytes in water and *N*-methylacetamide"; E. G. Finer, "Relaxation studies of hydration of polar molecules"; I. Page, "Neutron scattering from water and aqueous solutions." (H. S. Frank, session chairman): S. A. Rice, "Solid amorphous water"; A. Ben-Naim, "Hydrophobic interaction in water-alcohol mixtures."

23 August. (G. J. Safford, session chairman): C. T. Moynihan, "Electrical and mechanical relaxations in electrolyte solutions"; K. Hallenga, "The dielectric relaxation of water influenced by hydrophobic groups." (A. Narten, session chairman): W. A. Van Hook, "Solvent-isotope effects in thermodynamic excess function in aqueous solutions"; F. H. Stillinger, "Recent developments in molecular dynamics studies of models for aqueous systems."

24 August. (R. L. Kay, session chairman): K. P. Mishchenko, "Thermodynamics of electrolyte solutions in mixed aqueous-nonaqueous solvents"; I. D. Kuntz, "Hydration of proteins"; R. G. Bryant, "Nuclear magnetic resonance of water protons in protein crystals." (R. Lumry, session chairman): M. Zeidler, "Recent NMR relaxation studies in aqueous solutions."

25 August. (W. Y. Wen, session chairman): R. Pottel, "Dielectric relaxation in aqueous systems of biological interest"; J. Muenter, "Spectra and properties of water dimers in gas phase."

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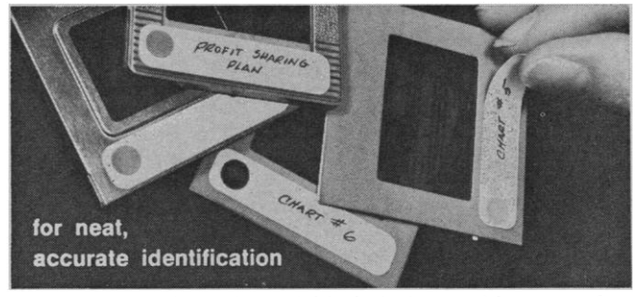

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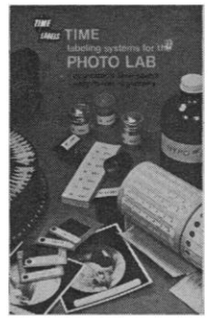

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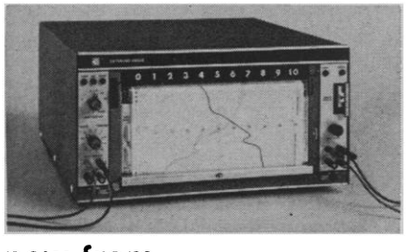

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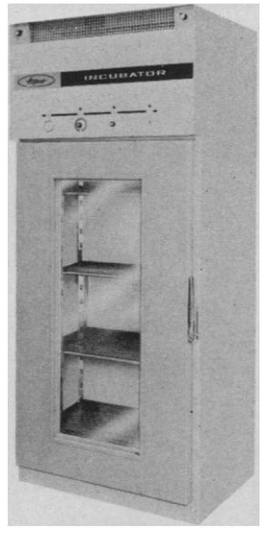

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BOOKS RECEIVED

(Continued from page 1102)

demic Press, New York, 1971. x, 284 pp., illus. $14.50.

Cours de Mathématiques. Vol. 3, Topologie, Intégration, Distributions, Équations Intégrales, Analyse Harmonique. J. Bass. Masson, Paris, 1971. 406 pp., illus. 64 F.

Critical Phenomena in Alloys, Magnets, and Superconductors. A colloquium, Geneva and Gstaad, Switzerland, Sept. 1970. Roger E. Mills, Edgar Ascher, and Robert I. Jaffee, Eds. McGraw-Hill, New York, 1972. xxxiv, 662 pp., illus. $48.50. McGraw-Hill Series in Materials Science and Engineering.

Current Topics in Developmental Biology. Vol. 6. A. A. Moscona and Alberto Monroy, Eds. Academic Press, New York, 1971. xx, 234 pp., illus. $14.50.

Data Processing Systems Design. Case Studies from the Application of Computers to Business. H. D. Clifton, Auerbach, Princeton, N.J., 1971. xviii, 152 pp., illus. Cloth, $9.95; paper, $6.

Dating Techniques for the Archaeologist. Henry N. Michael and Elizabeth K. Ralph. Eds. M.I.T. Press, Cambridge, Mass., 1971. xii, 228 pp., illus. $12.50.

Delinquency and Crime. A Biopsychcsocial Approach. Empirical, Theoretical, and Practical Aspects of Criminal Behavior. Juan B. Cortés and Florence M. Gatti. Seminar Press, New York, 1972. xii, 468 pp., illus. $14.50.

The Experimental Biology of Brain Tumors. Wolff M. Kirsch, Enrica Grossi-Paoletti, and Pietro Paoletti, Eds. Thomas, Springfield, Ill., 1972. xviii, 668 pp., illus. $42.

Experimental Psychopathology. Recent Research and Theory. H. D. Kimmel, Ed. Academic Press, New York, 1971. xiv, 264 pp., illus. $12.50.

Fast Reactor Safety. John Graham. Academic Press, New York, 1971. xxii, 368 pp., illus. $18. Nuclear Science and Technology, vol. 8.

Federal Health Care. (With Reservations!) Robert L. Kane and Rosalie A. Kane. Springer, New York, 1972. xii, 180 pp., illus. $6.95.

Introduction to Properties of Materials. Daniel Rosenthal and Robert M. Asimow. Van Nostrand Reinhold, New York, ed. 2, 1971. xxvi, 534 pp., illus. $13.95. University Series in Basic Engineering.

An Introduction to the Basic Language. John E. Skelton. Holt, Rinehart, and Winston, New York, 1971. xvi, 158 pp., illus. Paper, $3.75.

Introductory Quantum Chemistry. John C. Schug. Holt, Rinehart and Winston, New York, 1972. x, 288 pp., illus. $8.

Lattice Theory. First Concepts and Distributive Lattices. George Grätzer. Freeman, San Francisco, 1971. xvi, 212 pp., illus. $9. A Series of Books in Mathematics.

Lectures on Celestial Mechanics. C. L. Siegel and J. K. Moser. Translated from the German edition (Berlin, 1956) by C. I. Kalme. Springer-Verlag, New York, 1971. xii, 292 pp., $22.60. Grundlehren der mathematischen Wissenschaften, vol. 187.

NOMINATIONS FOR AAAS OFFICE

The Committee on Nominations and Elections invites members of the Association to suggest nominees for inclusion on the fall slates for election of a new President-Elect and two new members of the Board of Directors. (Present members of the Board were listed in the 18 February issue of *Science*.) Please print your nominations on the following form and return by 15 April.

To: Executive Officer, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C. 20005

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