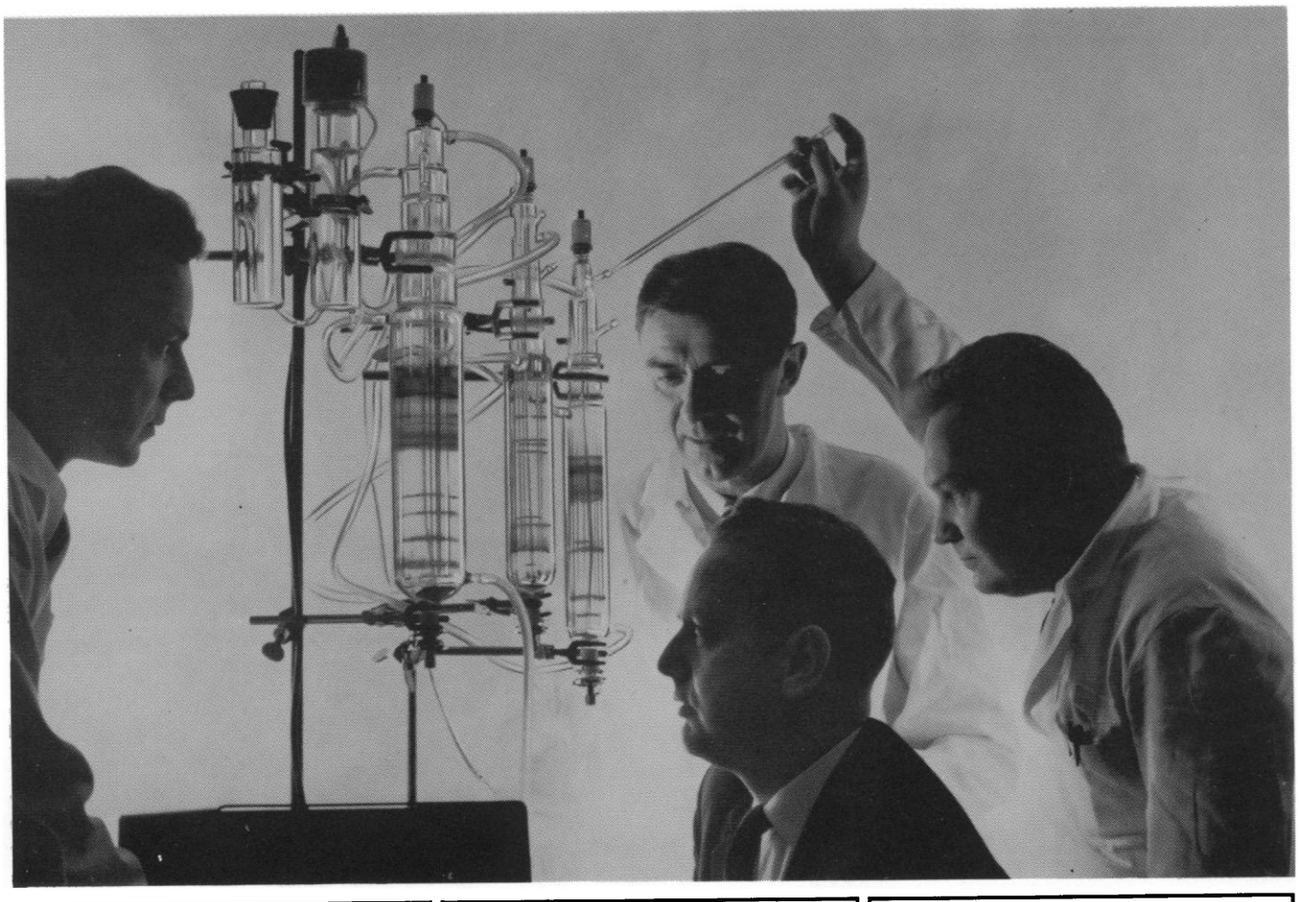
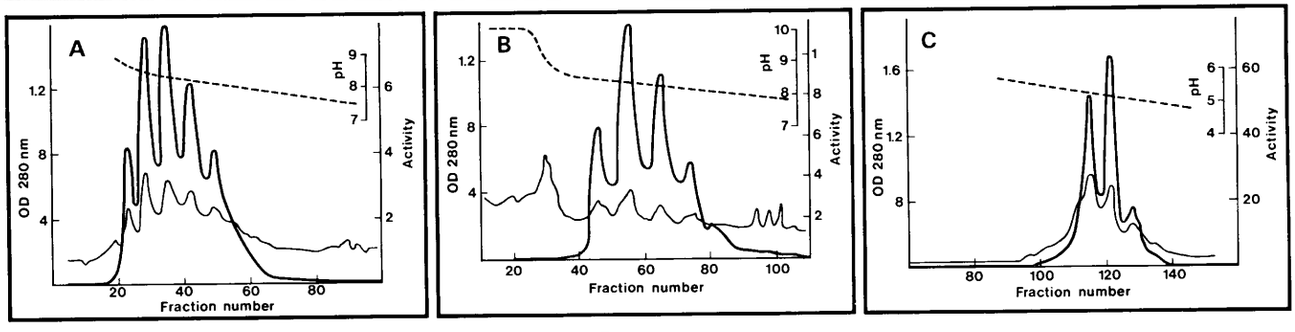
SCIENCE 12 November 1971

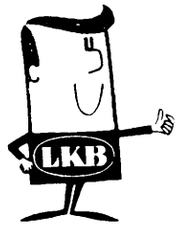
Vol 174, No. 4010

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





* *(Walter A. Susor, Marion Kochman and William J. Rutter, SCIENCE, Vol 165, pp 1260—1262, 19 Sept. 1969. Copyright 1969 by American Assn. for the Advancement of Science.)*



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Vol. 174, No. 4010

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Aerial view of the northwestern slopes and foothills of the Pico de Orizaba, (snow-capped mountain on left, 5511 meters) in Mexico. In the foreground can be seen Guadalupe Victoria, principal source of obsidian exploited by the Olmec of San Lorenzo Tenochtitlan. See page 666. [Michael D. Coe, Yale University]

Some things are changing for the better.

Many people know us as an instrument manufacturer: we make more than 2000 products for measurement, test and analysis. Others know us as a computer company: more than 10,000 own our programmable calculators and computers. We prefer to think that our business is to serve measurement, analysis and computation needs . . . in science, industry, medicine and education. This is the rationale behind every new instrument, computer or system that we tell you about in these ads. This month:

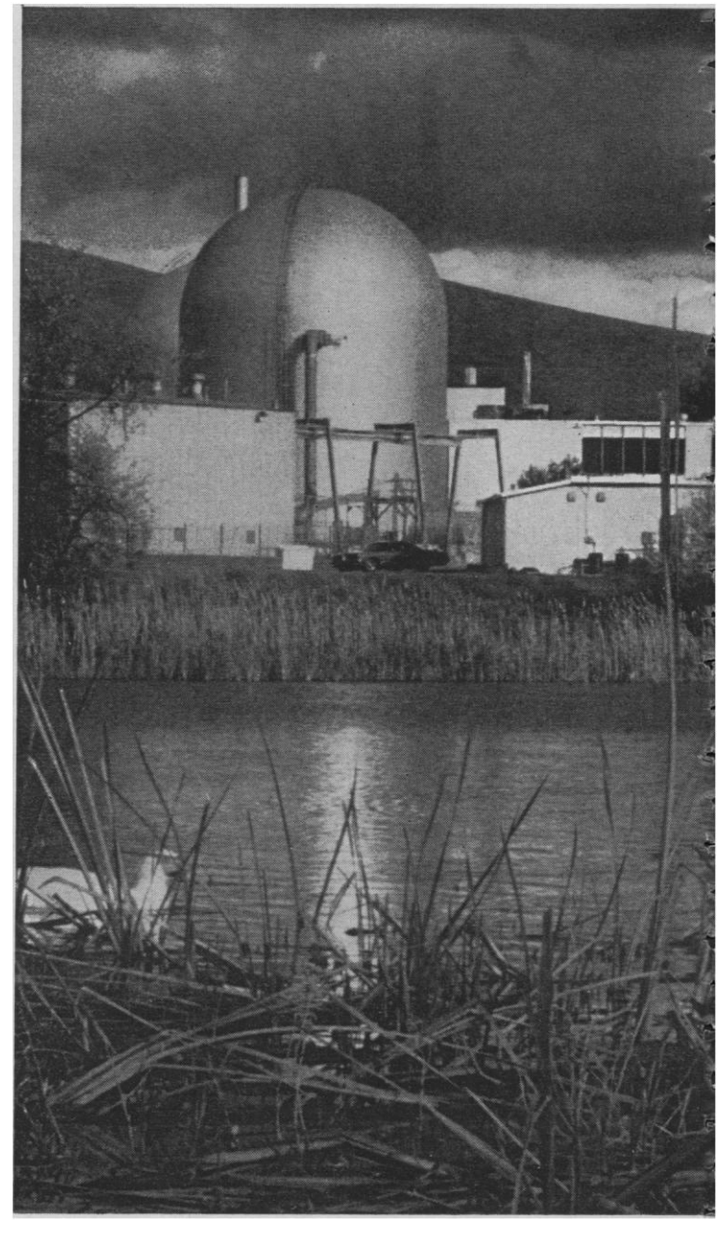
Nuclear waste assayed automatically for isotope inventories.

Of all industrial waste products, none requires more care than radioactive materials. And the assay of radioactive wastes is uncommonly time consuming and expensive.

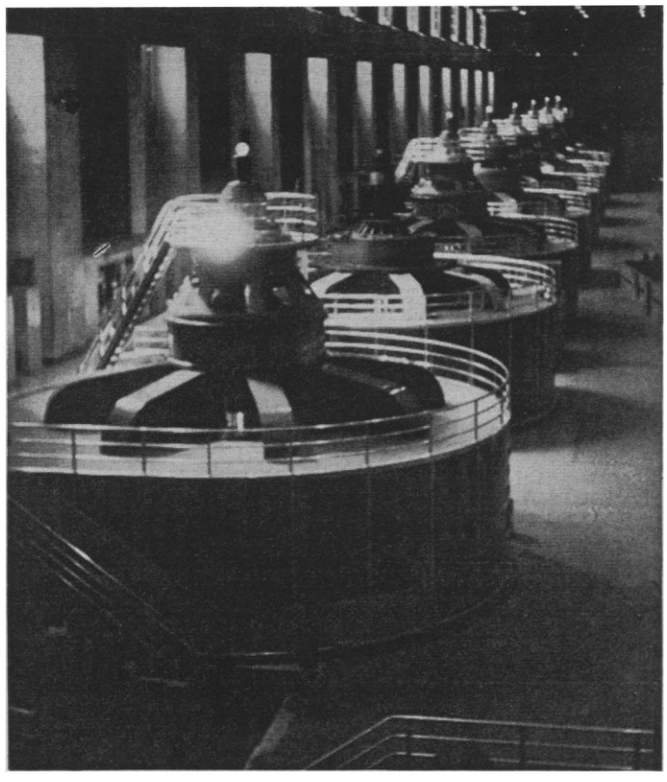
In a significant simplification of this problem, Gulf Energy and Environmental Systems, Inc. has developed a mobile automatic assay system with the help of Hewlett-Packard computerized nuclear instrumentation. Briefly, the system produces a penetrating beam of nuclear particles to induce gamma rays and measures the radioactivity without removing the material from its container. The computer analyzes the measurment, compares it with the known characteristics of nuclear materials, and automatically determines the types and quantity of isotopes present.

The Gulf system is better than previous techniques on at least two scores. Because it computerizes the intricate analysis, the system is easily operated by technicians. Results are immediate and accurate to 1%.

Similar HP nuclear measurement systems, beginning at $30,000, continuously monitor atomic power plant effluents and print out the type and amount of radioactivity. Detailed information is yours for the asking.



Pollution-free nuclear power generating plants now have added assurance they will stay that way. A Hewlett-Packard computerized measurement system helps by making a careful accounting of nuclear waste materials.



Keeping power generating equipment operating at capacity, especially during periods of peak demand, is vital. To insure against downtime, a new tool from HP can "look inside" key machinery and predict when it will need service or maintenance.

"Transformation Machine" converts fuzzy signals into sharp answers for power systems.

One user of the HP 5450 Fourier Analyzer acquired it after spending 18 frustrating months on a central computer trying to develop a method for the identification of load and machine characteristics in a power system. In his own words: "The 5450 makes practical the use of mathmatics to do things that scientists and engineers have wanted to do for 20 years. Using a central computer isn't satisfactory. It takes too long and you cannot see the results during your experiment. With the 5450 you can 'play' with the measurement signal to find out what's really going on. One session with the 5450 is worth 3 to 4 months on the central computer."

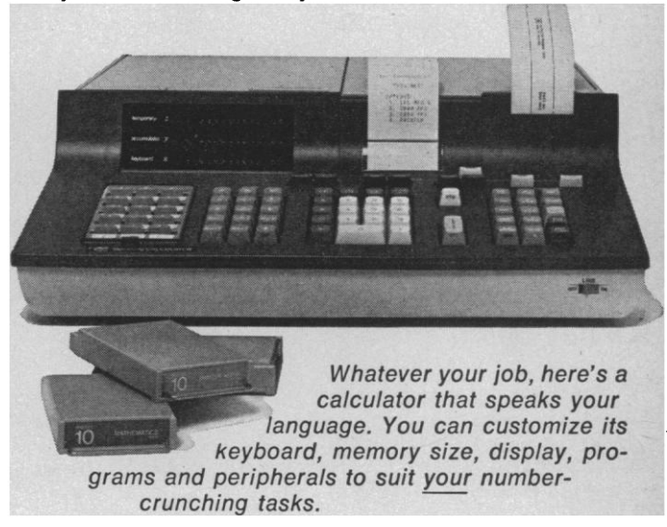
Scientists in many other fields have been confronted by measurement signals so complex that they look as useless as noise. Until recently, the best solution was to use the complex mathematics of the Fourier transform and program a computer to do the complex signal analysis computations off-line.

With the HP 5450 Fourier Analyzer, any scientist can perform these complex mathematical operations rapidly, while he's conducting his experiment. A computerized system that makes fundamental measurements of complex waveforms, the 5450 transforms signals from time to frequency domain and measures transfer function, coherence function, power spectrum and cross-power spectrum...at the touch of a keyboard. It unscrambles the waveforms into their individual frequency components and identifies the phase and amplitude of each component. The theory and use of the 5450 are described in the June 1970 issue of the HP Journal.

A design-your-own calculator: plug-in solutions to particular problems.

A user in virtually any discipline now can customize a powerful new programmable calculator to his specific computational needs.

An engineer at a utility company, for example, can use the Model 10 to design a transmission line or do a complete rate analysis. A broad spectrum of complex and tedious calculations common to the power industry now can be performed quickly and easily — often by simply entering the raw data and hitting a single key. Similarly, a chromatographer can obtain per cent concentration and relative retention time of each component on his chromatogram . . . at a single keystroke. A physicist completes a sequence of acceleration, velocity, force and work . . . and a clinical pathologist computes a full blood gas analysis . . . at a single keystroke. Et cetera.



Whatever your job, here's a calculator that speaks your language. You can customize its keyboard, memory size, display, programs and peripherals to suit your number-crunching tasks.

This is possible because the new Model 10 calculator has interchangeable function blocks which can define its keyboard to meet varying needs. One standard plug-in block emphasizes powerful statistical computations, another gives higher mathematics capability, and the third is completely user-definable. This block provides single keystroke solutions to multiple-step calculations commonly encountered by the user. Once programmed, each key performs its customized function whenever he strikes it.

For more on tailoring the $2,975 Model 10 to your particular profession (full alphanumeric printing capability, expandable memory, a wide line of peripherals, etc.) write for our brochure.

For more complete information, write Hewlett-Packard, 1507 Page Mill Road, Palo Alto, California 94304. In Europe: 1217 Meyrin-Geneva, Switzerland.

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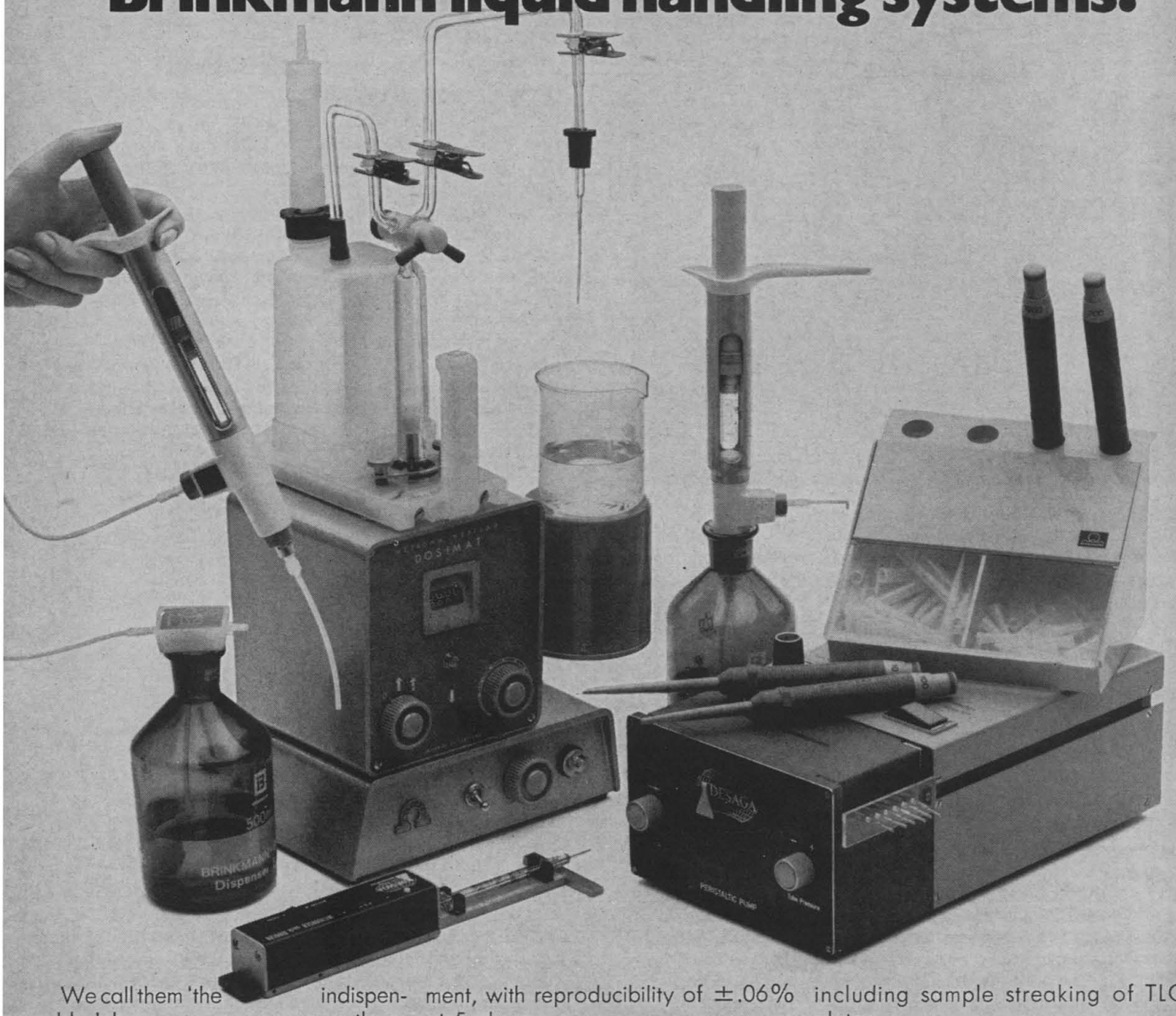

We call them 'the indispensables' because once you use them, you'll wonder how you ever managed without them.

For unbelievable ease in micropipetting with virtually 100% sample recovery, try the slim new Eppendorf® push-button Micropipets. They are now available in 13 sizes, from 5 to 1,000 µl, and precision is as fantastic as ever; less than 1% standard deviation at 10 µl. Also note the convenient new rack with two storage compartments for disposable tips.

For the versatility of on-flask *and* off-flask dispensing of liquid volumes from .05 to 15 ml, consider the Brinkmann Dispenser. Unlike most conventional dispensers, this is a precision instrument, with reproducibility of ±.06% at 5 ml.

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For administering microliter volumes of liquid at constant rates, nothing matches our Microdoser with 2-speed, battery-powered motor. It utilizes specially designed 50, 100, 250 and 500 lambda microsyringes and is ideally suited to a variety of medical, biological and pharmacological applications, including sample streaking of TLC plates.

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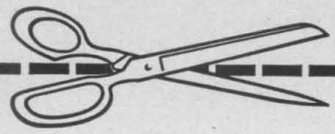

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Eastman Organic Chemicals supplies these reagents for acrylamide-gel electrophoresis:

Monomers

- Acrylamide (<0.01% acrylic acid) (EASTMAN X5521)
- N,N'-Methylene-bisacrylamide (EASTMAN 8383)

Initiators

- Ammonium Persulfate (EASTMAN 11151)
- Riboflavin (EASTMAN 5181)
- N,N,N',N'-Tetramethyl-ethylenediamine (EASTMAN 8178)

Stains

- 8-Anilino-1-naphthalenesulfonic Acid (EASTMAN P10296)
- 8-Anilino-1-naphthalenesulfonic Acid Magnesium Salt (EASTMAN 10990)
- Bromophenol Blue (EASTMAN 752)
- "Stains-All" (EASTMAN 2718)
- Methylene Blue (EASTMAN C573)
- Naphthol Blue Black (Amido Schwartz 10B) (EASTMAN 9763)

Buffer Components

- Acetic Acid (EASTMAN 13001)
- 2-Amino-2-(hydroxymethyl)-1,3-propanediol (99.5+%) (Tris Buffer) (EASTMAN 4833)
- Boric Acid (EASTMAN P1064)
- Citric Acid (EASTMAN 588)
- 2,4-Dinitroso-1,3-naphthalenediol (EASTMAN 9503)
- Formamide (EASTMAN 565)
- Glycine (EASTMAN 445)
- Sodium Acetate (EASTMAN T227)
- Sucrose (EASTMAN 11155)

Some of these are basic necessities, some are unique. For example, 8-Anilino-1-naphthalenesulfonic Acid Magnesium Salt (EASTMAN 10990) rapidly binds with proteins at neutral pH to produce a yellow fluorescence. Protein denaturation is minimal, since strongly acid conditions are not necessary for visualization. Therefore, the method can be used for preparative electrophoresis, where further study of the purified proteins is desirable. [*Anal. Biochem., 30,* 391 (1969) and *Neurospora Newsletter,* No. 15, 16 (December 1969).]

1-Ethyl-2-[3-(1-ethylnaphtho[1,2d]-thiazolin-2-ylidene)-2-methylpropenyl]-naphtho[1,2d]-thiazolium Bromide (EASTMAN 2718) is reported to stain RNA bluish-purple, DNA blue, protein red, and is also useful for staining acid polysaccharides. Because of its versatility, the reagent is referred to as "Stains-All." [*J. Mol. Biol., 41,* 139 (1969).]

Use of these two stains is described in Kodak Publication No. JJ-11, *Reagents for Acrylamide-Gel Electrophoresis,* along with package sizes, prices, and ordering information; use the coupon below to request your copy.

These reagents for acrylamide-gel electrophoresis are available from any of these laboratory supply houses:

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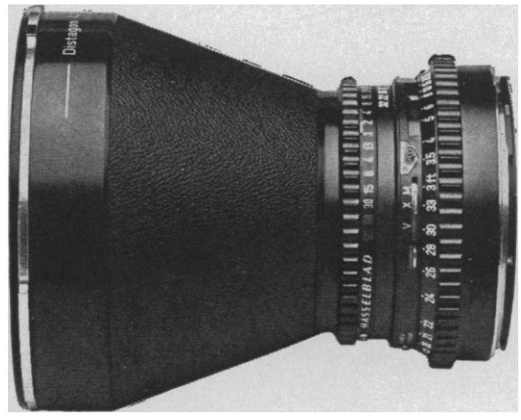

How to get involved in Hasselblad wide angle photography. For under $1,000. Or over $1,000.

For under $1,000 you can buy a Hasselblad Super Wide C. The whole camera. Body. Lens. Magazine and all.

The lens is a 38mm Zeiss Biogon f/4.5, and you couldn't buy it separately for any money. Because it comes permanently attached to the camera body.

The Super Wide C is the only Hasselblad that isn't a reflex camera. It couldn't be. To take advantage of its optical properties, a true wide-angle lens such as the 38mm Biogon had to be placed less than ¾" from the film plane. Which didn't leave much room for a mirror.

So we gave up a mirror to gain some unique advantages.

Like superb corner to corner sharpness and distortion-free images that only a true wide angle lens can give. (Verticals and horizontals emerge as straight lines, not distorted curvatures from edge to edge.)

And a sweeping 90° angle of view (a normal lens covers about 52°) that lets you take in a wide area without having to back away from your subject.

And enormous depth of field (at f/22. everything is sharp from 12" to infinity) which makes the Super-Wide C a great camera for grabbing quick shots when there isn't time to focus.

And a very compact camera for one that provides 2¼" x 2¼" photographs.

The Super Wide C employs an optical viewfinder. But should you ever require reflex viewing and focusing, you can remove the film magazine and attach a ground glass back in its place Then when you're ready to shoot just take it off and put the film magazine back.

38mm Biogon	Comparison of lenses	40mm Distagon
f 4.5	Aperture	f 4.
38mm	Focal length	40mm
90°	Angle of view	88°
8	Number of lens elements	10
12" to ∞	Focusing range	19" to ∞
B, 1-1/500 sec	Synchro Compur Shutter	B, 1-1/500 sec
4.5-22	Diaphragm	4-32
63	Filters—Hasselblad Series	104
Optical	Viewing system	Reflex
No	Interchangeable?	Yes
Under $1,000 (including body)	Price	Over $1,000 (including body)

The magazine might be any one of the five interchangeable film magazines of The Hasselblad System, because the Super Wide C accepts them all. So you can work in a variety of film formats and exposures per roll, all the way up to 70.

The Super Wide C was one of the Hasselblads chosen by NASA for use in space. During Gemini 9, it was taken on a two hour space walk where it recorded fifty remarkable photographs, working in total vacuum.

For over $1,000 you can buy our 40mm Zeiss Distagon f/4. lens, and a camera to go with it.

The lens alone costs about as much as the entire Super Wide C camera, and you still need a body and film magazine.

It costs what it does because the Distagon is a very remarkable lens.

It had long been thought that 50mm was the practical limit in building a fast, wide angle lens for a 2¼" reflex camera. Which limited the angle of view to 75°.

The Distagon broke the rules. It added another 13° to the angle of view, and proved to be as distortion-free as our 38mm Biogon.

But the big advantage of the Distagon lens is that it fits the Hasselblad 500 CM and 500 ELM cameras. So you can look through the large ground glass and see what's in and what's out of focus, how vertical the verticals are and what kind of perspective the finished picture will have.

The Distagon lens also interchanges with nine other Carl Zeiss lenses, up to 500mm telephoto.

And allows you to utilize all the backs and accessories of The Hasselblad System.

Both the 38mm Biogon and 40mm Distagon lenses are very much alike in terms of quality. Both lenses have built-in Compur shutters, so you can shoot at any shutter speed with any type of flash. Which is only possible when the shutter is in the lens—instead of in the camera.

The big difference between these two wide angle lenses is that one permits reflex viewing and one doesn't.

And it's up to you to decide how much that's worth to you.

For information, see your Hasselblad dealer. For his name, and a free 48-page catalog on The Hasselblad System, write to address below.

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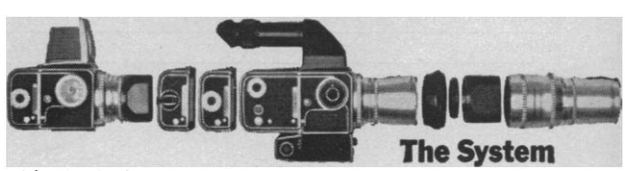

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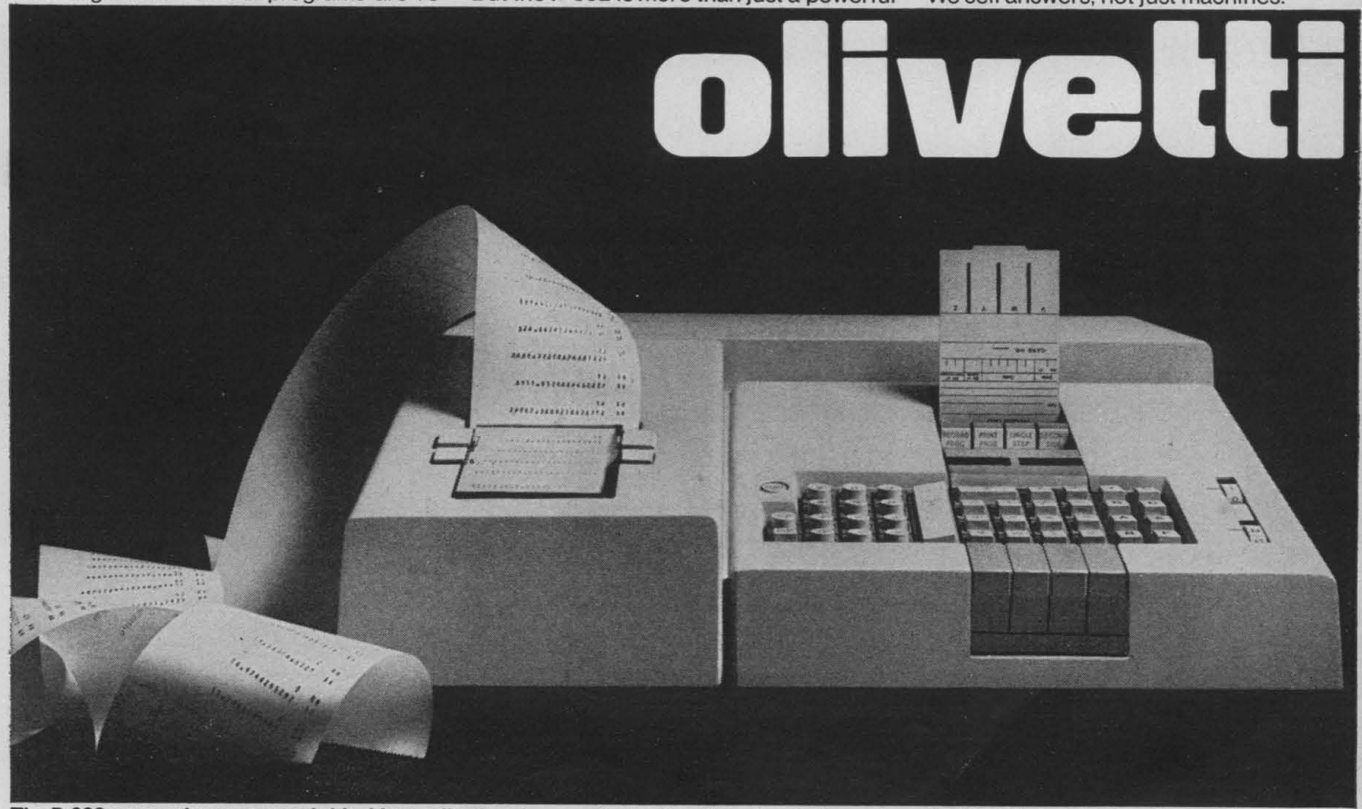
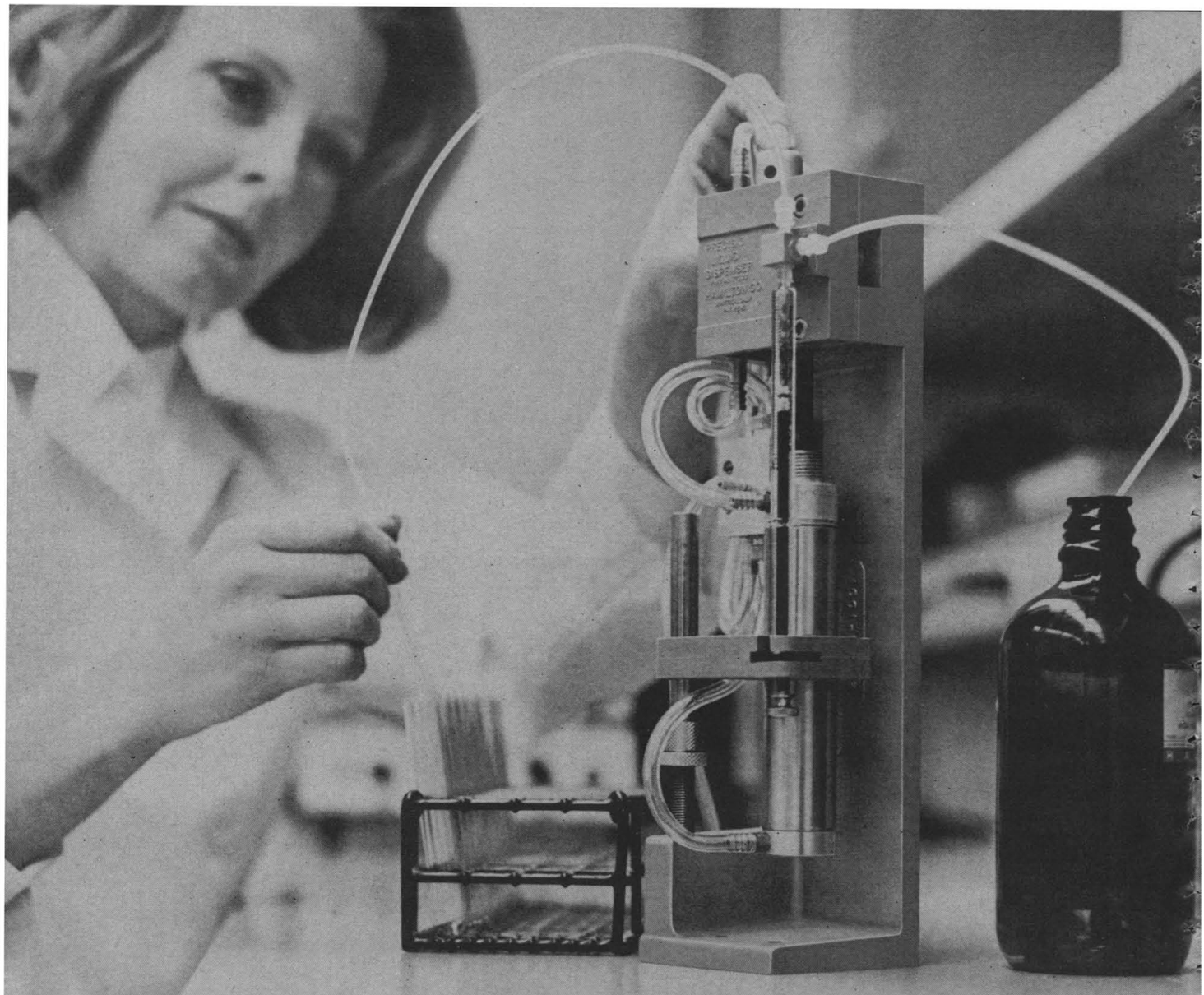


The P-602 super-microcomputer is ideal for applications in numerical and statistical analysis, mathematical function evaluation, curve fitting, medical and life sciences, physical sciences and engineering, chemistry, research, education, ecology...and many more.



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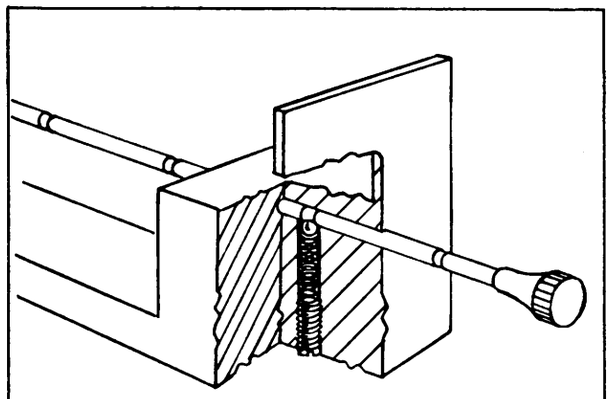

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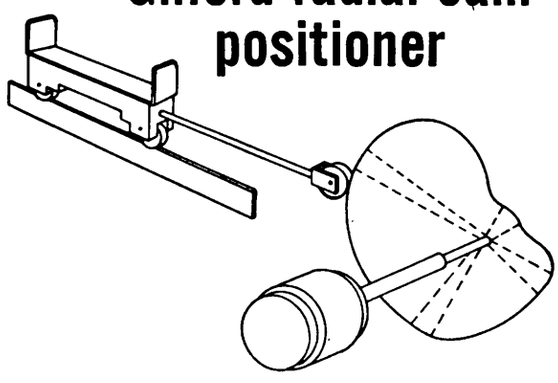

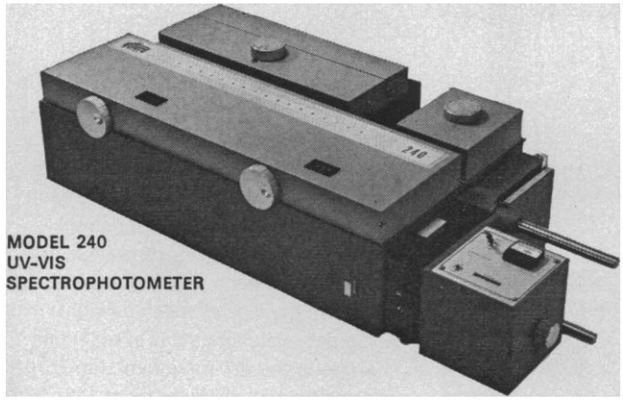

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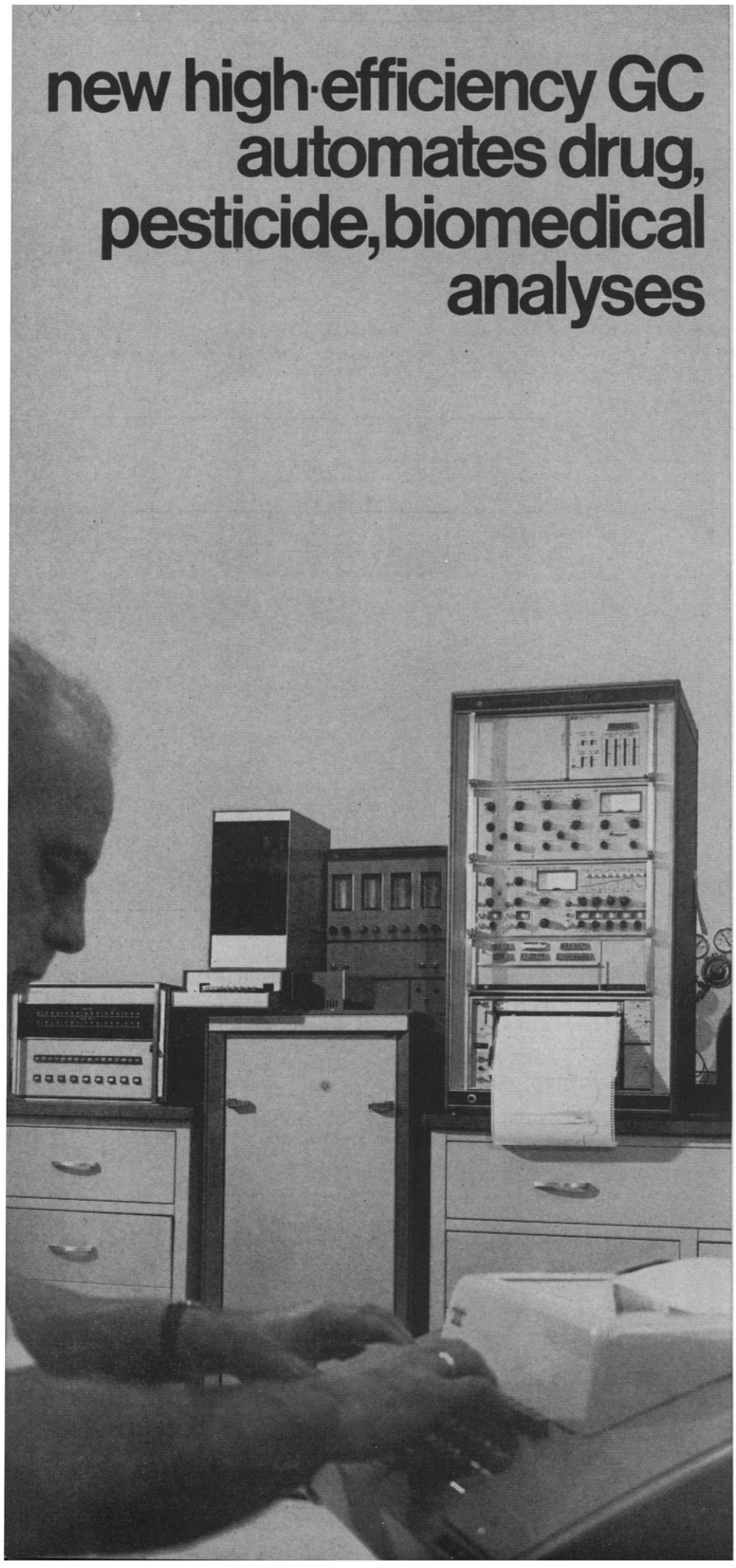

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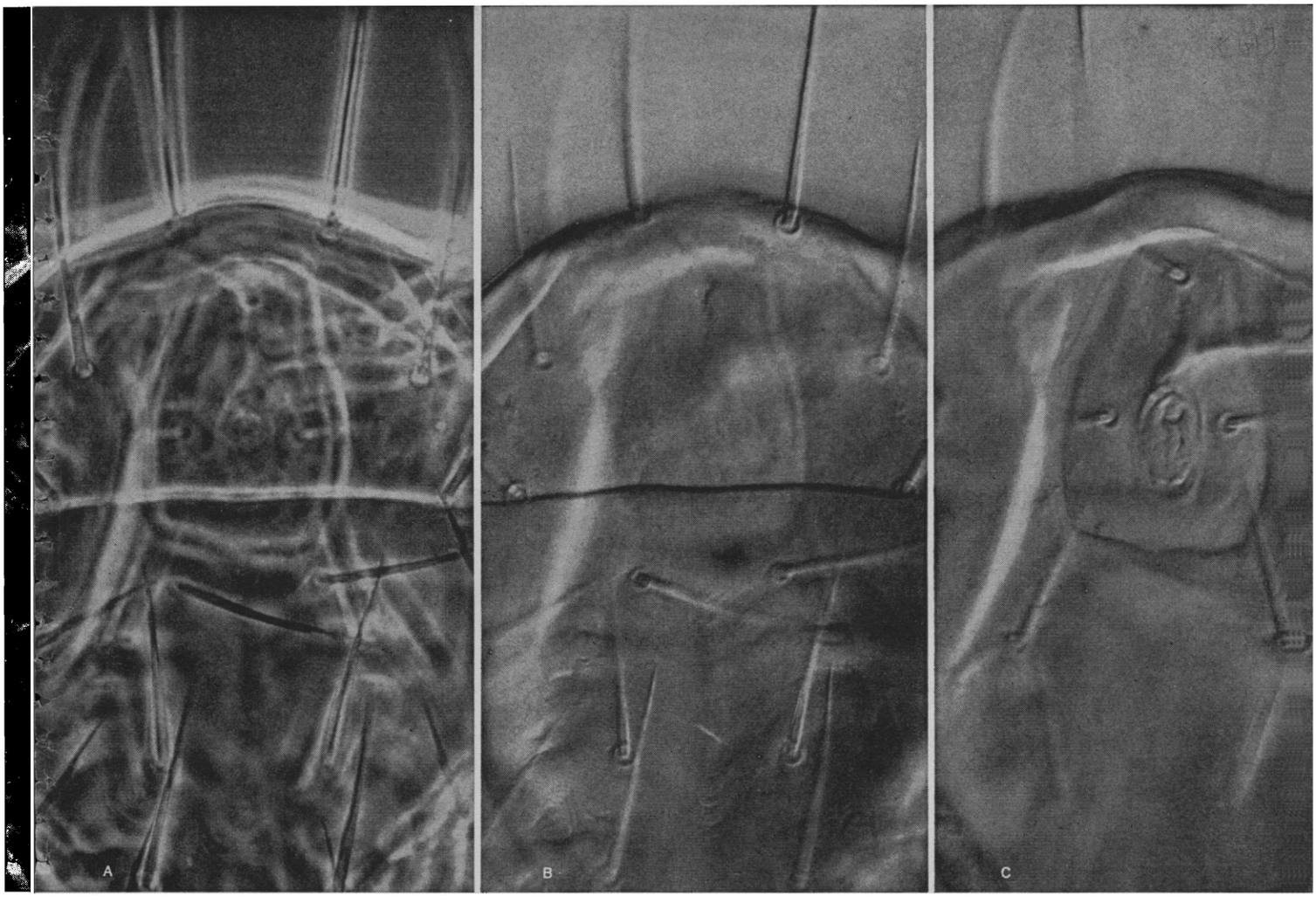

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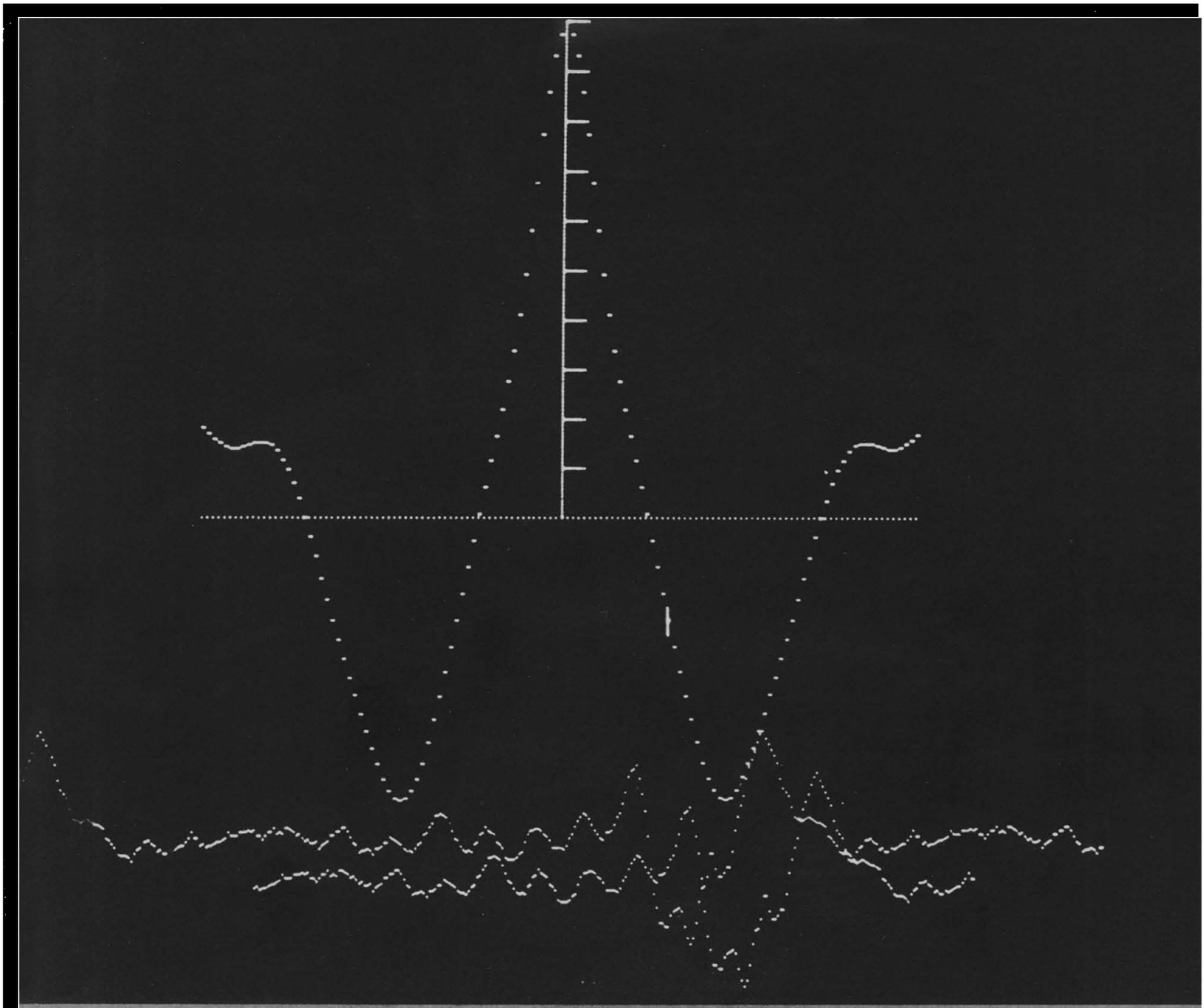

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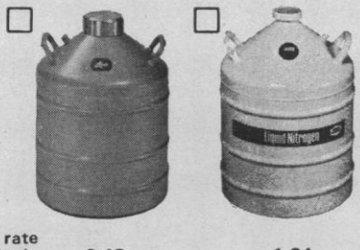

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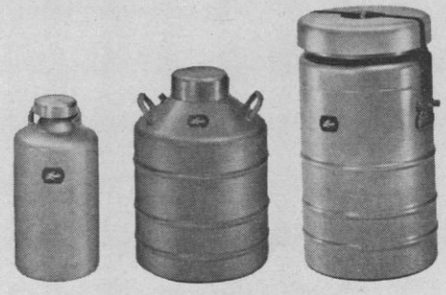

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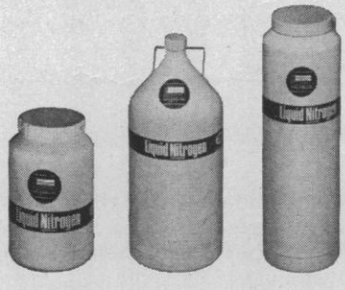

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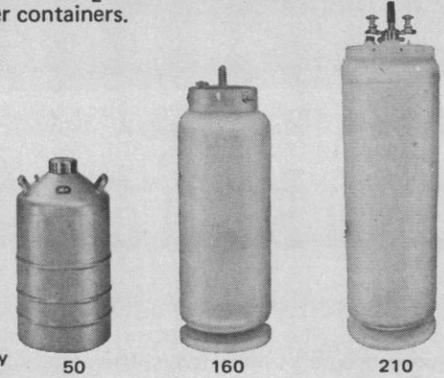

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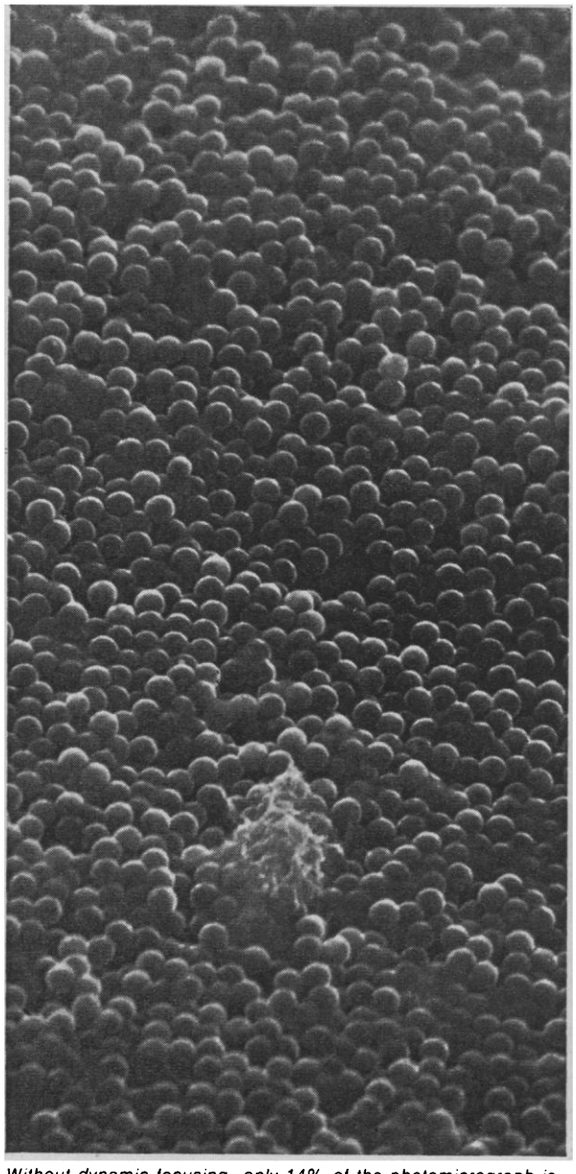

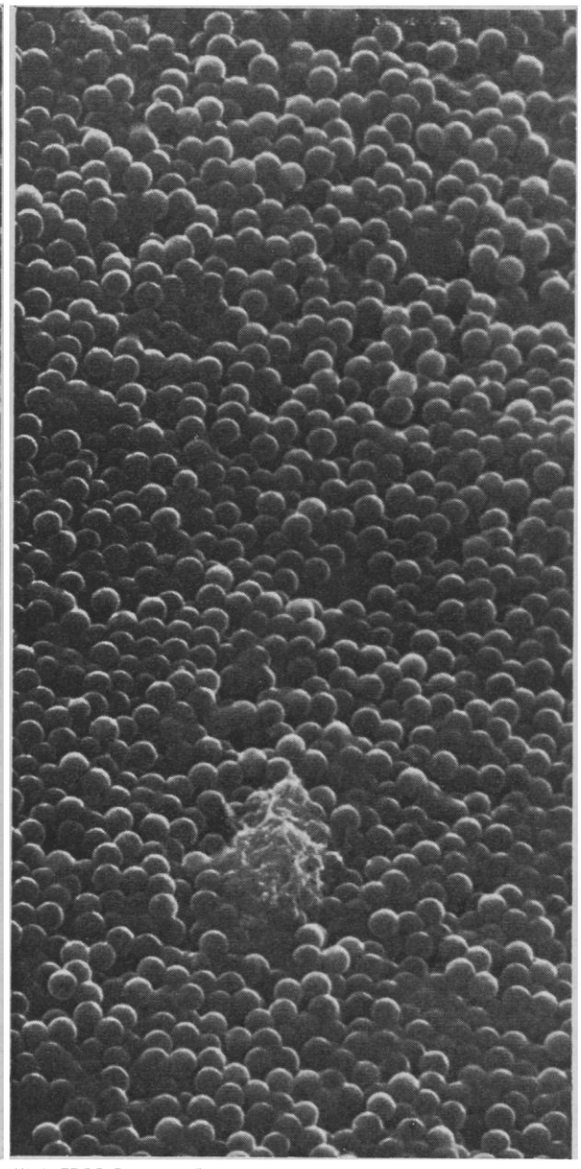

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building. When employment was no problem, the general attitude among engineers in the defense industry was that they were doing recognized engineering jobs, so that they were obviously professional engineers.

As in the case of the medical practitioners during the depression of the 1930's, the present financial hardships thrust upon engineers may be the irritant required to cause them to think seriously about what their profession is, what it should be, and what their societies should do to bring about a correspondence between the two.

WILLIAM C. ORTHWEIN
Department of Engineering Mechanics and Materials, Southern Illinois University, Carbondale 62901

The Space Shuttle

The conflicting analyses of the costs and benefits of the space shuttle that were carried out by Rand and by Mathematica (News and Comment, 11 June, p. 1112) have stimulated controversy over this space transportation system. The costs and benefits of the shuttle constituted a major topic of discussion at the recent Space Systems Meeting of the American Institute of Aeronautics and Astronautics.

The cost of the full operational space transportation system is now put at $12.7 billion, although new cost-cutting efforts may reduce that figure. This cost includes shuttle development, test, and production; establishment of facilities; and a reusable orbit-to-orbit shuttle or "space tug" that would be used to emplace and retrieve satellites in orbits up to the geosynchronous.

According to the Office of Management and Budget (OMB), the shuttle must be wholly justifiable on the basis of economic return, and the system must generate this return at a 10 percent discount rate. Such a conservatively high rate reflects the relatively low priority now afforded to space ventures.

Lindley (*1*) reports that the OMB specifications would be met by a traffic rate of 39 flights per year, much lower than the recent rate of launches by all users (NASA, Department of Defense, Comsat, and so forth). The specifications would also be met by a continuing level of space spending, again by all users combined, of $3 billion per year—much lower than is the case even today. Woodcock (*2*), analyzing shuttle design requirements after the methods applied to new commercial jet transports, also concludes that the current designs are adequate to meet the OMB requirements.

Shuttle benefits include reduced launch costs, elimination of launch losses through an intact-abort capability, on-orbit refurbishment and checkout of satellites with attendant simplification of satellite design, and optimal use of man in spaceborne investigations. Two types of payloads would be carried: those physically separated from the shuttle and those which remain attached, subsequently returning to Earth. These classes are referred to, respectively, as "automated satellites" and "sortie missions."

The automated satellite represents a development of the classic unmanned satellite. Salee (*3*) proposes an analytic method for determining the cost reductions such satellites might achieve. He suggests maintenance of the satellite by routine shuttle revisit, rather than relying upon redundant or high-reliability design. Salee concludes that such satellites should use available hardware, with new development eschewed in favor of proven designs. The resulting payloads would feature low technological risk, high credibility of cost prediction, and lower research and development cost. He reports a saving of 50 percent in a typical case, the High Energy Astronomical Observatory.

The sortie mission represents a fundamentally new mode of space operation. Bader and Farlow (*4*) propose that scientific sortie flights could resemble the experiment-carrying aircraft flights of the NASA program; their conclusions are echoed by Stuhlinger and Downey (*5*). In sortie flights, the scientists themselves would furnish the instruments, which could be of standard laboratory design, and they would accompany them to orbit. The instruments would require little or no space-qualification, and the scientists would require no astronaut training.

This approach contrasts with current methods, in which space experiments require the involvement of hierarchies of designers, managers, review and evaluation boards, contractors, and NASA centers. The time from experiment proposal to flight is 3 to 5 years; the cost, $30,000 per pound and up. Shuttle sortie experiments could be carried out at an equipment cost of $100 to $1000 per pound. Time from proposal to flight would be months or even weeks. Most important, the scientist could spend his time actually preparing

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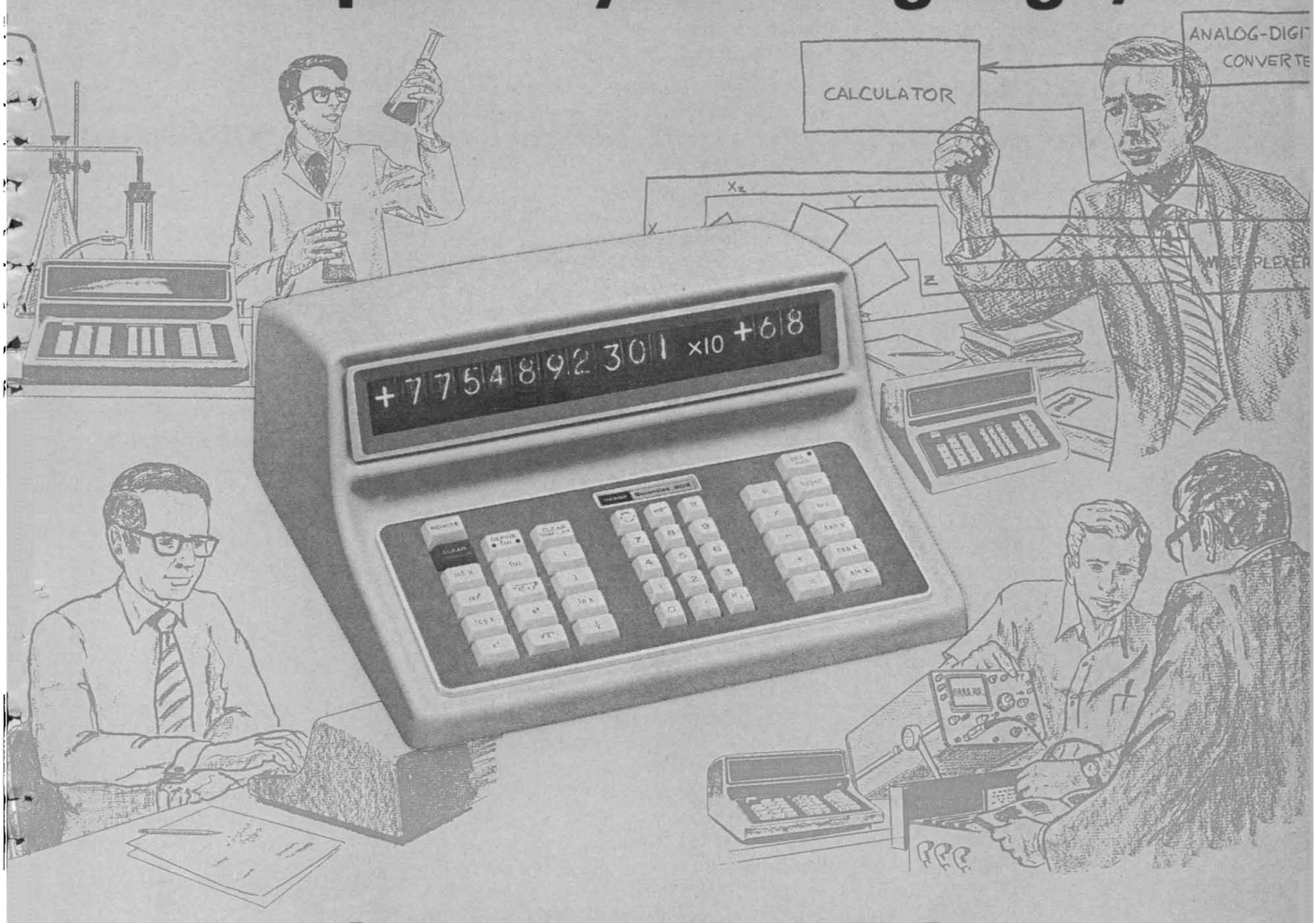

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his experiments, rather than overseeing exchanges of documents with contractors and designers.

Specialized research on research and application modules, or RAM's, would also take place (*6*). Hook and Carey (*7*) discuss the discipline areas that would benefit. In astronomy, the shuttle could support x-ray and infrared studies, as well as a 3-meter, diffraction-limited, optical telescope (900 to 10,000 angstroms) (*8*). Life sciences research at zero gravity could yield new insights. In materials science investigations, large crystals and unique composites might be produced at zero gravity, with possible commercial application. Engineering investigations in space technology and communications research could also use the shuttle in the sortie mode.

In the field of earth observations (*5*), high-quality, low-cost information could be gathered about crop yields and diseases. Other observations might involve earth physics, forestry and resource management, land-use patterns, and locations of new mineral or seafood resources. Water resource management and hydrology, geography and cartography, and oceanography might also benefit, as well as air and water pollution research. Disaster relief would benefit from the quick response time of a sortie mission for surveys of the damage and coordination of relief.

The scientific benefits of the shuttle do not in themselves justify its development; the $12.7-billion cost to establish this system is larger than the amount the National Science Foundation will receive during the same time. Defense, commercial, and applications benefits combine as well to furnish the justification. Nevertheless, the scientific benefits should not be overlooked. For the first time, laboratory-type investigations may be carried out in space, not by scientist-astronauts, but by scientists.

T. A. HEPPENHEIMER
Department of Aerospace Engineering, University of Michigan, Ann Arbor

References

1. R. N. Lindley, *AIAA Paper 71-806.*
2. G. R. Woodcock, *AIAA Paper 71-810.*
3. A. M. Salee, *AIAA Paper 71-807.*
4. M. Bader and N. H. Farlow, *AIAA Paper 71-808.*
5. E. Stuhlinger and J. H. Downey, *AIAA Paper 71-814.*
6. W. L. Breazeale and J. T. Milton, *AIAA Paper 71-813.*
7. W. R. Hook and W. T. Carey, *AIAA Paper 71-812.*
8. R. J. Kirby and R. S. Johns, *AIAA Paper 71-815.*
9. The above reports are obtainable from the American Institute of Aeronautics and Astronautics, Order Department (JF), 1290 Avenue of the Americas, New York 10019. Price per copy, $2.

Treatment of Laboratory Animals

Maurice B. Visscher's article (28 May, p. 916) on the Animal Welfare Act of 1970 (P.L. 91-579) leaves the scientific investigator with an unjustified sense of security that there is under this act no possibility of bureaucratic interference with the design or execution of any experiment.

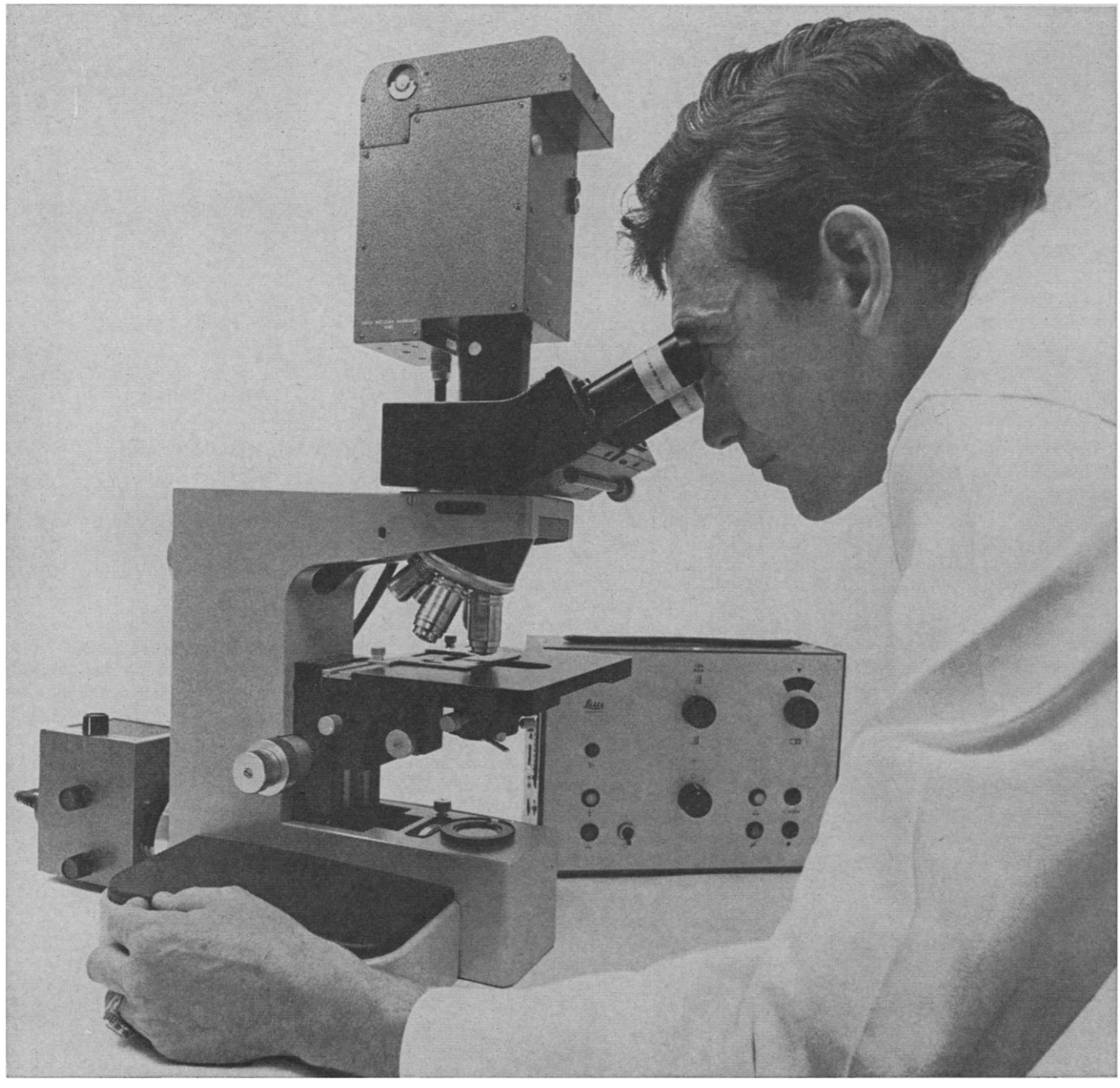
It is true that Section 13 of P.L. 91-579 contains language to the effect that nothing preceding Section 13 can be construed as authorizing the Secretary of Agriculture to promulgate rules, regulations, or orders with regard to design, outlines, guidelines, or performance of actual research or experimentation by a research facility. Immediately following, however, is what is known in governmental circles as a "march-in clause":

> Provided, however, that the Secretary shall require at least annually, every research facility to show that professionally acceptable standards governing care, treatment and use of animals including appropriate use of anesthetic, analgesic and tranquilizing drugs during experimentation are being followed by the research facility during actual research or experimentation.

This clause will certainly leave the investigator or facility open to question if some functionary of the Department of Agriculture assigned to reading these annual reports does not interpret "professionally acceptable standards" as the investigator or research facility does. These standards have yet to be decided upon, and even when that occurs they may not conform to the investigator's ideas of professionally acceptable standards.

Because of the quoted clause, the American Society For Pharmacology and Experimental Therapeutics did not endorse the legislation which became P.L. 91-579. Rather, the society consistently and publicly, on the recommendation of its Committee on Public Affairs, endorsed the legislation with regard to treatment of laboratory animals proposed by Representative Paul G. Rogers (D–Fla.) and Senator Jacob K. Javits (R–N.Y.) in the 90th and 91st Congress (1966–1970). We still believe that the Rogers-Javits proposals would have better served the interests of all concerned.

LEONARD PROCITA
Committee on Public Affairs,
American Society For Pharmacology
and Experimental Therapeutics,
Albany Medical College,
Albany, New York 12208



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12 November 1971, Volume 174, Number 4010

SCIENCE

Training Scientists for New Jobs

The American scientific enterprise has been experiencing a prolonged period of anxiety. At one time, scientists were among the most favored groups in society and many of them felt secure in their view that the pursuit of fundamental research was the only really worthwhile activity. Since an increasing number of positions were available on campus, academia trained and indoctrinated the best students to become professors.

Relatively sudden changes in public attitudes, in governmental support, in the financial status of universities, and in the job market have damaged the morale and poise of many scientists, particularly chemists and physicists. A few news stories about Ph.D.'s driving taxicabs have led professors, students, and the public toward the attitude that we are training too many physical scientists. The leading universities, which traditionally have produced the best doctorates, have drastically cut their enrollments of entering graduate students in physics and chemistry.* Should their example be followed in other schools, it would lead ultimately to a decimation of science faculties.

Instead of a gloom and doom attitude, a more constructive approach seems called for. Unemployment statistics indicate that that problem is not as dreadful as it has been portrayed. Moreover, if the universities would provide a broader-gauge indoctrination and training, more kinds of positions would be available to science graduates.

A recent survey conducted by the National Science Foundation† provides data on the employment status of scientists. The results indicate that the overall unemployment rate for physical scientists is 3 percent. Among those having the Ph.D. degree, the rate is only about 1 percent. The overall rate is age dependent, and those who are in the 25-to-29 age bracket are experiencing the toughest problems. Their unemployment rate is 5 percent. These findings are corroborated in conversations with professors of chemistry and physics at leading universities. They indicate that their best students are being placed, but that their lesser products are not always so fortunate.

Those professors who continue to indoctrinate and train their students only for the pursuit of fundamental research will find that the job market for the next several years will be poor. A limited number of academic posts will be available. Government support of research will not increase greatly, and industry's basic research is more likely to be curtailed than expanded. Unless professors are willing to watch their departments shrink, they must prepare their students for a broader range of positions. Almost all of the major problems of society involve a component of science and technology. The discipline of a good education in science, with its emphasis on facts and on a systematic approach to problem solving, could be an important component in training for many nonresearch careers in the public and private sectors.

Examples of what might be done are provided by some of the great technology-oriented companies. Only a small fraction of their technically trained employees are active in fundamental research. Others are engaged in development, in market surveys, in sales, and in all levels of management. Research managers point out that, for every dollar spent on successful basic research, $10 must be spent on development and $100 eventually spent on all the tasks involved in introducing a new product. These figures illustrate why industry and perhaps even society can afford to engage in only a limited amount of basic research. They also indicate potential usefulness of employing individuals of great competence in activities other than pure research.—PHILIP H. ABELSON

* Much of the content of this editorial was derived from a Conference on Unemployment organized by the AAAS and held 12 October 1971. † National Science Foundation Report No. 71-26.

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The program for the Winter Gordon Research Conferences follows.

Electrochemistry

Allen J. Bard, chairman; James D. E. McIntyre, vice chairman.

10 January. Robert O. Becker, Theodore L. Jahn, and Barnett Rosenberg, "Bioelectrochemistry—fundamentals and future."

11 January. Richard S. Nicholson and J. M. Saveant, "Cyclic voltammetry—progress and prognosis." Organic electrode reaction mechanisms: Lennart Eberson and Lynn S. Marcoux, "Organic electrode reaction mechanisms: ECE vs. disproportionation"; Manuel M. Baizer and W. Ves Childs, "Reductive couplings."

12 January. Fred Anson, W. Plieth, W. R. Fawcett, and Robert deLevie, "The electroactive species at the electrode surface."

13 January. Larry R. Faulkner, R. VanDuyne, and Nicholas Winograd, "Recent advances in electrochemical-spectroscopic phenomena." Open sessesion.

14 January. Barry Epstein and Harry B. Mark, Jr., "Electrochemistry and the environment."

Chemistry and Physics of Liquid Crystals

Roger S. Porter, chairman; Julian F. Johnson, vice chairman.

17 January. E. F. Carr, "Anomalous alignment and domains in nematics"; H. Gruler, "Elastic properties of nematics"; R. S. Porter, "Discussions of liquid crystal chemistry."

18 January. J. Kessler, "Thermal conductivity of nematics"; W. R. Young, "Preparation and calorimetric study of ring-methylated esters and methyl-branched chlorostilbenes"; E. M. Barrall, II, "Thermodynamics of mesophases."

19 January. H. K. Bücher, "Studies on dynamic scattering and kinetic behavior of homeotropic nematics"; F. Jones, "End group effects on mesomorphic properties of binary systems"; J. F. Johnson, "Discussions of liquid crystal physics."

20 January. F. Saeva, "Induced circular dichroism in cholesterics." Discussion of unsolved problems in liquid crystals: G. H. Brown, "Ultrasonic and x-ray studies of nematics; liquid crystals as solvents."

21 January. Distinguished foreign guests. Open discussion.

Polymers

Frederick E. Bailey, Jr., chairman; John I. Lauritzen, Jr., vice chairman.

24 January. (R. D. Lundberg, discussion leader): J. E. Glass, "Adsorption of water-soluble polymers at nonreflecting boundaries"; A. Silberberg, "Polymers in interfacial regions." (J. R. Knox, discussion leader): J. F. Johnson, "Separation mechanisms for polymer fractionation."

25 January. (W. R. McDonald, discussion leader): G. S. Y. Yeh, "Order and structure in amorphous polymers"; K. C. Frisch and H. L. Frisch, "Topologically interpenetrating polymer networks." (C. L. Sieglaff, discussion leader): T. T. Szabo, "Composites-multiphase polymer systems."

26 January. (R. Porter, discussion leader): N. W. Tschoegl, "Time-temperature superposition in block copolymers"; M. M. Labes, "Polymerization in liquid crystal systems." (R. M. Fitch, discussion leader): H. R. Allcock, "New advances in phosphonitrilic polymer chemistry."

27 January. (W. Zimmt, discussion leader): H. E. Podall, "Semi-permeable membranes for reverse osmosis processes"; M. M. O'Mara, "Polymer flammability." (F. E. Bailey, discussion leader): G. W. Ingle, "Plastics and the environment."

28 January. (J. I. Lauritzen, discussion leader): R. F. Steiner, "Associating protein systems"; O. Vogl, "New aspects of chloral polymerization"; A. C. Ouano, "Molecular weight detection of GPC effluents."

Forthcoming Events

December

3–4. **Tutorial on Multi-Testing**, Intern. Health Evaluation Assoc., Washington, D.C. (C. A. Caceres, 1759 Que St., NW, Washington, D.C. 20009)

5–7. American **Astronomical** Soc., San Juan, Puerto Rico. (H. M. Gurin, AAS, 211 FitzRandolph Rd., Princeton, N.J. 08540)

5–7. American Soc. of **Hematology**, San Francisco, Calif. (F. H. Gardner, ASH, 51 N. 39 St., Philadelphia, Pa.)

5–8. **Chemical Specialties** Manufacturers Assoc., Washington, D.C. (E. E. Wilson, CSMA, 50 E. 41 St., New York 10017)

5–8. Association of **Military Surgeons** of the United States, 78th annual, Washington, D.C. (W. Welham, AMSUS, 8502 Connecticut Ave., Chevy Chase, Md. 20015)

5–8. International College of **Psychosomatic Medicine**, 1st congr., Guadalajara, Mexico. (A. J. Krakowski, 202A Cornelia St., Plattsburgh, N.Y. 12901)

6–7. **Vitamin E and Its Role in Cellular Metabolism**, New York, N.Y. (P. P. Nair, Biochemistry Research Div., Dept. of Medicine, Sinai Hospital of Baltimore, Baltimore, Md.)

6–9. American **Geophysical** Union, San Francisco, Calif. (A. F. Spilhaus, Jr., AGU, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

6–9. **Ultrasonics** Symp., Inst. of Electrical and Electronics Engineers, Inc., Miami Beach, Fla. (J. E. May, Bell Laboratories, 555 Union Blvd., Allentown, Pa. 18103)

6–9. Symposium on **Underground Waste Management and Environmental Implications**, American Assoc. of Petroleum Geologists, Houston, Tex. (W. H. Curry, P.O. Box 572, Casper, Wyo. 82601)

7–10. American Soc. of **Agricultural Engineers**, Chicago, Ill. (J. L. Butt, ASAE, P.O. Box 229, St. Joseph, Mich. 49085)

8–11. American **Rheumatism** Assoc., San Diego, Calif. (Miss M. M. Walsh, Arthritis Foundation, 1212 Ave. of the Americas, New York 10036)

9–10. **Modeling of Complex Systems in the Pursuit of National Goals**, American Soc. of Cybernetics, Washington, D.C. (T. H. Murray, ASC, Suite C1112, 1600 S. Joyce St., Arlington, Va.)

9–14. American Acad. of **Optometry**, Toronto, Ont., Canada. (C. C. Koch, AAO, 214-215 Foshay Tower, Minneapolis, Minn. 55402)

13–14. Society of **Cosmetic Chemists**, New York, N.Y. (Miss S. A. Ragon, Amerchol Park, Talmadge Rd., Edison, N.J. 08817)

13–14. **Liquid Crystals** Symp., London, England. (Faraday Soc., 6 Gray's Inn Sq., Gray's Inn, London, W.C.1)

13–17. Use of **Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry**, International Atomic Energy Agency, Vienna, Austria. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

15–16. **Mechanical Properties of Ceramics, Fibres and Composites**, London, England. (Meeting Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1)

16–19. **Psychoanalysis**, American Psychoanalytic Assoc., New York, N.Y. (Mrs. H. Fischer, APA, 1 E. 57 St., New York 10022)

18–22. Interamerican Congr. of **Psychology**, Panama City, Panama. (L. F. S. Natalicio, SIP, 1801 Lavaca, Suite 11-E, Austin, Tex. 78701)

20–21. **Polychlorinated Biphenyls (PCB's): Chemistry, Environmental Aspects, Toxicology, Biochemical Actions, Alternatives**, Durham, N.C. (D. P. Rall, NIH, Nat'l. Inst. of Environmental Health Sciences, Research Triangle Park, N.C. 27709)

26–31. American Assoc. for the **Advancement of Science**, Philadelphia, Pa. (D. W. Thornhill, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)

26–31. **Metric** Assoc., Philadelphia, Pa. (R. W. Mattoon, Chemical Physics, Dept. 408, Abbott Laboratories, North Chicago, Ill. 60064)

26–31. American Soc. of **Naturalists**, Philadelphia, Pa. (Miss J. Spofford, Dept. of Zoology, Univ. of Chicago, Chicago, Ill. 60637)

26–31. American Soc. of **Zoologists**, Philadelphia, Pa. (D. Sprugel, Jr., Illinois Natural History Survey, 179 Natural Resources Bldg., Urbana 61801)

27–29. American **Economic** Assoc., New Orleans, La. (H. F. Williamson, 629 Noyes St., Evanston, Ill. 60201)

27–29. Society for the **History of Technology**, New York, N.Y. (M. Kranzberg, Crawford Hall, Case Western Reserve Univ., Cleveland, Ohio 44106)

27–29. American **Philosophical** Assoc., New York, N.Y. (A. Pasch, APA, 117 Lehigh Rd., College Park, Md. 20742)

27–30. **Archaeological** Inst. of America, Cincinnati, Ohio. (Miss E. A. Whitehead, AIA, 260 W. Broadway, New York 10013)

27–30. Society for **General Systems Research**, Philadelphia, Pa. (R. E. Ericson, 12613 Bunting Lane, Bowie, Md. 20715)

28. National Assoc. of **Science Writers**, Philadelphia, Pa. (Mrs. R. Arctander, Box H, Seacliffs, N.Y. 11579)

28–30. **Linguistic** Soc. of America, St. Louis, Mo. (T. A. Sebeok, Research Center for the Language Sciences, Indiana Univ., Bloomington)

28–30. **History of Science** Soc., New York, N.Y. (J. C. Greene, Dept. of History, Univ. of Connecticut, Storrs 06268)

January

4–6. **Solid State Physics** Conf., 9th annual, Manchester, England. (Inst. of Physics, 47 Belgrave Sq., London, S.W.1, England)

9–11. Association of **American Colleges**, Washington, D.C. (AAC, 1818 R St., NW, Washington, D.C. 20009)

9–14. **Mercury in the Industrial Environment**, Engineering Foundation, Pacific Grove (Monterey Peninsula), Calif. (EF, 345 E. 47 St., New York 10017)

10–11. **Molecular Basis of Biological Transport,** Biochemistry–Papanicolaou Cancer Research Inst., 4th annual, Miami Beach, Fla. (Biochemistry–PCRI Winter Symposia, P.O. Box 906, Biscayne Annex, Miami, Fla. 33152)

10–12. **Surface Physics of Semiconductors,** Southampton, England. (Inst. of Physics, 47 Belgrave Sq., London, S.W.1, England)

10–13. American **Meteorological** Soc., New Orleans, La. (K. C. Spengler, AMS, 45 Beacon St., Boston, Mass. 02108)

10–13. **Radioactive Isotopes in Clinical Medicine and Research,** intern. conf., Badgastein, Austria. (R. Hofer, Second Medical University Clinic, Isotopes Lab., A 1090, Wien, Garnisongasse 13, Austria)

11–15. National Soc. of **Professional Engineers,** Dallas, Tex. (P. H. Robbins, NSPE, 2029 K St., NW, Washington, D.C. 20006)

13–14. **Molecular Basis of Electron Transport,** Biochemistry–Papanicolaou Cancer Research Inst., 4th annual, Miami Beach, Fla. (Biochemistry–PCRI Winter Symposia, P.O. Box 906, Biscayne Annex, Miami, Fla. 33152)

16. **Human Factors in the Design and Operation of the Highway Transportation System,** 5th annual workshop, Washington, D.C. (A. J. McKnight, 300 N. Washington St., Alexandria, Va. 22314)

17–19. American College of **Surgeons,** sectional mtg., Miami, Fla. (Communications Div., ACS, 55 Erie St., Chicago, Ill. 60611)

17–21. **Numerical Reactor Calculations** Symp., Intern. Atomic Energy Agency, Vienna, Austria. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

19–21. American **Mathematical** Soc. and Mathematical Assoc. of America, Las Vegas, Nev. (A. B. Willcox, MAA, 1225 Connecticut Ave., NW, Washington, D.C. 20036)

23–27. American Soc. of **Heating, Refrigerating, and Air-Conditioning Engineers,** New Orleans, La. (A. T. Boggs III, ASHRACE, 345 E. 47 St., New York 10017)

24–26. **Aerospace Sciences,** 10th mtg., New York, N.Y. (American Inst. of Aeronautics and Astronautics, 1290 Ave. of the Americas, New York 10019)

24–27. **Environmental Design Research** Assoc., 3rd annual, Los Angeles, Calif. (W. J. Mitchell, School of Architecture and Urban Planning, Univ. of California, 405 Hilgard Ave., Los Angeles 90024)

27–29. American College of **Surgeons,** sectional mtg., Sydney, Australia. (Communications Div., ACS, 55 E. Erie St., Chicago, Ill. 60611)

27–30. American College of **Psychiatrists,** Coronado, Calif. (P. A. Martin, ACP, 857 Fisher Bldg., Detroit, Mich. 48202)

30–4. **Power Engineering** Soc., New York, N.Y. (J. W. Beam, Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)

30–7. Role of **Surface Properties in Dosage Form Design and Development,** 7th annual Arden House Conf. on Industrial Pharmacy, Harriman, N.Y. (S. M.

Gross, College of Pharmaceutical Sciences, Columbia Univ., 115 W. 68 St., New York 10023)

31–3. American Assoc. of **Physics Teachers**, San Francisco, Calif. (W. F. Johnson, AAPT, 1785 Massachusetts Ave., NW, Washington, D.C. 20036)

31–4. International Symp. on **Information Theory**, Pacific Grove, Calif. (T. Kailath, Dept. of Electrical Engineering, Stanford Univ., Stanford, Calif. 94035)

February

1–3. **Computer-Aided Design and Computer-Aided Manufacturing** Conf. and Exhibit, Soc. of Manufacturing Engineers, Atlanta, Ga. (T. C. Akas, SME, 20501 Ford Rd., Dearborn, Mich. 48128)

3–5. Association for **Hospital Medical Education**, Chicago, Ill. (T. G. Kummer, AHME, 2001 Jefferson Davis Hwy., Arlington, Va. 22202)

4–5. Problems of the **Female Breast as Related to Neoplasms and Reconstruction**, New York, N.Y. (R. K. Snyderman, Memorial Sloan-Kettering Cancer Center, 444 E. 68 St., New York 10021)

5–6. **Medical Education**, 68th annual congr., American Medical Assoc., Chicago, Ill. (C. H. W. Ruhe, AMA Council on Medical Education, 535 N. Dearborn St., Chicago 60610)

5–9. American Acad. of **Allergy**, San Francisco, Calif. (J. O. Kelly, AAA, 225 E. Michigan St., Milwaukee, Wis. 53202)

5–12. Asian and Pacific Congr. of **Gastroenterology**, Manila, Philippines. (Philippine Soc. of Gastroenterology, P.O. Box 2598, Manila)

6–11. American Soc. of **Range Management**, Washington, D.C. (F. T. Colbert, ASRM, 2120 S. Birch St., Denver, Colo. 80222)

6–12. **Chemistry of Natural Products**, 8th intern. symp., New Delhi, India. (S. Rangaswami, Indian National Science Acad., Bahadur Shah Zafar Marg, New Delhi-1)

7–9. **Integrated Optics-Guided Waves Materials Devices**, Optical Soc. of America, Las Vegas, Nev. (OSA, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

8–12. American **Group Psychotherapy** Assoc., New York, N.Y. (L. Kane, AGPA, 1790 Broadway, New York 10019)

9–11. American Acad. of **Occupational Medicine**, Pittsburgh, Pa., (D. Minard, Dept. of Occupational Health, AAOM, 130 DeSoto St., Pittsburgh 15213)

9–19. **Ground Water Quality and Treatment**, 14th conf., Urbana, Ill. (V. L. Snoeyink, Dept. of Civil Engineering, Univ. of Illinois at Urbana-Champaign, Urbana 61801)

14–15. **Psychology of Technical Communication**, Philadelphia, Pa. (Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)

14–16. Use of **Enzymes in Agricultural and Food Industries**, 13th intern. symp., Paris, France. (Sécretariat, XIIIème Symp. International, Commission Internationale des Industries Agricoles et Alimentaires–Bureau International Permanent de Chimie Analytique, 24, rue Téhéran, Paris 8e)

14–16. American College of **Surgeons**, sectional mtg., St. Louis, Mo. (Communications Div., ACS, 55 E. Erie St., Chicago, Ill. 60611)

16–18. Australian **Electrochemistry** Conf., 3rd, Terrigal, New South Wales. (D. A. J. Swinkels, B. H. P. Central Research Labs., Shortland, N.S.W. 2307, Australia)

16–18. **Solid-State Circuits** Conf., Philadelphia, Pa. (Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)

18–19. Symposium on **Regulation of Catecholamine Metabolism in the Sympathetic Nervous System**, New York, N.Y. (I. Saulpaugh, New York Heart Assoc., 2 E. 64 St., New York 10021)

20–23. American Inst. of **Chemical Engineers**, Dallas, Tex. (F. J. Antwerpen, AICE, 345 E. 47 St., New York 10017)

20–24. American Inst. of **Mining, Metallurgical and Petroleum Engineers**, San Francisco, Calif. (J. B. Alford, AIMMPE, 345 E. 47 St., New York 10017)

21–22. **Coastal Zone Pollution Management** Symp., Charleston, S.C. (B. L. Edge, Rhodes Engineering Research Center, Clemson Univ., Clemson, S.C. 29631)

23. Applications of **Auger Spectroscopy**, London, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SW1X 8QX)

23–25. Society of **Professors of Education**, Chicago, Ill. (Miss R. Bayles, Atlanta Univ., Atlanta, Ga.)

23–25. **Research and Training Reactor Utilization**, American Nuclear Soc., College Station, Tex. (J. D. Randall, Nuclear Science Center, Texas A&M Univ., College Station 77843)

26. Oregon **Acad. of Science**, Portland. (C. L. Smith, Dept. of Anthropology, Oregon State Univ., Corvallis 97331)

28–3. **Medical Data Processing** Symp., Toulouse-Pyrenees, France. (E. E. Van Brunt, Permenente Medical Group, Medical Methods Research, 3779 Piedmont Ave., Oakland, Calif. 94611)

March

1–4. American Acad. of **Forensic Sciences**, Atlanta, Ga. (J. T. Weston, 44 Medical Dr., Salt Lake City, Utah 84113)

1–5. American College of **Cardiology**, Chicago, Ill. (W. D. Nelligan, ACC, 9650 Rockville Pike, Bethesda, Md. 20014)

2–3. American Astronomical Soc., Div. on **Dynamical Astronomy**, College Park, Md. (J. D. Mulholland, Dept. of Astronomy, Univ. of Texas, Austin 78712)

2–4. Diagnosis of the **Functions in Endocrinology—Methods and Interpretations**, 18th symp., German Soc. of Endocrinology, Hannover. (J. Kracht, Pathologisches Institut, Klinikstrasse 32 g, 63 Giessen, Germany)

3–5. **American College of Apothecaries**, Chicago, Ill. (D. C. Huffman, Univ. of Tennessee, College of Pharmacy, Memphis 38103)

4–10. American **Concrete** Inst., Dallas, Tex. (ACI, Box 4754 Redford Sta., 22400 W. Seven Mile Rd., Detroit, Mich. 48219)

6–8. National Federation of **Science Abstracting and Indexing Services**, New

York, N.Y. (Miss S. Keenan, NFSAIS, 2102 Arch St., Philadelphia, Pa. 19103)

6–10. **Analytical Chemistry and Applied Spectroscopy**, 23rd Pittsburgh conf., Cleveland, Ohio. (H. W. Fracek, Fisher Scientific Co., 585 Alpha Dr., Pittsburgh, Pa. 15238)

6–10. **Neutron Inelastic Scattering**, 5th symp., Intern. Atomic Energy Agency, Grenoble, France. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

6–11. International Acad. of **Pathology**, Chicago, Ill. (Miss J. Graves, Intersociety Committee on Pathology Information, Inc., College of American Pathologists, 9650 Rockville Pike, Bethesda, Md. 20014)

8–15. National **Wildlife** Federation, Mexico City, Mexico. (T. L. Kimball, NWF, 1412 16th St., NW Washington, D.C. 20036)

9–10. Advanced **Analytical Methods for the Clinical Laboratory**, Oak Ridge, Tenn. (C. D. Scott, Oak Ridge National Lab., P.O. Box X, Oak Ridge 37830)

9–10. American Soc. for **Clinical Pharmacology and Therapeutics**, Houston, Tex. (R. T. Smith, 1718 Gallagher Rd., Norristown, Pa. 19401)

11–18. American Assoc. of **Pathologists and Bacteriologists**, American Assoc. of **Neuropathologists**, and **Pediatric Pathology** Club (joint), Cincinnati, Ohio. (A. J. French, 1335 E. Catherine St., Ann Arbor, Mich. 48104)

12–17. American Soc. of **Photogrammetry**, Washington, D.C. (L. P. Jacobs, 105 N. Virginia Ave., Falls Church, Va. 20046)

13–17. International Union against **Cancer** Conf. (melanoma and skin cancer, leukemia). Sydney, Australia. (Intern. Cancer Conf., GPO Box 475, Sydney, NSW)

13–17. California **Membrane** Conf., Squaw Valley. (C. F. Fox, Dept. of Bacteriology, Univ. of California, Los Angeles 90024)

14. **Acoustic Emission**, London, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SW1X 8QX)

14–16. **Mineral Waste Utilization**, 3rd symp., U.S. Bureau of Mines and IIT Research Inst., Chicago, Ill. (M. A. Schwartz, IIT Research Inst., 10 W. 35 St., Chicago 60616)

19–25. Council for **Exceptional Children**, 50th annual intern. conv., Washington, D.C. (W. C. Geer, CEC, Suite 900, Jefferson Plaza, 1411 S. Jefferson Davis Highway, Arlington, Va. 22202)

20–22. **Physical Electronics** Conf., 32nd annual, Albuquerque, N.M. (R. L. Schwoebel, Dept. 5330, Sandia Labs., Albuquerque 87115)

20–23. American Assoc. of **Dental Schools**, Las Vegas, Nev. (B. F. Miller, 211 E. Chicago Ave., Chicago, Ill. 60611)

20–23. Institute of **Electrical and Electronics Engineers**, New York, N.Y. (D. G. Fink. IEEE, 345 E. 47 St., New York 10017)

20–23. American Soc. of **Neurochemistry**, 3rd natl., Seattle, Wash. (W. L. Stahl, Dept. of Medicine (Neurology), School of Medicine, Univ. of Washington, Seattle 98105

20–24. Use of **Isotopes in Studies on the Physiology of Domestic Animals** with Special Reference to Hot Climates, Intern. Atomic Energy Agency, Athens, Greece. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

21–23. **Control of Hazardous Material Spills** Conf., Houston, Tex. (H. N. Myrick, Univ. of Houston, 3801 Cullen Blvd., Houston 77004)

23–25. American **Philosophical** Assoc. San Francisco, Calif. (A. Pasch, APA, 117 Lehigh Road, College Park, Md. 20742)

23–25. **Seismological** Soc. of America, Honolulu, Hawaii. (D. Tocher, P.O. Box 826, Berkeley, Calif. 94701)

26–29. **Environmental Mutagen** Soc., Cherry Hill, N.J. (W. W. Nichols, Inst. for Medical Research, Copewood St., Camden, N.J. 08103)

April

3–6. National Assoc. for **Research in Science Teaching**, Chicago, Ill. (R. W. Lefler, Dept. of Physics, Purdue Univ., Lafayette, Ind. 47907)

3–7. American **Educational Research** Assoc., Chicago, Ill. (R. A. Dershimer, AERA, 1126 16th St., NW, Washington, D.C. 20036)

3–8. American College of **Radiology**, Bal Harbour, Fla. (W. C. Tronach, ACR, 20 N. Wacher Dr., Chicago, Ill. 60606)

4–6. Symposium on **Computer-Communications Networks and Teletraffic**, 22nd annual intern. symp., New York, N.Y. (J. Fox, Polytechnic Inst. of Brooklyn, MRI Symp. Committee, 333 Jay St., Brooklyn, N.Y. 11201)

4–7. American Assoc. of **Anatomists**, Dallas, Tex. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, 4643 Medical Science II, Ann Arbor 48104)

4–8. Institute of **Management Sciences**, Houston, Tex. (Mrs. M. R. DeMelim, IMS, 146 Westminster St., Providence, R.I.)

5–7. **Reliability Physics** Symp., 10th annual, Inst. of Electrical and Electronics Engineers, Las Vegas, Nev. (H. Lauffenburger, IITRI, 10 W. 35 St., Chicago, Ill. 60616)

5–7. **Phase Analysis: Identification and Quantitative Determination**, Hull, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SW1X 8QX)

5–8. American **Orthopsychiatric** Assoc., 49th annual, Detroit, Mich. (Miss M. F. Langer, AOA, 1790 Broadway, New York 10019)

5–9. **Learning and Culture**, Soc. for Applied Anthropology, American Ethnological Soc., and Council on Anthropology and Education (joint), Montreal, Canada. (Miss N. Gonzalez, Dept. of Anthropology, Univ. of Iowa, Iowa City)

6–8. Florida **Acad. of Sciences**, Winter Park. (R. W. Long, Dept. of Biology, Univ. of South Florida, Tampa 33620)

6–8. Association of Southeastern **Biologists**, Mobile, Ala. (Miss M. L. Gilbert, Biology Dept., Florida Southern College, Lakeland 33802)

7–11. National **Science Teachers** Assoc., New York, N.Y. (R. H. Carleton, NSTA, 1201 16th St., Washington, D.C. 20036)

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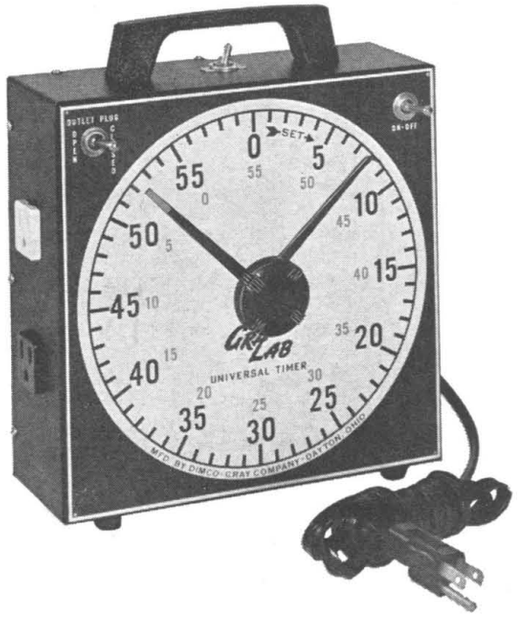

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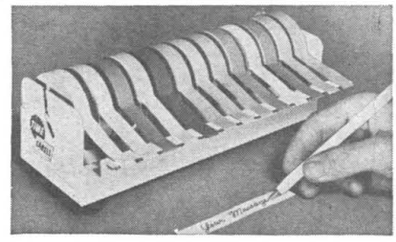

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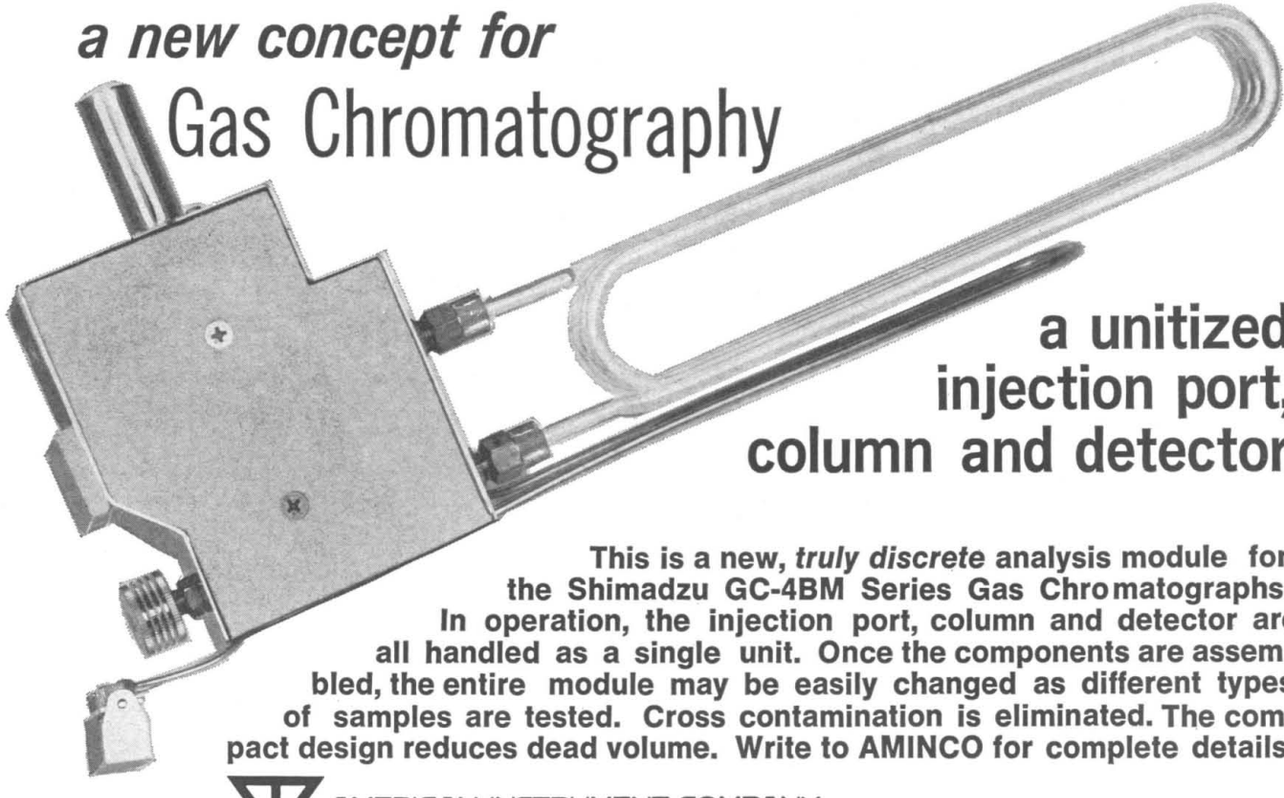

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9–14. American Soc. of **Biological Chemists**, Atlantic City, N.J. (R. A. Harte, ASBC, 9650 Rockville Pike, Bethesda, Md. 20014)

9–14. American **Chemical** Soc., Boston, Mass. (F. T. Wall, ACS, 1155 16th St., NW, Washington, D.C. 20036)

9–14. Federation of American Societies for **Experimental Biology**, Atlantic City, N.J. (Miss A. Nixon, FASEB, 9650 Rockville Pike, Bethesda, Md. 20014)

9–14. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (R. E. Knutti, ASEP, 9650 Rockville Pike, Bethesda, Md. 20014)

9–14. American Soc. of **Pharmacology and Experimental Therapeutics**, Atlantic City, N.J. (E. B. Cook, ASPET, 9640 Rockville Pike, Bethesda, Md. 20014)

10–12. **Acoustical Holography**, 4th intern. symp., Inst. of Electrical and Electronics Engineers, Inc., Santa Barbara, Calif. (Meetings Officer, IEEE, 345 E. 47 St., New York 10017)

10–13. International Conf. on **Magnetics** (Intermag), 10th, Inst. of Electrical and Electronics Engineers, Kyoto, Japan. (D. H. Looney, Bell Telephone Laboratories, Inc., Whippany, N.J. 07981)

10–14. Modern Trends in **Activation Analysis**, 4th intern. conf., Saclay, France. (P. L. Leveque, Centre d'Etudes Nucléaires de Saclay, B. P. No. 2, 91-Gif-sur-Yvette, France)

10–14. American Assoc. of **Immunologists**, Atlantic City, N.J. (Mrs. B. B. Reines, AAI, 9650 Rockville Pike, Bethesda, Md. 20014)

10–14. **Nuclear Activation Techniques in the Life Sciences**, Intern. Atomic Energy Agency, Ljubljana, Yugoslavia. (IAEE, Kärntnerring 11-13, A-1011 Vienna, Austria)

10–15. **Optical** Soc. of America, New York, N.Y. (Miss M. E. Warga, OSA, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

11–13. Conference on **Phosphorus in Fresh Water and the Marine Environment**, Intern. Assoc. on Water Pollution Research, London, England. (K. J. Ives, Dept. of Civil and Municipal Engineering, University College, London, Gower St., London, W.C.1)

12–14. **Machine Perception of Patterns and Pictures**, Teddington, Middlesex, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London SW1X 8QX, England)

13–15. American Assoc. of **Physical Anthropologists**, Lawrence, Kans. (E. I. Fry, Box 339, Southern Methodist Univ., Dallas, Tex. 75222)

13–15. **Population** Assoc. of America, Toronto, Ont., Canada. (J. W. Brackett, PAA, P.O. Box 14182, Benjamin Franklin Sta., Washington, D.C. 20044)

14. Utah **Acad. of Sciences, Arts and Letters**, Provo. (K. T. Slack, Marriott Library, Univ. of Utah, Salt Lake City 84112)

14–16. American **Psychosomatic** Soc., 29th annual, Boston, Mass. (H. Weiner, APS, 265 Nassau Rd., Roosevelt, N.Y. 11575)

16–19. National Council of **Teachers of Mathematics**, 50th annual, Chicago, Ill. (J. D. Gates, NCTM, 1201 16th St., Washington, D.C. 20036)

BOOKS RECEIVED

(Continued from page 686)

son, Ed. Plenum, New York, 1971. xiv, 294 pp., illus. $19.50.

Cosmopolitan World Atlas. Rand McNally, New York, ed. 2, 1971. Variously paged. $19.95.

Cranio-facial Growth in Man. A conference, Ann Arbor, Mich., May 1967. Robert E. Moyers and Wilton M. Krogman, Eds. Pergamon, New York, 1971. x, 360 pp., illus. $18.75.

Curves and Automation: The Scientists' Plot. Jesse Dilson. Lippincott, Philadelphia, 1971. 144 pp., illus. $5.50.

Cybernetics, Art and Ideas. Jasia Reichardt, Ed. New York Graphic Society, Greenwich, Conn., 1971. 208 pp., illus. $13.50.

Electron Scattering from Complex Nuclei. Part A. Herbert Uberall. Academic Press, New York, 1971. xvi, 480 pp., illus. $24. Pure and Applied Physics, vol. 36.

Encyclopedia of Animal Care (Formerly Black's Veterinary Dictionary). William C. Miller and Geoffrey P. West. Williams and Wilkins, Baltimore, Md., ed. 9, 1970. viii, 1014 pp., illus. $15.50.

Fabre. Poet of Science. G. V. Legros. Translated by Bernard Miall. Horizon, New York, 1971. 352 pp. $7.50. Reprint of the 1913 edition.

Fast Reactions. David N. Hague. Wiley-Interscience, New York, 1971. viii, 160 pp., illus. $8.50.

Food Study Manual. Helen Charley. Ronald, New York, ed. 2, 1971. xii, 276 pp., illus. Paper, $5.50.

The Gary Schools. Randolph S. Bourne. M.I.T. Press, Cambridge, Mass., 1970, lxviii, 324 pp., illus. $12.50. Reprint of the 1916 edition.

The Genetics of Human Populations. L. L. Cavalli-Sforza and W. F. Bodmer. Freeman, San Francisco, 1971. xviii, 966 pp., illus. $27.50.

Ground Water. A Selected Bibliography. Frits van der Leeden, Ed. Water Information Center, Port Washington, N.Y., 1971. x, 116 pp. $15.

Homeopathy in America. The Rise and Fall of a Medical Heresy. Martin Kaufman. Johns Hopkins Press, Baltimore, Md., 1971. xii, 206 pp. $10.

Hormones in Development. A conference, Nottingham, England, Sept. 1968. Max Hamburgh and E. J. W. Barrington, Eds. Appleton-Century-Crofts, New York, 1971. xx, 854 pp., illus. $30.

The Human Aviary. A Pictorial Discovery of New Guinea. Kenneth E. Read. Photographs by George Holton. Scribner, New York, 1971. 64 pp. $6.95. A Scribner Portfolio in Natural History.

Immunity and Tolerance in Oncogenesis. A conference, Perugia, Italy, June 1969. Lucio Severi, Ed. Division of Cancer Research, Perugia, 1970. 2 vols., boxed. xcvi, 1310 pp., illus. $60.

The Kaiser-Permanente Medical Care Program. One Valid Solution to the Problem of Health Care Delivery in the United States. A symposium, Oakland, Calif., March 1971. Anne R. Somers, Ed. Commonwealth Fund, New York, 1971 (distributor, Association of American Medical Colleges, Washington, D.C.). xii, 238 pp., illus. Paper.

The Language of Sociology. Charles W.

Lachenmeyer. Columbia University Press, New York, 1971. xii, 130 pp., illus. $7.50.

Languages of the Brain. Experimental Paradoxes and Principles in Neuropsychology. Karl H. Pribram. Prentice-Hall, Englewood Cliffs, N.J., 1971. xvi, 432 pp., illus. $9.50.

The Logic of Science in Sociology. Walter Wallace. Aldine-Atherton, Chicago, 1971. 140 pp., illus. Cloth, $6; paper, $2.45.

Making New Schools. Joseph Turner. McKay, New York, 1971. xiv, 302 pp., illus. Cloth, $5.95; paper, $2.95.

Measure and Category. A Survey of the Analogies between Topological and Measure Spaces. John C. Oxtoby. Springer-Verlag, New York, 1971. viii, 96 pp., illus. Paper, $7.50. Graduate Texts in Mathematics, 2.

Signal Processing, Modulation, and Noise. J. A. Betts. Elsevier, New York, 1971. xii, 292 pp., illus. $12. Science and Technology Series.

Social Control and Social Change. John Paul Scott and Sarah F. Scott, Eds. University of Chicago Press, Chicago, 1971. x, 238 pp. $7.95.

Soils. An Introduction to Soils and Plant Growth. Roy L. Donahue, John C. Shickluna, and Lynn S. Robertson. Prentice-Hall, Englewood Cliffs, N.J., ed. 3, 1971. xx, 588 pp., illus. $9.95.

Spontaneous and Virus Induced Transformation in Cell Culture. J. Pontén. Springer-Verlag, New York, 1971. iv, 256 pp., illus. $22.50. Virology Monographs, vol. 8.

Statistical Abstract of Latin America, 1969. Kenneth Ruddle and Mukhtar Hamour, Eds. Latin American Center, University of California, Los Angeles, 1970. xvi, 382 pp. + foldout tables. Cloth, $12; paper, $8.

Stereochemistry of Carbohydrates. J. F. Stoddart, Wiley-Interscience, New York, 1971. xiv, 249 pp., illus. $14.95.

A Stereotactic Atlas of the Brainstem of the Mallard (Anas platyrhynchos L.) A Stereotactic Apparatus for Birds and an Investigation of the Individual Variability of Some Headstructures. G. A. Zweers. Van Gorcum, Assen, The Netherlands, 1971 (U.S. distributor, Davis, Philadelphia). viii, 148 pp., illus. $20. Studies in Neuro-Anatomy, vol. 10.

Steroid Protein Interactions. U. Westphal. Springer-Verlag, New York, 1971. xiv, 568 pp., illus. $24.90. Monographs on Endocrinology, vol. 4.

Stimulus and Sensation. Readings in **Sensory Psychology.** William S. Cain and Lawrence E. Marks, Eds. Little, Brown, Boston, 1971. x, 326 pp., illus. Paper, $5.95.

Teaching Elementary Science. Through Investigation and Colloquium. Brenda Lansdown, Paul E. Blackwood, and Paul F. Brandwein. Harcourt Brace Jovanovich, New York, 1971. xiv, 434 pp., illus. Paper, $5.95.

Trees. Structure and Function. Martin H. Zimmermann and Claud L. Brown. Springer-Verlag, New York, 1971. xiv, 336 pp., illus. $19.80.

Twentieth Century Theme. A Philosophical Study. D. W. Gotshalk. Coronado, Lawrence, Kans., 1971. vi, 56 pp. Paper, $2.