

SCIENCE

11 July 1969

Vol. 165, No. 3889

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Until now Raman Spectrophotometers have been huge conglomerates of non-standard equipment, difficult to operate and far too expensive for most labs to buy.

Now, that's changed. Spectra-Physics' Model 700 Raman Spectrophotometer puts it all on a 40 x 23 inch bench top and makes it push-button easy . . . at half the price of previous units.

To accomplish this Raman revolution, Model 700 was designed as an integral unit, with all components engineered and packaged to obtain the best possible spectra at the lowest possible cost.

For example, by designing a fast new double monochromator especially for the 700, it was possible to use the casting as the backbone of the instrument. Then, advanced detector circuitry, all-solid-state electronics, sample chambers, xy recorder, ITT FW-130 photocathode, and Spectra-Physics Model 124 laser were all matched to obtain the design goal.

The result is a compact, high performance Raman Spectrophotometer that even a child can operate. Put it on the

lab bench, plug it in, push three buttons and the spectra records . . . accurately and rapidly.

Digital controlled scanning permits the 700 to run a full spectrum, 4000 wavenumbers, in 2 minutes, or in 80 minutes, or in any one of four speeds in between. The data can be recorded in six different scales and is presented in easy to use and store form with direct wavenumber readout on the 11 x 17 xy plotter.

Designed to accommodate samples in liquid, powder or solid form, Model 700 contains provision for rotation of the laser beam and for analyzing either polarization to allow depolarization measurements.

With a scanning range of 23,500 to 11,300 wavenumbers, Model 700 can be used with the entire range of laser sources. Thermoelectric cooling of the selected S-20 photomultiplier can also be added for the ultimate in sensitivity.

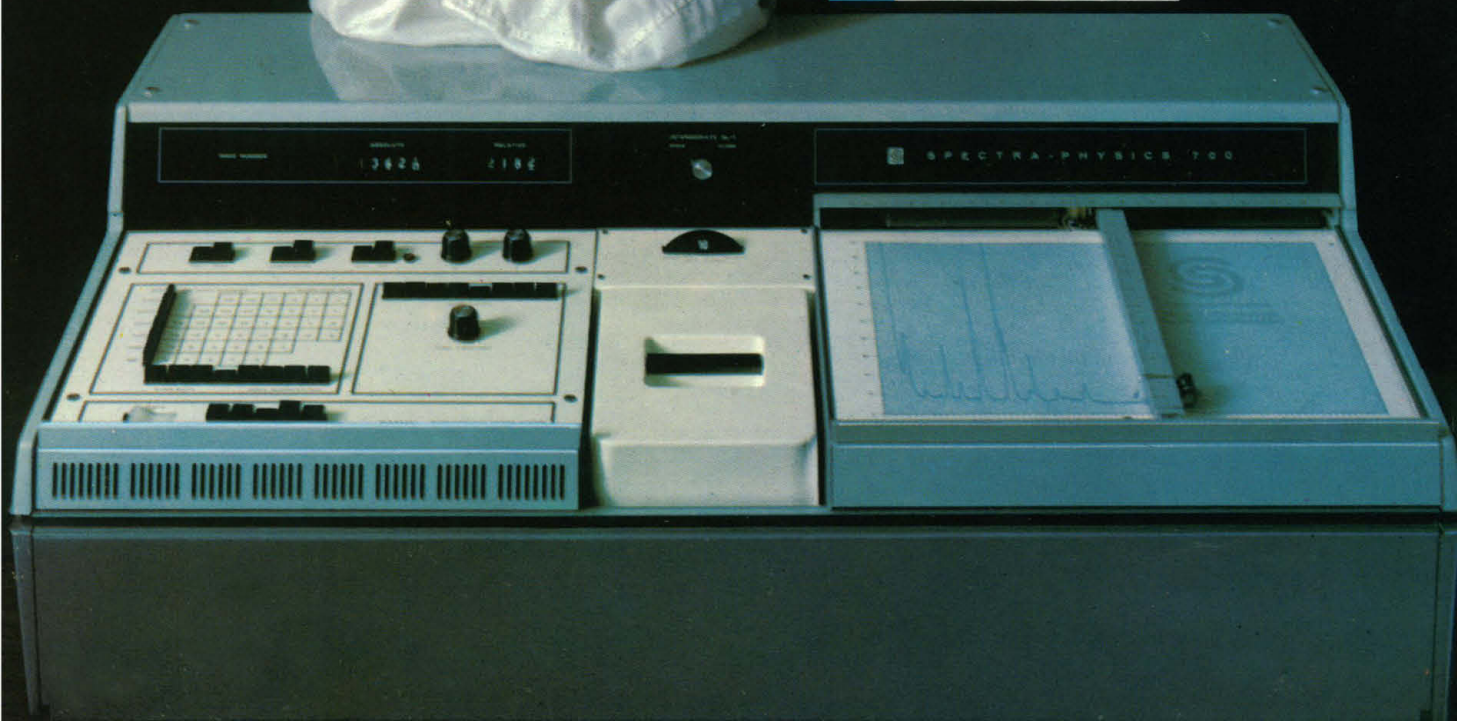
The price, installed in your laboratory, is \$24,900.* For complete specifications and applications information contact: Spectra-Physics, 1250 West Middlefield Road, Mountain View, California 94040 (415) 961-2550.

A simple Raman spectrophotometer that doesn't take up the whole bloomin' room . . . and budget

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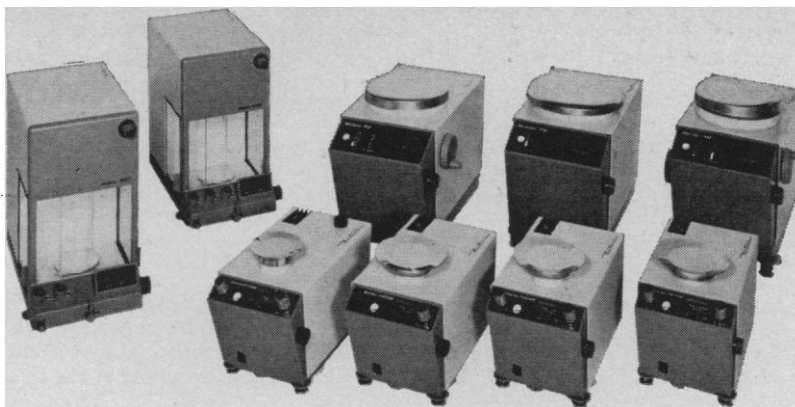
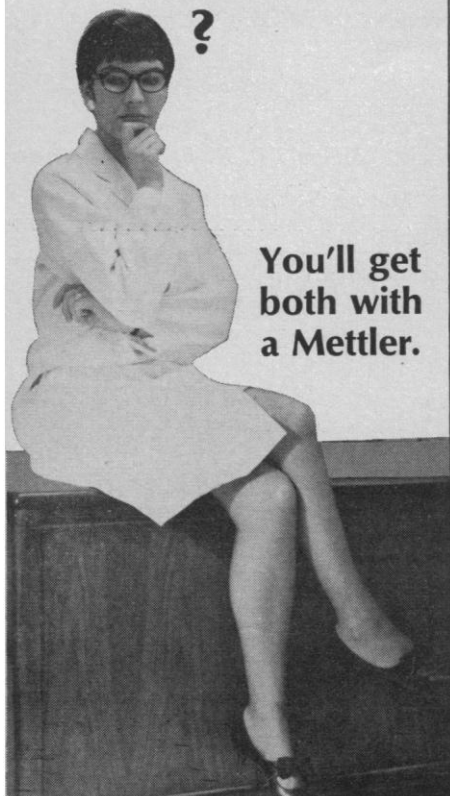
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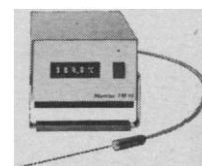
You get two balances for the price of one with our Mettler Model H20. It combines the capacity of a macro analytical with the precision of a semi-micro. Some Mettler analyticals give an instant reading of the approximate weight on the pan. We call this feature preweighing.

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Need clearly printed records of your weighings? Check our Models H10P and H20P which print out results on adhesive-backed paper. Then there's our sophisticated H20E electronic. As it weighs, it generates an analog signal which can be fed to compatible instrumentation such as recorders. The H20E can also be interfaced with computer or other control equipment to continuously monitor and keep weight changes within predetermined limits.

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For information or a demonstration of a Mettler balance or the new TM 15, write Mettler Instrument Corporation, 20 Nassau St., Princeton, N.J. 08540.

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COVER

Adult female monkey (*Cebus capucinus*) sitting in and feeding on *Gustavia superba*. See page 187. [J. R. Oppenheimer, Johns Hopkins University]

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

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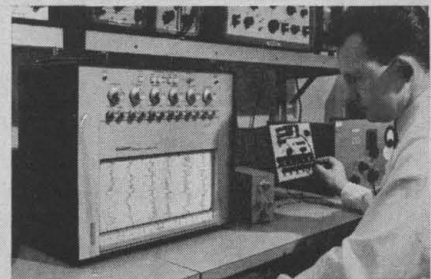
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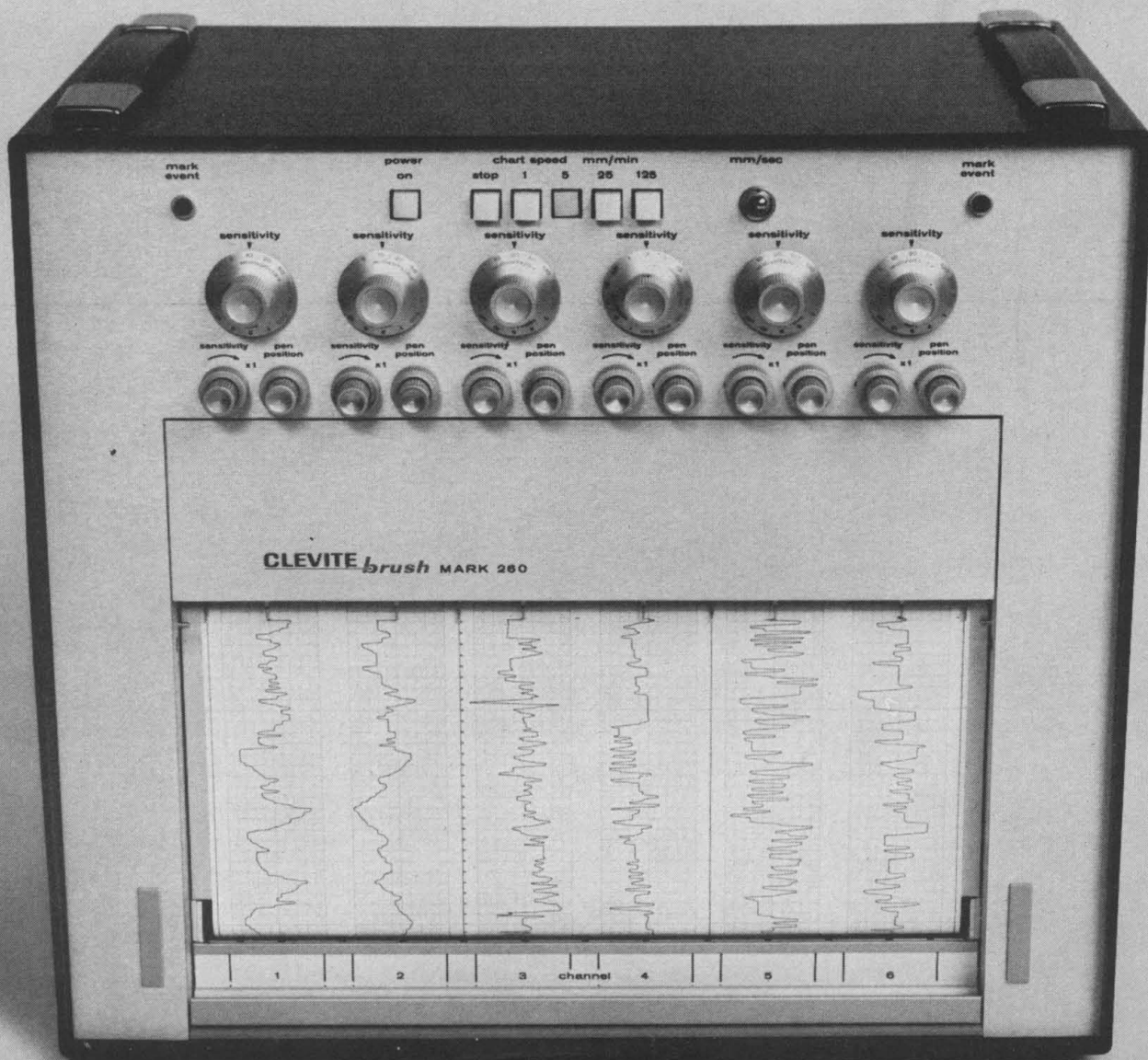
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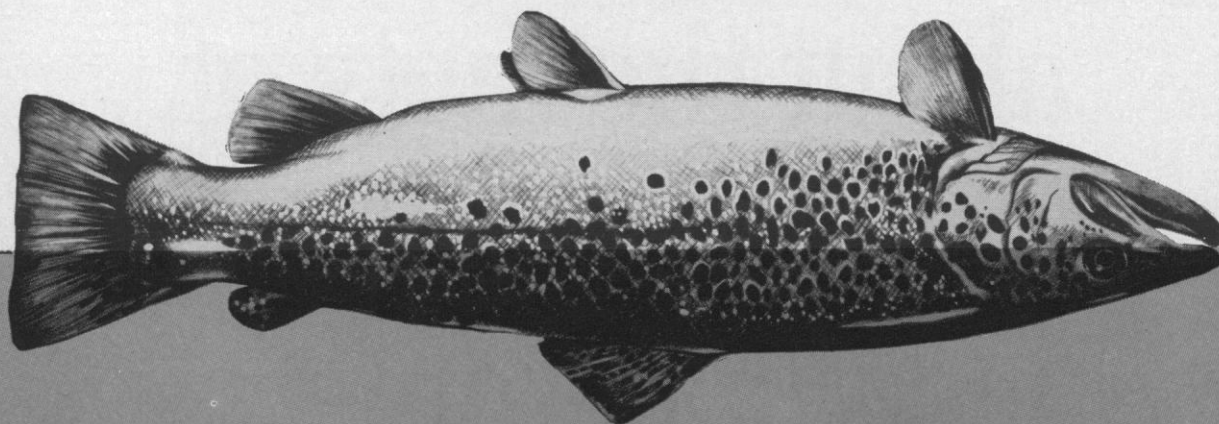
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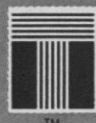
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Are you being misled about the facts of Linear Absorbance Spectrophotometry?

“Similar” does not mean *the same*; nor is “equivalent” necessarily *equal*.

In spectrophotometers, for example, several manufacturers may use certain components of similar design such as the prism system or photomultiplier. Yet, *only one* has the essential elements that make the difference between ordinary and extraordinary results.

If you are considering the purchase of a spectrophotometer — whether a basic, general purpose system or a system for enzyme analysis — the following questions deserve your careful consideration.

Is the system linear with absorbance, or with % Transmittance?

Gilford Instrument Laboratories pioneered the application of a unique, patented photometer to standard UV-VIS spectrophotometry. The results were — and are — extraordinary.

The Gilford Photometer provides an accurate, linearized output *directly in absorbance* throughout the measuring range of 0.000 to 3.000 *A*.

The specifications of photometric accuracy, linearity and repeatability apply throughout the entire linear absorbance measuring range; they are not limited to a single point as are those of % Transmittance photometers. Gilford photometric accuracy is specified as 0.5 *A* throughout the entire range, not as a % *T* value at zero only.

Can absorbance be read easily and clearly?

In the Gilford system, the usual needle type

meter is replaced by a clearly readable four-digit scale which responds to the photometer output. Single sample measurements are registered *directly in absorbance*, and are readable to 0.001 *A* throughout the complete 0.000 to 3.000 *A* range.

This digital readout is *standard*, at no additional cost, in all Gilford systems.

Are recording sensitivity and response stable or variable?

The linear absorbance output of the Gilford Photometer is applied directly to a linear strip chart recorder which can be calibrated to 0.1 *A* full scale, throughout any portion of the 0.0 to 3.0 *A* range. Recording sensitivity and response are constant, directly in absorbance.

The photometer signal is linear with absorbance, extremely stable, and has an inherently low noise level. There is no need for damping circuitry which impedes recorder sensitivity and response, and distorts input data.

In % Transmittance systems, the inherent short term variations of photometer output (noise) are heightened in the conversion from % *T* to absorbance. Damping must be employed to minimize this effect.

Is the sample positioner suitable for enzyme studies in the automatic mode?

Gilford Instrument Laboratories originated the Automatic Cuvette Positioner, a device which replaces the usual manual positioner and permits absorbance changes in more than one sample to be registered sequentially on the same chart as a function of time. Four positions were deliberately chosen, instead of more, so that 4 plot points could be registered for each sample every 15 seconds — 16 points for every sample every 4 minutes. Time lapse between complete cycles is minimal, in contrast with certain cuvette positioning devices which require almost a one minute time lapse before a second cycle can begin.

The Gilford Automatic Cuvette Positioner thus provides a detailed record of enzyme catalyzed reaction rates that fully meets the requirements of the majority of enzyme kinetics procedures. Positioning accuracy and repeatability are so precise that micro cuvettes as well as semimicro and standard cuvettes can be used.

Other capabilities are temperature control and measurement, simplified manual opera-

tion, the use of flow through cuvettes, and an exclusive offset feature.

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A microscope in the field is worth two in the lab ...for some applications

There are many situations—away from the lab—where the opportunity for on-the-spot use of a microscope can be most valuable, even essential. The veterinarian determining the sperm virility of a prize bull would certainly find this more practical than taking either the animal or the specimen to his laboratory. The public health man working on pest control or water pollution, can pack a prodigious amount of work into his field trips by simply screening and classifying samples on-the-spot; pre-selecting those warranting final study in the lab.

The Nikon H hand or field microscope was designed for just such applications. Notwithstanding its diminutive size (it's no larger than a 35mm camera) the Nikon H is a sophisticated, precision instrument. It is equipped with a 10X screw-in, wide-field eyepiece and a rotating nosepiece which accepts any three of the following parfocal, achromatic objectives: 4X, 10X, 40X and oil immersion 100X. The Nikon H also has a built-in Abbe double-lens condenser with iris diaphragm.

Illumination is provided by either daylight, or a built-in incandescent lamp powered by two self-contained penlight batteries. All controls for fine focusing, nosepiece rotation and slide manipulation are conveniently located, yet recessed to prevent accidental disturbance.

Among the most obvious applications for the Nikon H microscope is its use as an educational tool. There are others, equally self-evident. For the benefits to be derived from the capabilities of this unique little instrument are manifold. The Nikon H is supplied complete with oil applicator, carrying case and shoulder strap.

For details and specifications, write: Nikon Inc. Instrument Division, Subsidiary of Ehrenreich Photo-Optical Industries, Inc., Garden City, N.Y. 11533.



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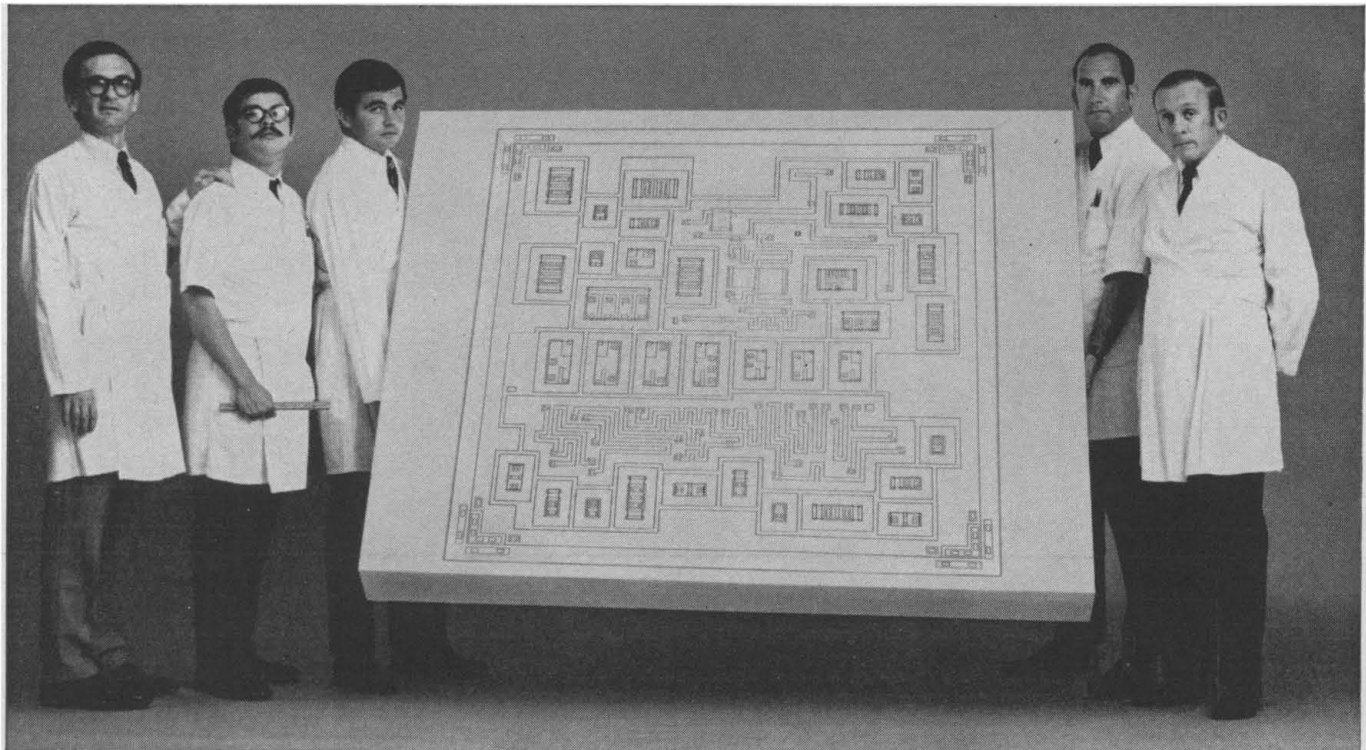
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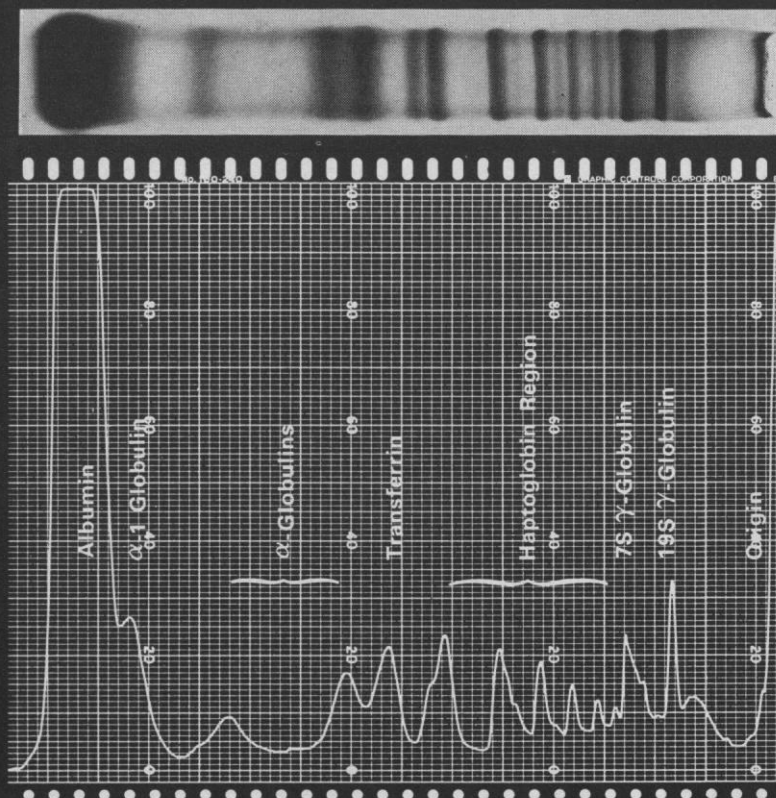
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Haptoglobin abnormalities in human serum separated by new Ortec system. Densitometric trace shows 25 peaks; area under each peak integrated and printed out digitally.

News of a major development in electrophoresis

- **marked improvement in acrylamide-gel resolution**
- **pulsed regulated power, reducing joule heating and permitting higher voltage gradients for faster separations**
- **the first digital densitometric readout**
- **protein and isoenzyme separated simultaneously in the same gel slab**

To the already familiar advantages of polyacrylamide-gel electrophoresis, Ortec brings advances in equipment and electrochemistry that result in significantly sharpened resolution.

Pulsed constant power. The complete new Ortec system, shown for the first time at the 1969 FASEB Conference, owes a great deal of its effectiveness to a new principle of power supply. Rather than rely only on regulated current or voltage, Ortec went to the heart of joule heating, which has been a major drawback to improved electrophoretic resolution: Low-duty-cycle *pulsed constant power**, provided by the new Model 4100 Power Supply, permits very high voltage gradients free of the damaging heating effects that until now have prevented rapid enzyme separations.

Conductivity shift plus moving ion boundary. With the new high-resolution Ortec system, a wide differential in ionic strength (conductivity shift) between buf-

fered sample and gel allows the rapid formation of very thin starting zones. Pulsed constant power is then increased, and a boundary or envelope of fast- and slow-moving ions moves down, further sharpening the zones sequentially. Separations of proteins and isoenzymes are completed in one-half to three-quarters the time required in previous techniques. As many as thirty clearly defined component bands now appear where only about twenty could be resolved before.

Continuous pH. The new Ortec method utilizes the same pH in both the gel and the electrode-buffer tanks. No pre-electrophoresis of the gel is necessary, nor is a spacer gel required.

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*Patent pending

†Allen, R. C., Moore, D. J., and Dilworth, R. H., "A New Rapid Electrophoresis Procedure Employing Pulsed Power in Gradient Gels at a Continuous pH: The Effect of Various Discontinuous Buffer Systems on Esterase Zymograms," *Abstract, 20th Histochem. and Cytochem. Meetg.*, Atlantic City, N.J., April 1969.

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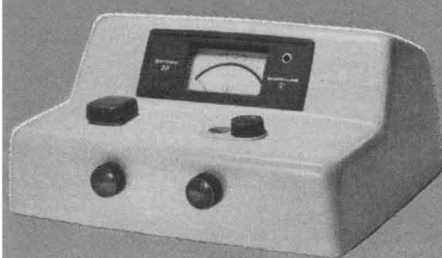
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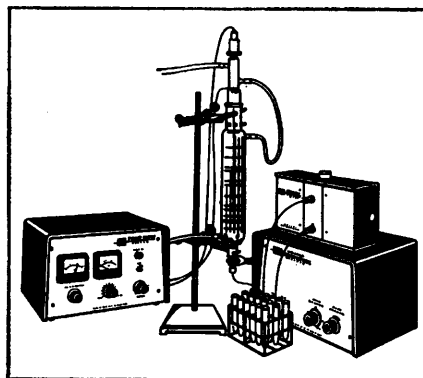
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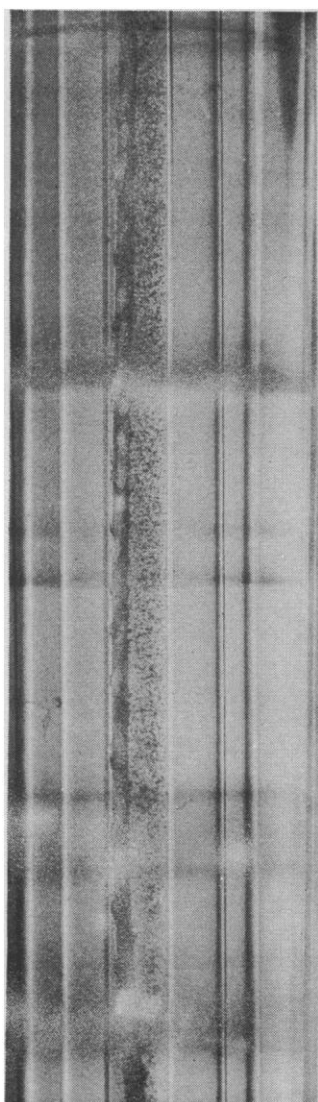
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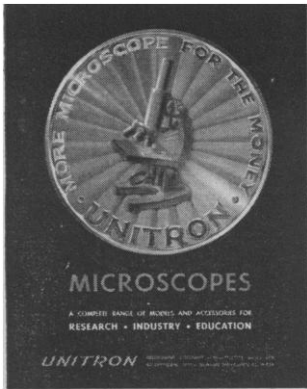


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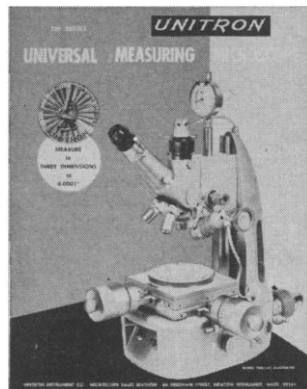
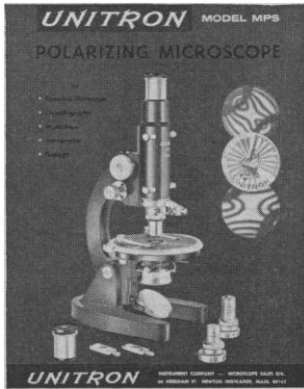
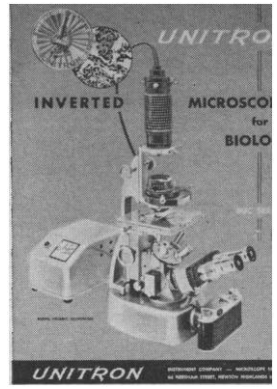
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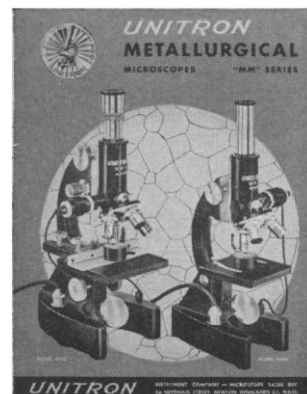
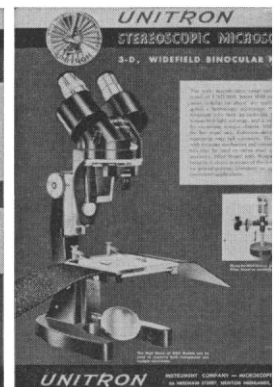
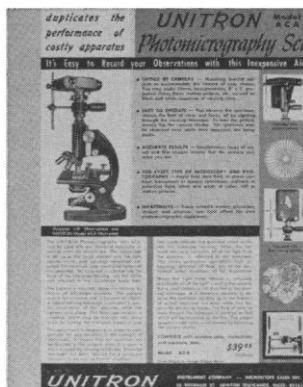
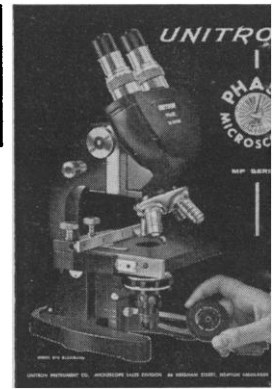
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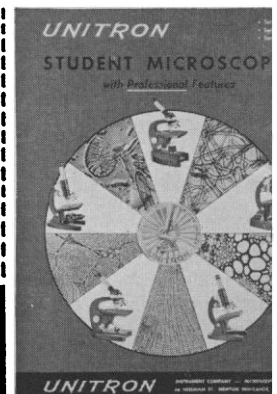
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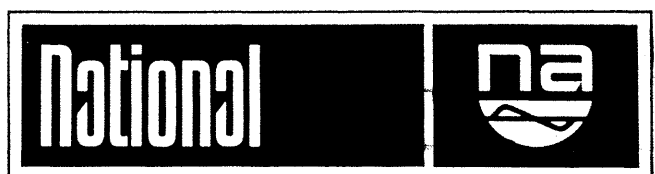
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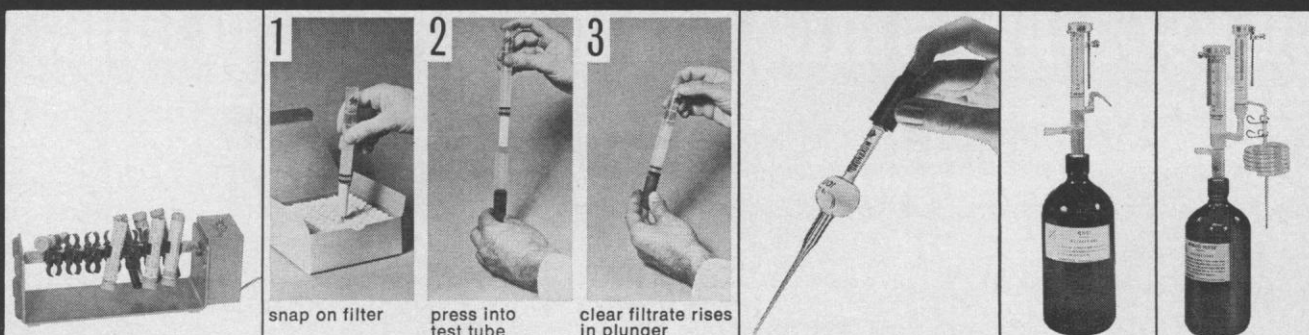


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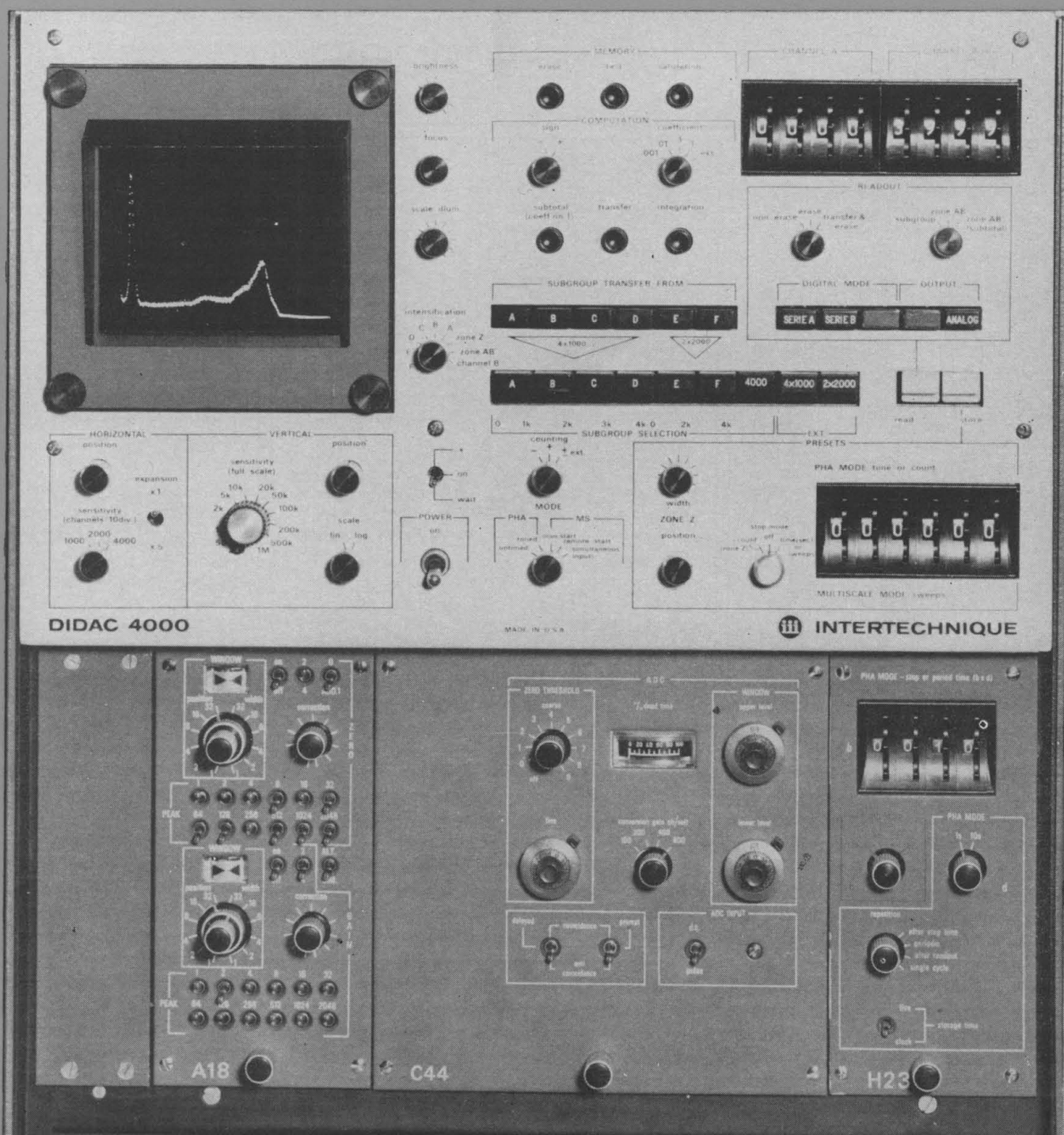
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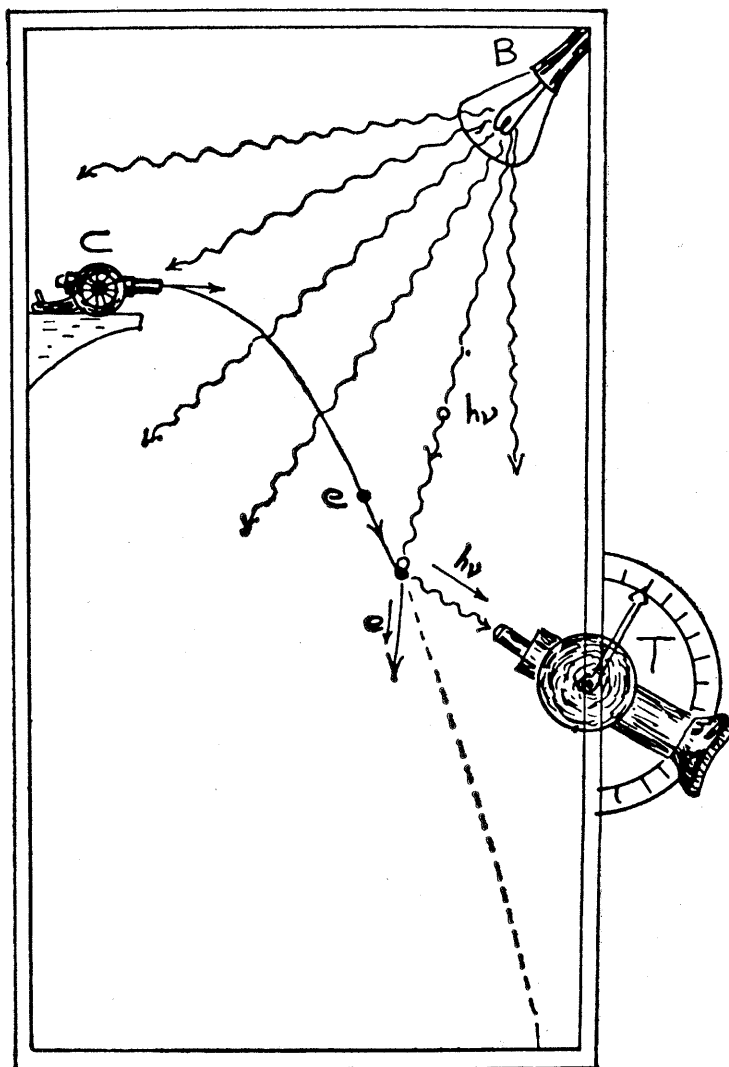
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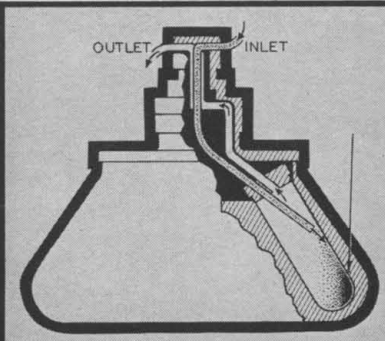


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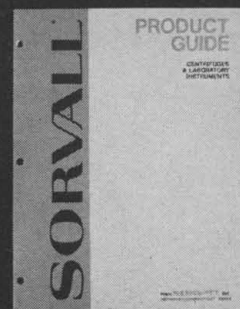
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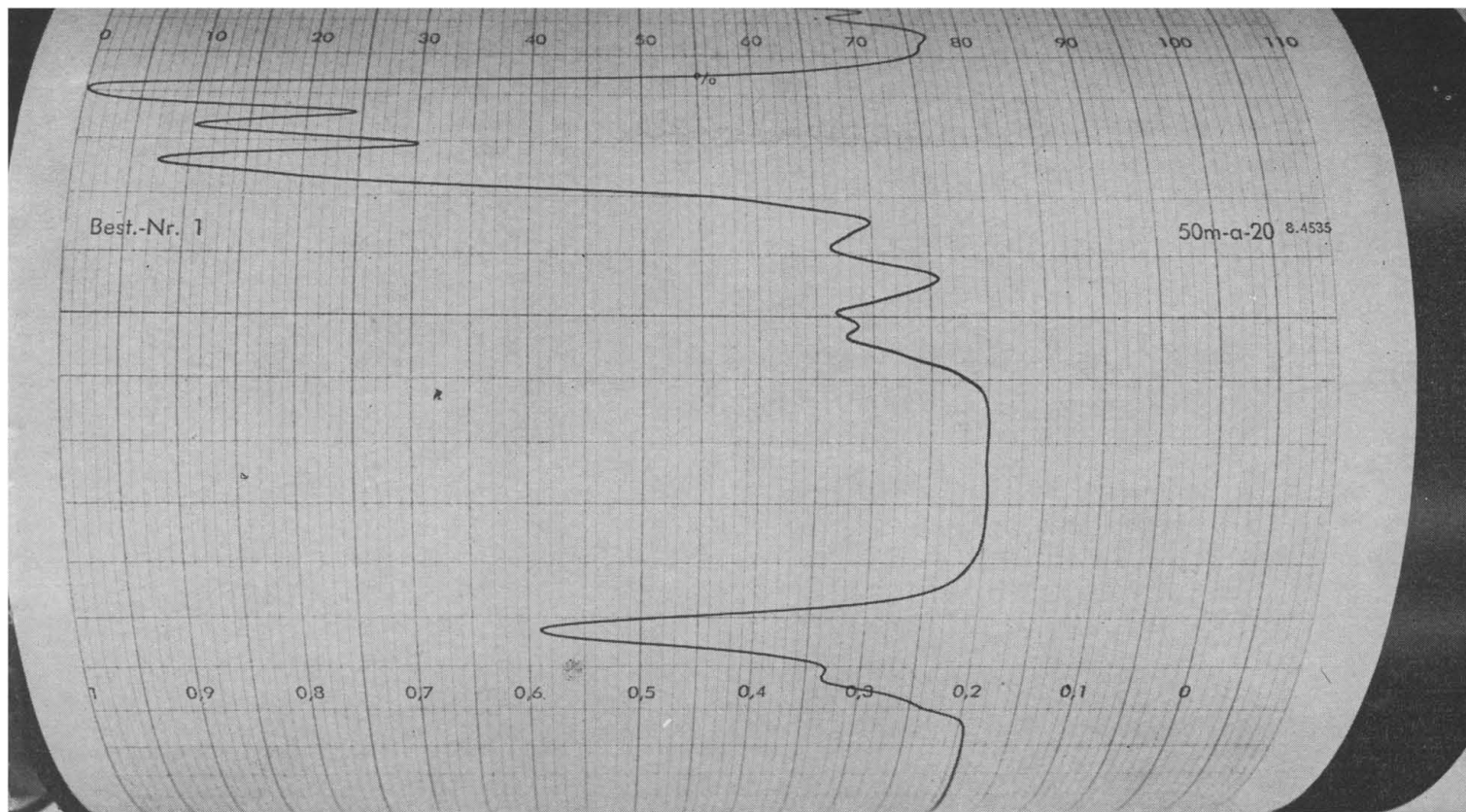
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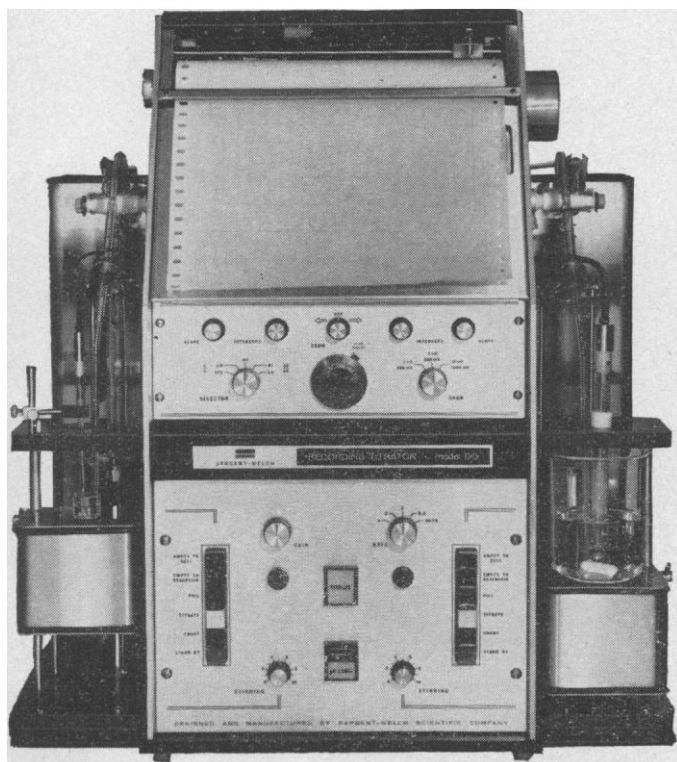
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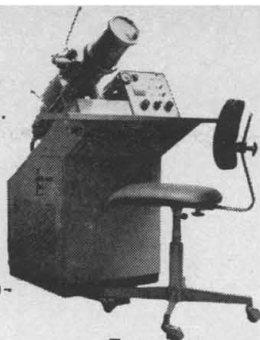
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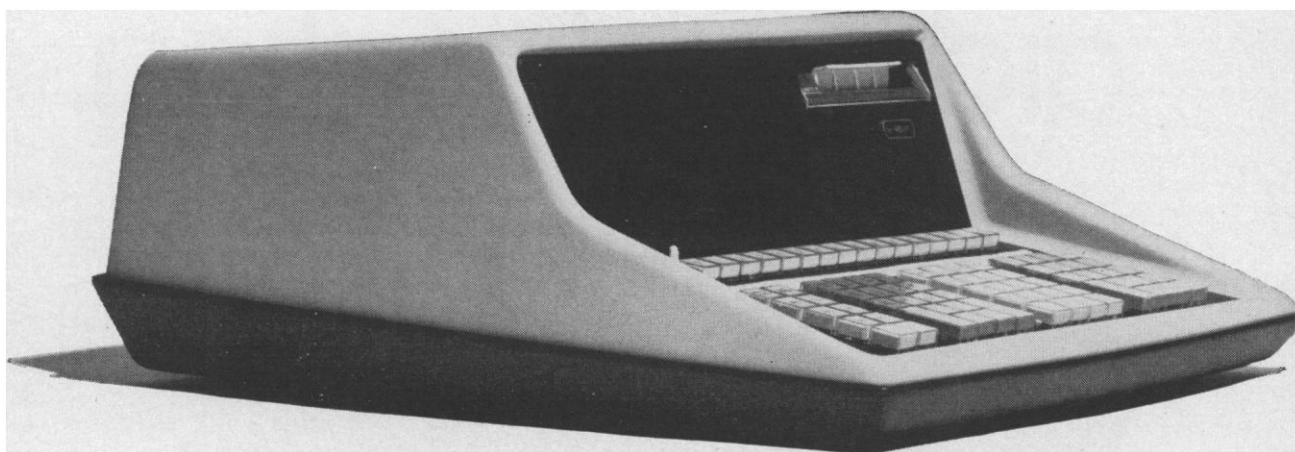


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ences of nonclinic populations. Let me remind these readers (and Weissman as well) that I did not claim that all persons have optimum access to family planning. I simply questioned the need for and appropriateness of massive, class-oriented, government intervention at the clinical level—especially since there are still unexplored and unexploited resources in the private sector.

The possible "side effects" discussed in the article (such as charges of genocide and of encouraging sexual activity by teenage girls) are smoldering public issues (not personal objections, as suggested by Frank and Reynolds). When these are combined with the possibility of physiological side effects from birth control drugs, the potential explosiveness of the mixture cannot be entirely ignored. However, I do not argue that the government should hesitate to act because of a threat of this sort—if the issue is one clearly involving national welfare and requiring its resources and authority. I have argued, rather, that no one has demonstrated convincingly that family planning "deprivation" in the United States today is such an issue.

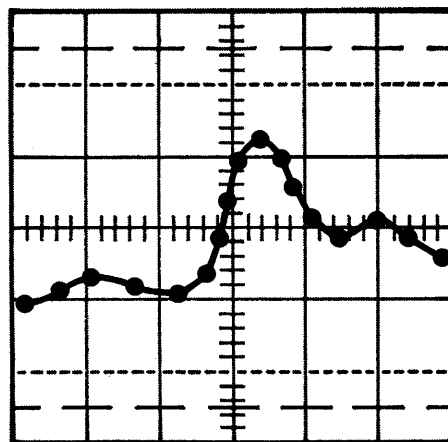
JUDITH BLAKE

Department of Demography,
University of California,
Berkeley 94720

Social Science in the Marketplace

Willeke's letter (16 May) discusses the problem of plans developed by technical experts and subsequently "rejected by the people." He urges a better understanding of such resistance to social changes and suggests that the services of social scientists be used to implement proposals that might otherwise be rejected.

Thompson's original article (14 Mar., p. 1180) reported the defeat of a conservation plan. Willeke refers to controversies surrounding the fluoridation of municipal water supplies and the planning of freeways in urban areas. Using social scientists to help secure the adoption of proposals of these types raises important ethical issues. Should the scientist (whether "social" or "physical") make his services available to all who request it? Can social scientists adopt such a "morally neutral" position? Ten years ago I was active in several campaigns involving fluoridation of municipal water supplies. Shortly thereafter I refused to participate in a social-



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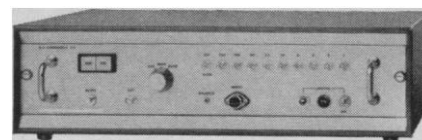
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psychological study of the reasons why scientists refuse to participate in research on chemical and biological warfare. Ten years ago I might well have offered my services to groups seeking to overcome objections to major freeway proposals. Today I would not participate in such a project. How often are such questions discussed in graduate psychology or sociology training programs or at the annual meetings of the relevant professional associations?

College students are increasingly inquiring about our society's utilization of its highly sophisticated technical skills and knowledge. Protests against war-related research have occurred on numerous campuses. Is the scientist similar to the oft-described worker on the Detroit assembly line who is concerned only about the particular operation which is his responsibility? Should he not be concerned about the end-product which results from his efforts?

Social scientists often can contribute to the understanding of complex group and individual behavior. Clearly, however, the caveats that increasingly are being raised about the uses (and misuses) of science in general apply equally to the behavioral sciences.

THOMAS F. A. PLAUT

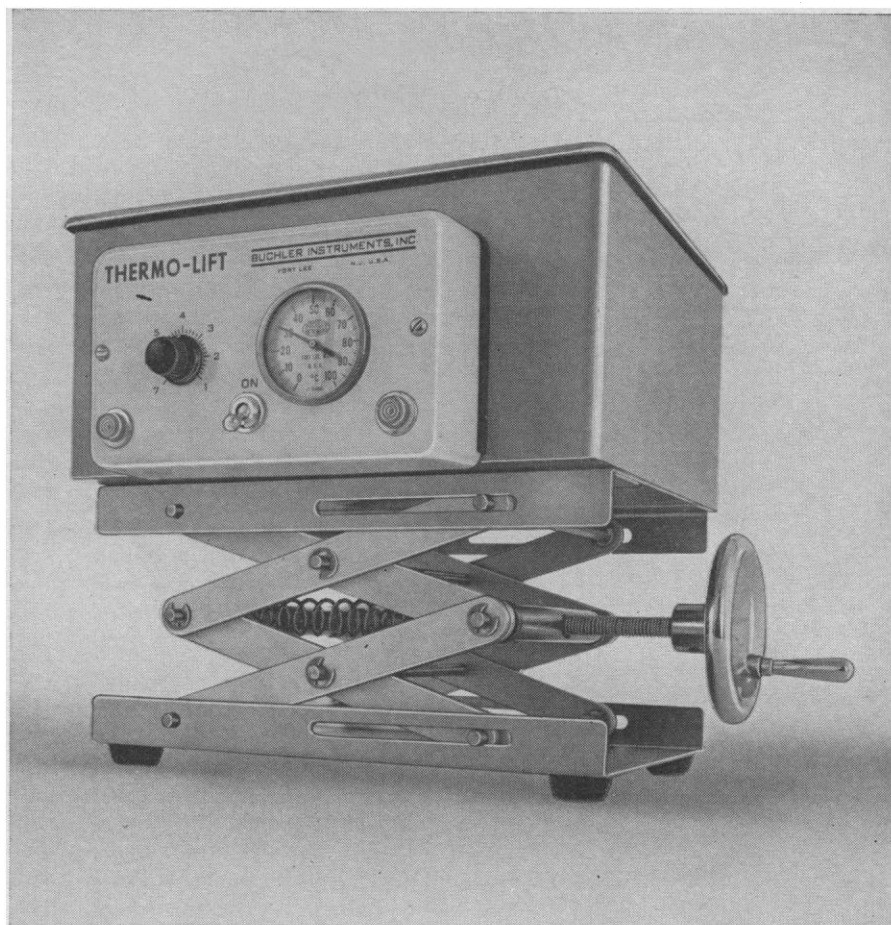
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Lysine Enrichment:

Do We Need It?

Paul B. Hamilton's letter (16 May) regarding the value of fortification of wheat with lysine was sharply critical of the Food and Drug Administration and other governmental agencies for failing to expedite a formal lysine fortification program. Hamilton failed to mention several key facets of the problem—facets which bear strongly on the wisdom of decisions on public policy in dealing with both domestic and international nutritional problems.

As a general principle, two broad types of data can justify serious consideration of enriching basic food commodities in attempting to control malnutrition. One of these consists of thorough and reliable survey data showing widespread deficiency of the nutrient in question among the population. With the B-vitamins, vitamins A and D, iron and iodine, such data were available for the United States prior to our enrichment and fortification programs for wheat, corn, and salt. Absolutely no such data indi-

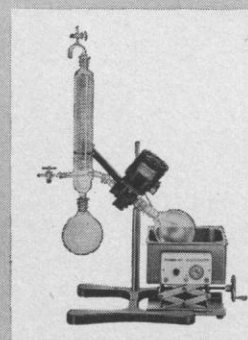


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cating widespread lysine deficiency have appeared, however.

The second type of data justifying fortification consists of field demonstrations that fortification of the type proposed yields a significant public health response among the population groups in question. The advocates of lysine fortification also have not produced data of this type. They do have voluminous data showing that lysine enrichment of wheat protein is beneficial to the rat under rigidly controlled dietary conditions and very limited data on infants, again under rigid metabolic ward conditions and restricted diets, showing a lysine response. There are, however, no field demonstrations of a significant lysine response on the part of either adults or children. The equivocal data resulting from such a study in which I participated [*American Journal of Clinical Nutrition* 12, 36 (1963)] are typical.

Those of us who hesitate to recommend lysine fortification of cereals do so because data indicating potentially significant public health benefits to be derived from such a program are lacking. Until positive results of this kind are available, it seems to us to be poor public policy to launch a program at home or abroad on the basis that lysine fortification might, rather than would, contribute to alleviation of the world food deficit.

KENDELL W. KING

Research Corporation,
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Reprint Clearinghouse

Potter's proposal (Letters, 7 Mar.) that "reprints should be paid for by the laboratory that requests them and not by the laboratory that generates them" indicates the widespread feeling of scientists that responsibility for dissemination of results does not extend beyond publication of an article. A practical solution would be for publishers to sell and distribute reprints through one central clearinghouse operated jointly on a prepaid basis by cooperating publishers of all scientific journals. If reprints cost less than making a copy (perhaps 3 cents per page with a 20-cent handling and mailing charge) and were mailed rapidly with a guarantee that all orders would be filled, the volume would be very high, yielding a substantial return even though per item profit would be

low (the reverse of some existing and proposed systems).

Scientists would buy 10-cent coupons in advance and send them with a mark-sense form-card giving a single order number (taken from the published article) identifying the document and the number of coupons required. Order cards would be automatically processed with payments credited to cooperating publishers. The cards would then be sorted by order number to match the arrangement of articles on the shelves. Clerks could pull several thousand articles from shelves in one sequential pass, fold each article to reveal a preprinted postage-paid authorization on the blank back page, turn the request form over to show a return address, attach it to the reprint, and mail it at low bulk rates. Total clerical time should be less than one minute per reprint mailed.

This system has potential advantages to all. Authors would no longer need to process reprint requests or pay related postage costs, but instead would be required to pay the publisher a standard amount similar to current payments for reprints as a subsidy for printing and supplying reprints to the central office. The payment is a simple and inexpensive way to discharge an important, often overlooked, responsibility to society of dissemination of results.

Publishers, with a centralized mailing operation, use of standardized prepaid coupons, automated processing of fiscal information, and a small subsidy from authors, should realize about 1.5 cents profit per page distributed out of the 3 cents charged. For 250 orders of twenty 7-page articles in one issue of a monthly journal, 1.5 cents profit per page would be equivalent (assuming a 50 percent profit) to income from 420 subscriptions to a journal costing \$30 per year.

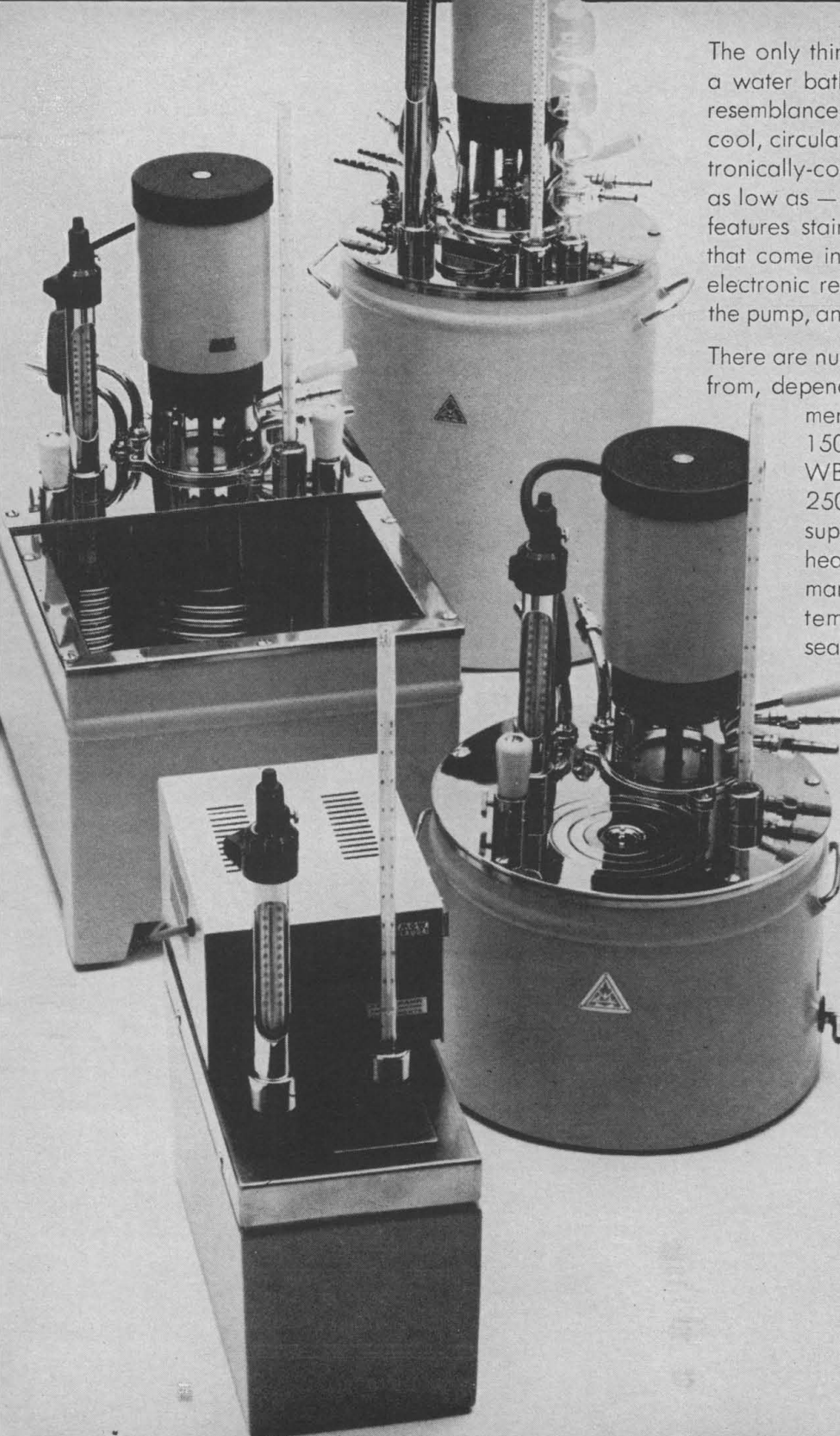
Librarians and administrators could reduce the expense and staffing of sizable copying operations. These are widespread because there is no alternative cheap method of obtaining single copies of papers. (The average number of reprints obtained by each of 108 active research scientists at the M.D. or Ph.D. level in a recent survey I made was 17 per month or 204 per year.)

Serious users of reprints would benefit most from this proposed system, since they would be assured of receiving in a matter of days reprints at less than total copying cost. A more complete description is available on request.

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Activism and the Rejection of History*

We are a society bemused in its purposes and yet secretly homesick for a lost world of inward tranquility. The thirst for illimitable knowledge now conflicts directly with the search for a serenity obtainable nowhere upon earth. Knowledge, or at least what the twentieth century acclaims as knowledge, has not led to happiness.

Ours is the most time-conscious generation that has ever lived. Our cameras, our television, our archaeological probings, our C¹⁴ datings, pollen counts, underwater researches, magnetometer readings, have resurrected lost cities, placing them accurately in stratigraphic succession. Each Christmas season the art of Ice Age Lascaux is placed beside that of Rembrandt on our coffee tables. Views of Pompeii share honors with Chichen Itza upon the television screen in the living room. We unearth obscure ancestral primates and, in the motion picture "2001," watch a struck fragment of bone fly into the air and become a space ship drifting among the stars, thus telescoping in an instant the whole technological history of man. We expect the average onlooker to comprehend the symbolism; such a civilization, one must assume, should show a deep veneration for the past.

Strangely, the results are quite otherwise. We appear to exist, instead, amidst a meaningless mosaic of fragments. From ape skull to Mayan temple we contemplate the miscellaneous debris of time like sightseers to whom these mighty fragments, fallen gateways, and sunken galleys convey no present instruction.

In our streets and on our campuses riots an extremist minority dedicated to the now, to the moment, however absurd, degrading, or irrelevant the moment may be. It is an activism that deliberately rejects the past and is determined to start life anew—indeed to reject the very institutions that feed, clothe, and sustain our swarming millions.

A yearning for a life of noble savagery without the accumulated burdens of history seems in danger of engulfing a whole generation, as it did the French *philosophes* and their 18th-century followers. Those individuals who persist in pursuing the mind-destroying drug of constant action have not alone confined themselves to an increasingly chaotic present—they are also, by the deliberate abandonment of their past, destroying the conceptual tools and values that are the means of introducing the rational into the oncoming future.

Their world, therefore, becomes increasingly the violent, unpredictable world of the first men simply because, in losing faith in the past, one is inevitably forsaking all that enables man to be a planning animal. For man's story, in brief, is essentially that of a creature who has abandoned instinct and replaced it with cultural tradition and the hard-won increments of contemplative thought. The lessons of the past have been found to be a reasonably secure instruction for proceeding against the unknown future. To hurl oneself recklessly, without method, upon a future that we ourselves have complicated is a sheer nihilistic rejection of all that history, including the classical world, can teach us. —LOREN EISELEY, *Benjamin Franklin Professor of Anthropology and the History of Science, University of Pennsylvania, Philadelphia*

* This is an excerpt from *The Unexpected Universe*, which will be published in October by Harcourt, Brace & World. Copyright © 1969 by Loren Eiseley.

Choosing a Signal Processor

by DR. E.U. COHLER, *President*
Computer Signal Processors, Inc.

Signal processing systems fall into three general categories. It is important to appreciate the differences in order to make a sensible selection.

Function-Specific

Function-specific processors are usually designed to perform a single version of a complete processing function. These systems, when developed and debugged, very often maximize performance per dollar. Unfortunately, they often result from the observation: "It's simple; we just throw together a few integrated circuits and . . .". Sadly, the result is usually functionally rigid, obsolescent, and has cost a great deal to engineer.

Algorithm-Specific

Algorithm-specific processors are designed to perform individual algorithms of general usefulness, such as Fast Fourier Transforms. This category really consists of partial systems, since these processors must be combined with either a function-specific processor or a computer. Thus it is clear that the algorithm-specific processor, like the function-specific processor, is an inherently rigid approach.

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General-purpose processors are systems whose functions are programmed rather than wired. The most flexible of the three, they combine the advantage of standard hardware with a multiple function capability. Such a system may be used for any algorithm: Fourier transforms, digital filtering, correlations, convolutions, cepstra, amplitude histograms, signal averaging, spectral densities, or statistical analyses. It can also accomplish the many odd jobs peculiar to a non-specific environment: comparison, peripherals handling, display, threshold sets, adaptation, and decision-making.

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single allelic disparity caused observable differences in the sibling data; quantitative disparity increased when two allelic differences were compared with one. Kinetic measurements indicated a minimal "responding unit" of 1 per 300 cells, a "dividing unit" of 1 per 200 cells, and a cell generation time of 18 hours. Reasons for high frequency of "responding units" in cellular immune reactions and the mechanism for recognition were discussed.

The second speaker, Eli Sercarz (University of California, Los Angeles) elaborated on in vitro experiments that were directed toward substantiating his previously formulated X-Y-Z scheme of maturation of immunocompetent cells. Briefly, this scheme involves an X cell or antigen-sensitive lymphocytic cell which, upon antigen stimulation, is converted to a Y or "memory" cell; the latter, triggered by antigen, divides and matures irreversibly to a Z or terminal cell that is a mature, antibody-producing plasma cell. Using a constant in vivo dose of 10 mg of bovine serum albumin per rabbit and exposing spleen tissue in vitro to varying levels of antigen, different levels of unresponsiveness were obtained. While the data

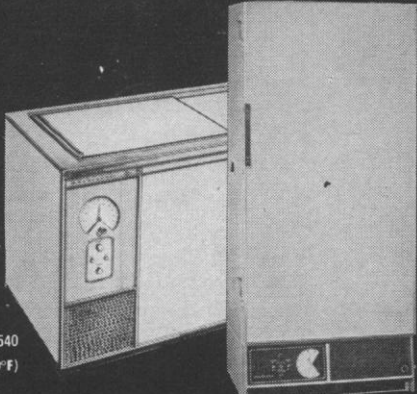
established the existence of a reversible state of in vitro paralysis, the cell stage at which paralysis occurs remains unknown. The time for establishment of memory in the primary response was less than 1 day. During this time, no cell division was required, but during the first day of the secondary response progenitor cells divided. It was concluded that it may be possible to study directly the antigen-binding activity of memory cells by sensitive techniques of micromanipulation, specific enzyme-binding antibody, and fluorimetry.

Robert Good (University of Minnesota, Minneapolis) chaired the session on "Cell Population Qualities and Kinetics in the Immune Response." Edward Boyse (Sloan-Kettering Institute for Cancer Research) spoke on "Antigenic Differentiation of Lymphoid Cells" and primarily about his own investigations. This work deals with normally occurring surface antigens, involving genetic differences among cells of the same type (for example, thymocytes) from different individuals, or phenotypic differences among the cells of a single individual. Whereas the genetic differences are of practical significance in homotransplantation, the

phenotypic differences are of special interest because they are presumably relevant to the organization of interdependent cell populations within an individual. Six antigen systems have been defined for mouse thymocytes, using cytotoxic antisera in an in vitro test. The cell surfaces have been mapped on the principle that when antibody is absorbed by one of two cell antigens of different specificity, both situated in close proximity on the cell surface, the subsequent absorption of antibody by the other antigen is impeded. All the antigens studied occur on both thymocytes and lymphocytes with the exception of one set, TL, that is present only on thymocytes. Normally the antigens are stronger on thymocytes than on lymphocytes except H-2 which has four times as much on lymphocytes as on thymocytes. The genes for H-2 and TL are linked; the others are independent in inheritance. The TL genes (*Tla*) are unexpressed in TL⁻ mice, but may be activated during leukemogenesis. Leukemia cells taken from immunized animals do not express TL antigen, but the cells regain the antigen upon passage in nonimmunized syngeneic hosts, a phenomenon termed

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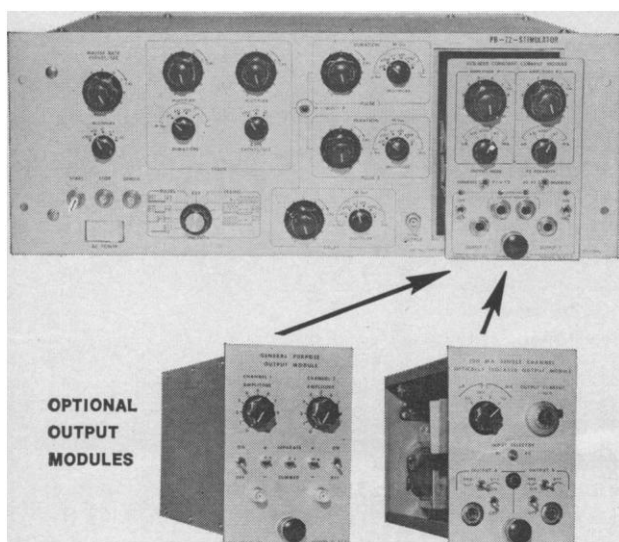
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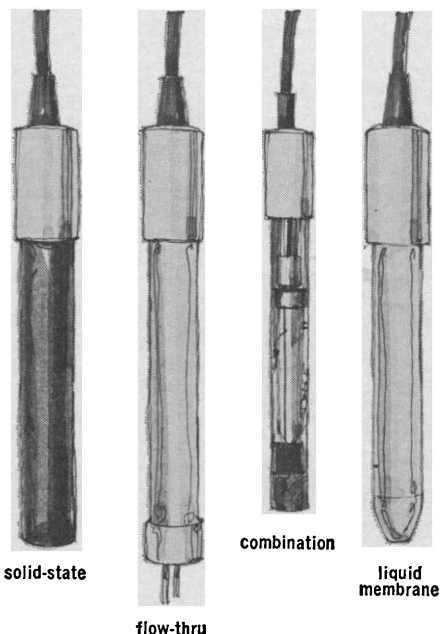
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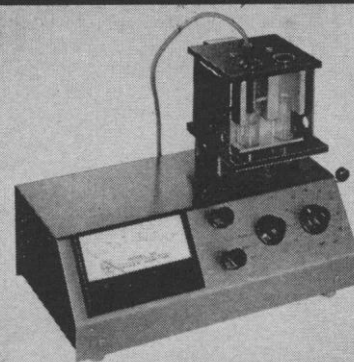
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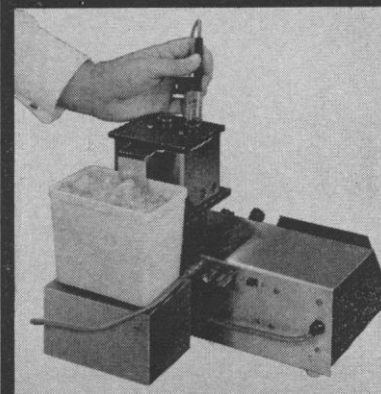
antigenic modulation. The features of antigenic modulation were amplified. It is assumed, but not established, that the cluster pattern of the antigens is a basic repetitive unit on the cell membrane.

Takashi Makinodan (Oak Ridge National Laboratories) spoke about "Kinetics of Cell Populations" and described various models of cell multiplication that might account for the exponential increase in numbers of antibody-forming cells. The experimental system of this investigator involves spleen tissue from mice stimulated with sheep red blood cells. Although the rate of cell increase is actually dependent upon antigen dose and factors such as cell migration, death, and possibly dedifferentiation, the models were simple and did not involve the latter parameters. The models differed with respect to number of recruitments (single or multiple); manner of recruitment (random or non-random); and proliferative capacity of the recruited cells (no division; synchronous or asynchronous division). The data from Perkins and other collaborators at Oak Ridge were most compatible with the model characterized as non-random, multiple recruitment, proliferating synchronously. Recruitment of cells capable of dividing would characterize a highly efficient differentiation process in which only a limited number of programmed cells need be stored at any one time.

The concluding session on "Regulation of the Immune Response" was chaired by Edwin Lennox (Salk Institute, San Diego). Coinvestigators Donald Rowley and Frank Fitch (University of Chicago) spoke on "Feedback Regulation." Model systems where regulation has been achieved were presented and factors involved were discussed from the findings. One model makes use of renal allografts in rats, and was studied for the effect of administering donor lymphoid cells from spleen or kidney (antigen) and/or antibody intravenously at various times with respect to time of the surgery. When both antigen and antibody were administered one day prior to surgery, the grafted kidneys functioned optimally, over very prolonged periods. Despite kidney survival, the treatment of the host had no effect on survival of skin grafts. Some circulating antibody against donor antigen was detected, even while the kidney grafts were fully functional. Since circulating antibody had not been totally suppressed, the



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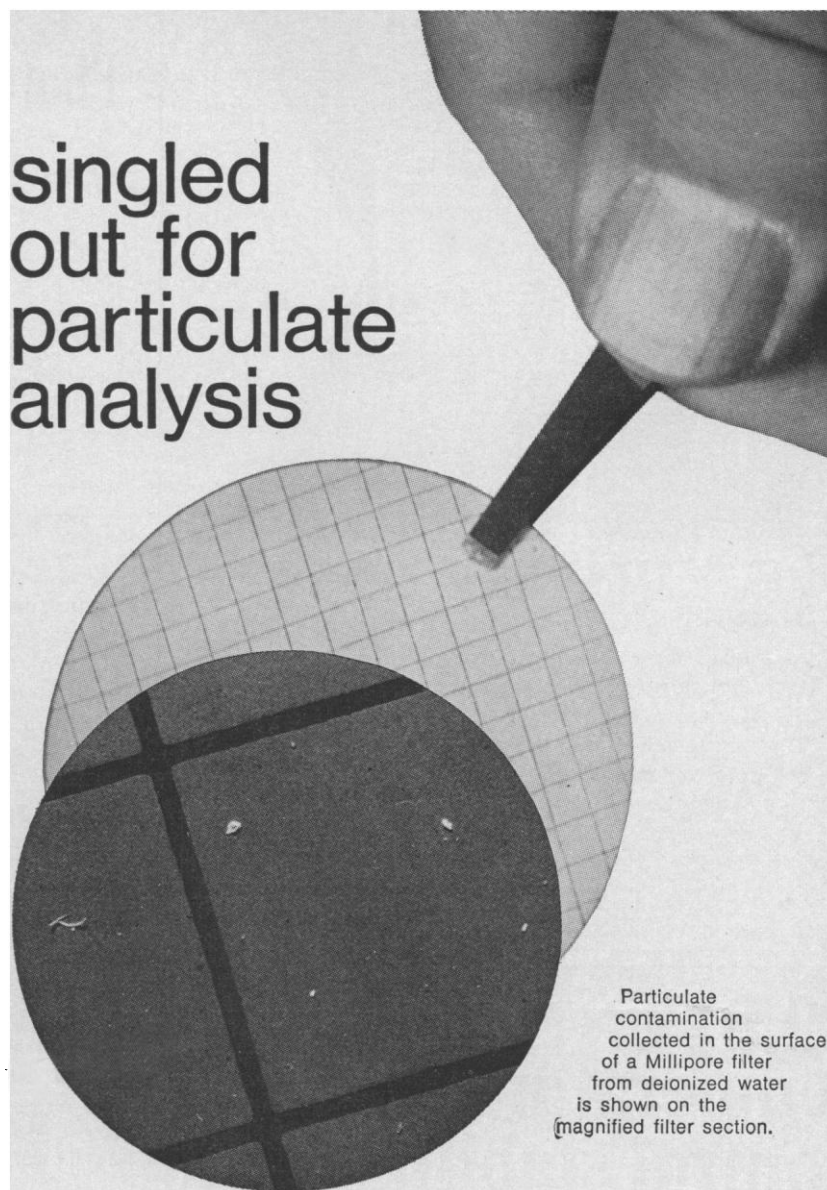
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inhibition of response had been primarily in the delayed hypersensitivity system. When the established kidney was removed, without further treatment of the host, a successful second renal allograft could be achieved. Thus, it appeared that treatment with antigen and antibody had modified host rather than effecting a change in graft. From a second in vivo model involving Sprague-Dawley rats sensitized with sheep red blood cells and Freund's adjuvant specific antibody reduced the delayed hypersensitivity response when antigen was given 9 days later. It was postulated that delayed hypersensitivity involves two interactions between cells of limited number and that one of these (non-macrophage) had been suppressed by antibody. It had been shown previously by an in vitro model (plaque assay) that Sprague-Dawley rats, treated with specific antibody prior to sensitization with 10^8 sheep red blood cells, had a greatly reduced number of plaques in the spleen. The number represented a negligible response compared to well characterized responses to sheep red blood cells over a wide dosage range. It was suggested that, because of the importance of giving antibody before antigen, antibody acts by combining with antigen (at the level of specific antigenic determinants) and its effect is independent of adjuvant effect. Cell interaction appears to be important in both in vivo and in vitro reactions, as evidenced by the fact that the "rocking" of dispersed cells in cultures produced an increased number of plaques. The mechanism for feedback regulation by antibody was suggested as prevention of cell interaction through combination with antigen.

Eugene Lance (Cornell University) gave the concluding speech on "Immunosuppression." Nonspecific immunosuppressive agents (those whose action is not unique to the immune system or to particular antibody responses) include x-irradiation, radio-mimetic drugs, steroids, and antimetabolites (all acting on processes of cell division, cell viability, and components of the DNA-RNA-protein sequence). Some uncertain miscellaneous phenomena such as hypnotism, reticuloendothelial blockade and treatment of grafts with RNA were also noted. Specific suppression by antigen and by anti-lymphocyte serum (ALS) were taken up in some detail. ALS, serum obtained by injecting lymphocytes of one animal into another species (or the antibody fraction eluted after absorption of such

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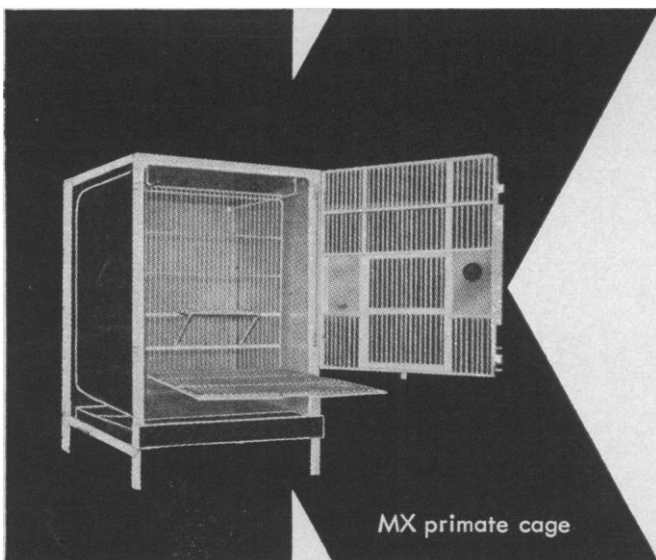
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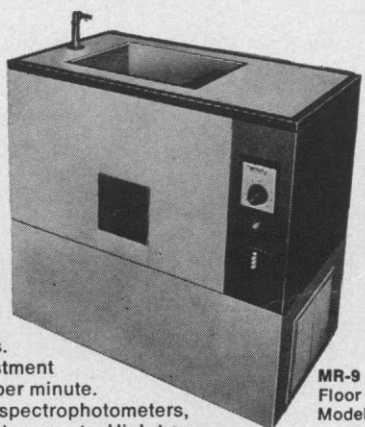
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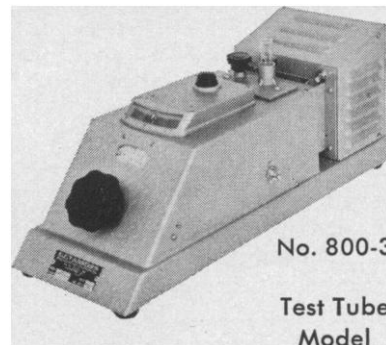
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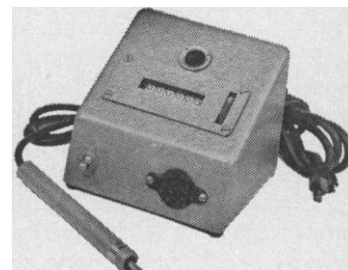


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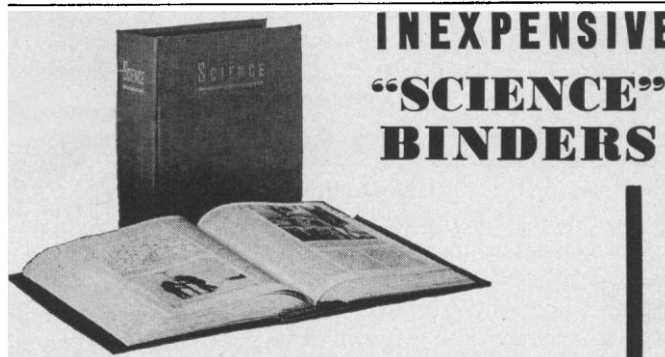
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SCIENCE, VOL. 165

serum to lymphocytes), alters immune reactions profoundly. Some points in describing the scope of the effect of ALS on humoral response were: importance of giving ALS before antigen (optimal effect when given intravenously 3 days before antigen), effectiveness on primary response which is suppressed but not abolished, and non-effectiveness against the secondary response. In order to prolong skin graft survival indefinitely, ALS must be given continuously. The serum caused no change in the thymus but produced selective damage in the paracortical area of thymus-dependent lymphoid tissue (spleen and bone marrow). The fate of labeled ALS-eluted antibody was studied. Because of rapid blood clearance it was assumed to exert a rapid effect. Radioautography of various tissues indicated only a small percentage uptake into lymphoid tissues. Because of large uptake in liver, a model was presented that indicated interaction of recirculating lymphocytes with circulating ALS and clearance of these cells by the liver. Lance expressed concern about the tendency of immunosuppressive drugs and ALS to increase the background of neoplastic cells that might give rise to lymphomas. However, he was optimistic about deriving experimental models using skin grafts and limited amounts of ALS plus other immunosuppressive agents that would lead to avoiding untoward clinical reactions to grafts.

The conference was supported in part by Ames Laboratories, Elkhart, Indiana; the Office of Naval Research, Biochemistry Branch, Washington, D.C.; and Hyland Laboratories, Los Angeles, California. This is contribution No. 3828.

JUSTINE S. GARVEY
Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena 91109

National Meetings

August

3-6. National Heat Transfer Conf., 11th, Minneapolis, Minn. (D. C. Kelly, American Inst. of Chemical Engineers, 345 E. 47 St., New York 10017)

3-7. Society for Cryobiology, 6th annual, Buffalo, N.Y. (R. E. Greco, 3175 Staley Rd., Grand Island, N.Y. 14072)

4-5. Aerospace Structures Design Conf., Seattle, Wash. (J. R. Fuller, Boeing Co., P.O. Box 707, Ortn. 6-8650, M/S 77-89, Renton, Wash. 98055)

4-5. American Soc. of Safety Engineers, College Park, Md. (W. C. Christensen,

ASSE, 850 Busse Highway, Park Ridge, Ill. 60068)

4-6. Deterioration and Preservation of Library Materials, 34th annual conf., Chicago, Ill. (H. W. Winger, Graduate Library School, Univ. of Chicago, 1116 E. 59 St., Chicago 60637)

4-8. Molecular Biology and Pathology, 2nd conf., Saratoga Springs, N.Y. (K. T. Lee, Dept. of Pathology, Albany Medical College, Albany, N.Y. 12208)

5-8. World Conf. on Records, Salt Lake City, Utah. (S. E. Beesley, 1030 S. Orchard Dr., Bountiful, Utah 84010)

6-8. Applications of X-Ray Analysis Conf., Denver, Colo. (B. L. Henke, Div. of Metallurgy, Denver Research Inst., Denver 80210)

10-13. Soil Conservation Soc. of America, Fort Collins, Colo. (H. W. Pritchard, 7515 NE Ankeny Rd., Ankeny, Iowa 50021)

11-13. Symposium on Crystal Growth, Washington, D.C. (H. S. Peiser, Room B316, Bldg. 223, National Bureau of Standards, Washington, D.C. 20234)

11-14. Society of Photo-Optical Instrumentation Engineers, 14th annual technical symp., San Francisco, Calif. (H. L. Kasnitz, SPIE Symposium, P.O. Box 288, Redondo Beach, Calif. 90277)

12. American Astronomical Soc., Albany, N.Y. (G. C. McVittie, Univ. of Illinois Observatory, Urbana 61801)

13-24. Frontier Topics in Crystallography, Stony Brook, L.I., N.Y. (E. H. Kone, American Inst. of Physics, 335 E. 45 St., New York 10017)

17-22. Animal Behavior Soc., Burlington, Vt. (B. Dane, Tufts Univ., Medford, Mass.)

17-22. American Inst. of Biological Science, Burlington, Vt. (J. R. Olive, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

17-22. American Soc. of Zoologists, Burlington, Vt. (J. R. Shaver, Dept. of Zoology, Michigan State Univ., East Lansing 48823)

18-20. Genetics Soc. of America, Madison, Wis. (B. Wallace, Dept. of Genetics, Cornell Univ., Ithaca, N.Y. 14850)

18-21. American Hospital Assoc., Chicago, Ill. (E. L. Crosby, 840 N. Lake Shore Dr., Chicago 60611)

18-22. New England Assoc. of Chemistry Teachers, 31st summer conf., Plymouth, N.H. (M. P. Olmsted, Publicity Chairman, NEACT, 9 Brookmont Dr., Wilbraham, Mass. 01095)

18-22. American Soc. of Pharmacognosy, 10th annual, Corvallis, Ore., with Marine Biomed'cinals Symp. (P. Catalfomo, School of Pharmacy, Oregon State Univ., Corvallis 97331)

18-22. American Phytopathological Soc., Spokane, Wash. (J. P. Fulton, Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701)

18-22. National Goals in Water Pollution Control, Santa Barbara, Calif. (F. A. Butrico, Coordinator of Environmental Sciences Programs, Battelle Memorial Inst., Columbus Laboratories, Washington, D.C.)

19. Biometric Soc., western North American regional, Pullman, Wash. (J. S. Williams, Statistical Lab., Colorado State Univ., Fort Collins)

19-21. Birch Symp., Durham, N.H.

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19-22. **Biometric Soc.**, eastern North American regional, New York, N.Y. (D. G. Gosslee, P.O. Box 713, Oak Ridge, Tenn. 37830)

19-22. **American Assoc. of Clinical Chemists**, 21st natl. mtg., Denver, Colo. (J. Preston, P.O. Box 18323, Capitol Hill Station, Denver 80218)

19-22. **Western Electronic Show and Convention**, San Francisco, Calif. (D. W. Martin, WESCON, 3600 Wilshire Blvd., Los Angeles, Calif. 90005)

19-22. **American Soc. for Horticultural Science**, 44th annual, Pullman, Wash. (C. Blackwell, The Society, 615 Elm St., St. Joseph, Mich. 49085)

19-22. **Phytochemical Soc. of North America**, Banff, Alberta, Canada. (J. W. Watkin, Prairie Regional Lab., Saskatoon, Sask., Canada)

19-22. **American Statistical Assoc.**, 129th, New York, N.Y. (D. C. Riley, The Association, 810 18th St., NW, Washington, D.C. 20006)

19-23. **American Fern Soc.**, Seattle, Wash. (A. M. Evans, Dept. of Botany, Univ. of Tennessee, Knoxville 37916)

20-22. **American Soc. of Civil Engineers**, Hydraulics Conf., Logan, Utah. (ASCE Hydraulics Conf., % Utah Water Research Lab., Utah State Univ., Logan 84321)

21-23. **American Nature Study Soc.**, Pullman, Wash. (J. Geisler, Milewood Rd., Verbank, N.Y. 12585)

24-25. **Programming Languages Definition**, San Francisco, Calif. (J. A. Painter, IBM Corp., Research Lab., Dept. 978, Bldg. 025, Monterey and Cottle Rds., San Jose, Calif. 95114)

24-27. **Alaska Div., AAAS**, College. (V. Fisher, Inst. of Social, Economic and Government Research, Univ. of Alaska, College 99701)

24-27. **Defects in Electronic Materials for Devices**, Boston, Mass. (D. P. Seraphim, IBM Components Div., Bldg. 300, Hopewell Junction, N.Y. 12533)

24-27. **Conference on Food-Drugs from the Sea**, Kingston, R.I. (G. F. Greene, Jr., % Professional Services, Abbott Labs., North Chicago, Ill. 60064)

24-29. **Gerontological Soc.**, Washington, D.C. (E. Kaskowitz, The Society, 660 S. Euclid St., St. Louis, Mo. 63110)

24-2. **Botanical Soc. of America**, Seattle, Wash. (R. C. Starr, Dept. of Botany, Indiana Univ., Bloomington 47401)

25-27. **Applied Mechanics Western Conf.**, Albuquerque, N.M. (A. B. Conlin, Jr., Technical Depts., 345 E. 47 St., New York 10017)

25-27. **Mathematical Assoc. of America**, Eugene, Ore. (A. B. Willcox, The Association, 1225 Connecticut Ave., NW, Washington, D.C. 20036)

25-28. **Chromosphere-Corona Transition**, Boulder, Colo. (J. W. Evans, Sacramento Peak Observatory, Sunspot, N.M. 88349)

25-29. **American Physiological Soc.**, Davis, Calif. (G. Hamilton, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

26-28. **Engineering Applications of Electronic Phenomena Conf.**, Ithaca,

N.Y. (H. J. Carlin, School of Electrical Engineering, Cornell Univ., Ithaca 14850)

26-29. **Electron Microscope Soc. of America**, St. Paul, Minn. (G. G. Cocks, Olin Hall, Cornell Univ., Ithaca, N.Y. 14850)

28-1. **Society of Petroleum Engineers**, Denver, Colo. (J. B. Alford, 6200 N. Central Expressway, Dallas, Tex. 75206)

31-4. **American Psychological Assoc.**, Washington, D.C. (K. Goodall, The Society, 1200 17th St., NW, Washington, D.C. 20036)

31-4. **Psychometric Soc.**, Washington, D.C. (W. B. Schrader, Educational Testing Service, Princeton, N.J. 08540)

31-6. **Quantum Solids: Hydrogen and Helium**, Aspen, Colo. (J. C. Raich, Colorado State Univ., Fort Collins 80521)

September

2-4. **Comparative Virology**, intern. conf., Montreal, Canada. (K. Maramorosch, Boyce Thompson Inst. for Plant Research, Yonkers, N.Y. 10701)

2-6. **Molecular Structure and Spectroscopy**, 24th annual symp., Columbus, Ohio. (K. N. Rao, Physics Dept., Ohio State Univ., Columbus 43210)

2-6. **Tuberculosis**, intern. conf., New York, N.Y. (J. E. Perkins, Natl. Tuberculosis Assoc., 1790 Broadway, New York 10019)

3-5. **Weather Forecasting and Analysis**, 3rd, Virginia Beach, Va. (E. C. Kindle, Navy Weather Research Facility, Bldg. R 48, Naval Air Station, Norfolk, Va. 23511)

3-6. **Conference on Biogenic Amines as Physiological Regulators**, Woods Hole, Mass. (B. A. Curtis, Tufts Univ. School of Medicine, 136 Harrison Ave., Boston, Mass. 02111)

3-6. **American Political Science Assoc.**, New York, N.Y. (E. M. Kirkpatrick, APSA, 1527 New Hampshire Ave., NW, Washington, D.C. 20036)

4-6. **American Assoc. of Obstetricians and Gynecologists**, Hot Springs, Va. (R. B. Wilson, 200 First St., SW, Rochester, Minn. 55901)

4-6. **Parapsychological Assoc.**, 12th intern. conv., New York, N.Y. (J. G. Pratt, Box 152, Univ. of Virginia Medical School, Charlottesville 22901)

5-7. **Society for the Study of Amphibians and Reptiles**, 12th annual, Carbondale, Ill. (J. T. Collins, Museum of Natural History, Univ. of Kansas, Lawrence 66044)

7-12. **American Chemical Soc.**, 158th natl., New York, N.Y. (Manager, Natl. Meeting and Divisional Activities, 1155 16th St., NW, Washington, D.C. 20036)

7-12. **Experimental Medicine and Surgery in Primates**, 2nd conf., New York, N.Y. (J. Moor-Jankowski, New York Univ. Medical Center, 550 First Ave., New York 10016)

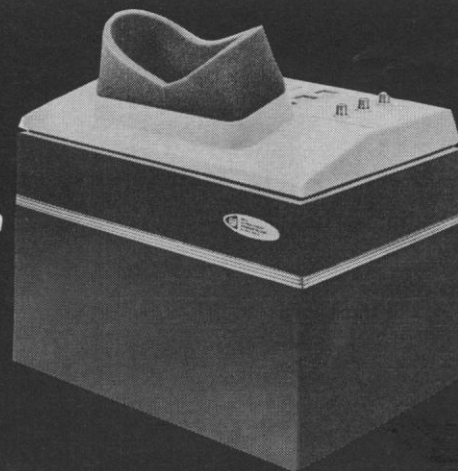
8-9. **Symposium on Turbulence Measurements in Liquids**, Rolla, Mo. (G. K. Patterson, Dept. of Chemical Engineering, Univ. of Missouri, Rolla 65401)

8-10. **Agriculture Meteorology Conf.**, 9th, Seattle, Wash. (R. J. Hanks, Dept. of Soils and Meteorology, Utah State Univ., Logan 84321)

8-10. **Metallurgy and Materials Science**,

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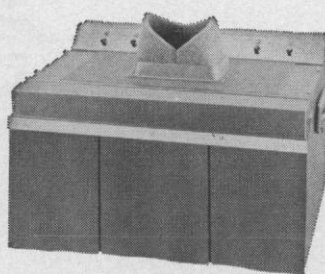


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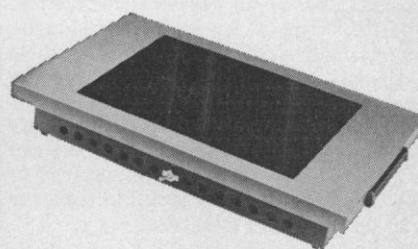
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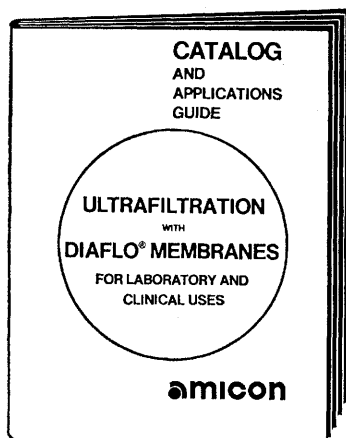
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intern. conf., Philadelphia, Pa. (G. R. Belton, School of Metallurgy and Materials Sciences, Univ. of Pennsylvania, Philadelphia 19104)

8-10. **Standards Engineers Soc.**, 18th annual, Washington, D.C. (J. M. Ward, 11208 Long Pine Trail, Potomac, Md. 20857)

8-11. **Electrical Insulation Conf.**, 9th, Boston, Mass. (H. P. Walker, Code 6158D, Naval Ship Engineering Center, Washington, D.C. 20360)

8-12. **Dietetics**, 5th intern. congr. (American Dietetic Assoc., 52nd annual), Washington, D.C. (Public Relations, The Association, 620 N. Michigan Ave., Chicago, Ill. 60611)

8-12. **American Soc. of Limnology and Oceanography**, La Jolla, Calif. (G. H. Lauff, W. K. Kellogg Biological Station, Michigan State Univ., Hickory Corners, 49060).

8-13. **High Energy Physics and Nuclear Structure**, intern. conf., New York, N.Y. (S. Devons, Dept. of Physics, Columbia Univ., New York 10027)

9-10. **Society of Logistics Engineers**, 4th annual, Cape Canaveral, Fla. (G. Dill, Aerospace Services Div., Pan American World Airways, Inc., Patrick AFB, Fla. 32925)

11-12. **Symposium on Sulphur in Nutrition**, Corvallis, Ore. (J. E. Oldfield, Dept. of Animal Science, Oregon State Univ., Corvallis 77331)

14-17. **Association of Medical Illustrators**, Washington, D.C. (B. J. Melloni, AMI, Georgetown Univ., Washington, D.C. 20007)

14-20. **College of American Pathologists and American Soc. of Clinical Pathologists**, joint annual mtg., Chicago, Ill. (O. Neibel, CAP, 230 N. Michigan Ave., Chicago 60601)

15-17. **Woodhandling**, 2nd symp., Ottawa, Ont., Canada. (Technical Section, Canadian Pulp and Paper Assoc., 2280 Sun Life Bldg., Montreal 110, P.Q.)

17-19. **American Science Film Assoc.**, Washington, D.C. (B. J. Melloni, ASFA, Georgetown Univ., Washington, D.C. 20007)

17-19. **Blood and Tissue Antigens**, intern. symp., Ann Arbor, Mich. (D. Aminoff, Simpson Memorial Inst., Univ. of Michigan, Ann Arbor 48104)

17-19. **Industrial Research**, 5th natl. conf., Chicago, Ill. (V. J. Danilov, Industrial Research Bldg., Beverly Shores, Ind. 46301)

18-20. **Chemical Marketing Research Assoc.**, Lake Placid, N.Y. (P. E. Levesque, FMC Corp., 633 Third Ave., New York 10017)

18-20. **Symposium on Coniferous Forests of the Northern Rocky Mountains**, Missoula, Mont. (Center for Natural Resources, Univ. of Montana, Missoula 59801)

21-24. **American Assoc. of Medical Clinics**, New York, N.Y. (E. M. Wurzel, Executive Director, The Association, 421 King St., Alexandria, Va. 22314)

21-24. **Petroleum Mechanical Engineering Conf.**, Tulsa, Okla. (H. E. Broadbent, Atlantic Richfield Co., P.O. Box 8138, Philadelphia, Pa. 19101)

21-25. **Comparative Leukemia Research**, 4th intern. symp., Cherry Hill, N.J. (R. M. Dutcher, School of Veteri-

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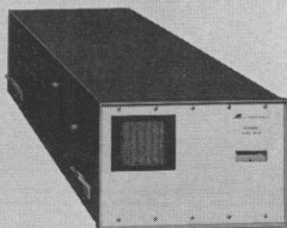
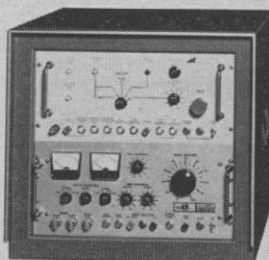


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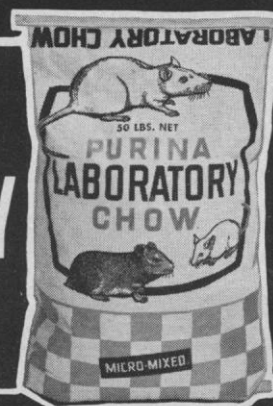
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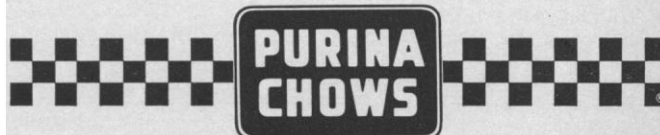


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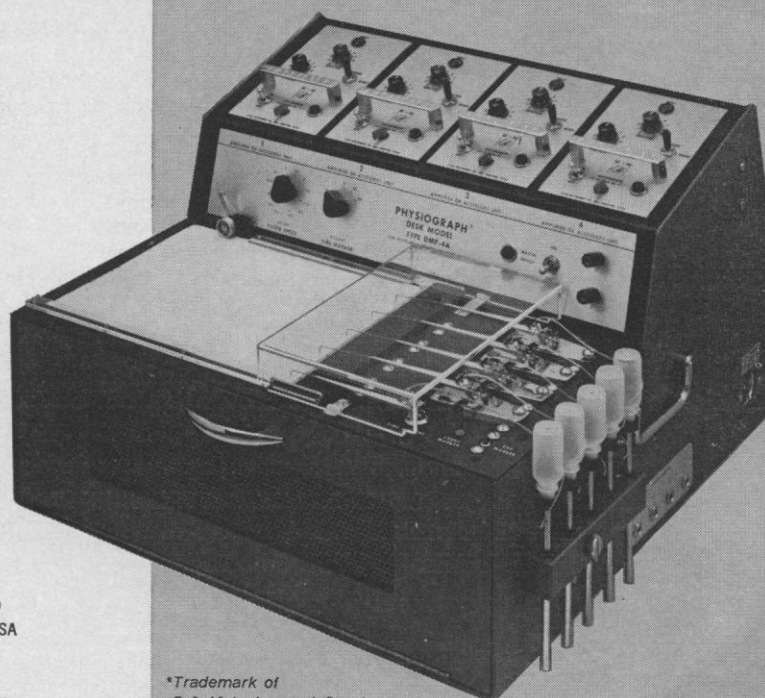


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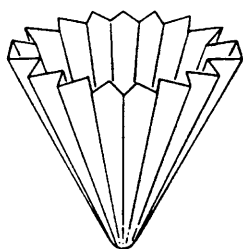


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22-24. National Conf. on **Packaging Wastes**, San Francisco, Calif. (M. Li, Food Protection and Toxicology Center, Univ. of California, Davis 95616)

22-26. International **Simulation and Training Conf.**, Montreal, Canada. (W. I. Marble, SAE Hq., Meetings Manager, 2 Pennsylvania Plaza, New York 10001)

23-25. **Physics and Nondestructive Testing**, 9th annual, Chicago, Ill. (W. J. McGonnagle, Symp. Coordinator, P.O. Box 554, Elmhurst, Ill. 60126)

24-26. **IEEE Ultrasonics Symp.**, St. Louis, Mo. (D. I. Bolef, Inst. of Electrical and Electronics Engineers, Ultrasonics Symp., Dept. of Physics, Washington Univ., St. Louis 63130)

26-3. American Acad. of **General Practice**, Philadelphia, Pa. (M. F. Cahal, The Academy, Volker Blvd. at Brookside, Kansas City, Mo. 64112)

28-1. Society of **Petroleum Engineers of AIME**, 44th annual, Denver, Colo. (J. R. Dempsey, Northern Natural Gas Co., P.O. Box 308, Omaha, Neb. 68102)

29-1. International Conf. on **Bioelectrical Impedance**, New York, N.Y. (S. E. Marovich, The Conference, 1150 NW 14th St., Miami, Fla. 33136)

29-3. American Soc. of **Photogrammetry**, Portland, Ore. (L. P. Jacobs, 105 N. Virginia Ave., Falls Church, Va. 22046)

Foreign Meetings

September

1-4. International Soc. of **Geographical Pathology Conf.**, Jerusalem, Israel. (I. S. Levij, Dept. of Pathology, Hebrew Univ., Hadassah Medical School, P.O. Box 1172, Jerusalem)

1-5. British **Pharmaceutical Conf.**, Belfast, Northern Ireland. (Secretary, The Conference, 17 Bloomsbury Sq., London, W.C.1, England)

1-5. International Soc. of **Neurochemistry**, 2nd, Milan, Italy. (R. Paoletti, Scientific Secretary, Inst. of Pharmacology, Univ. of Milan, via Andrea del Sarto 21, 20129 Milan)

1-5. **Phenomena in Ionized Gases**, 9th intern. conf., Bucharest, Rumania. (E. Badareu, Inst. of Physics, Acad. of Science, Bucharest, Rumania)

1-10. **Non-Linear Continuum Theories in Mechanics and Physics and Their Applications**, Padua, Italy. (D. H. Rivlin, Scientific Director, Center of Applied Mathematics, Lehigh Univ., Bethlehem, Pa. 18015)

1-12. International Assoc. of **Geomagnetism and Aeronomy**, Madrid, Spain. (P. A. Romana, Observatoire del Ebro, Apdo 9, Tarazona, Spain)

1-19. **Geophysical Fluid Dynamics**, Bangor, N. Wales. (G. E. R. Deacon, Natl. Inst. of Oceanography, Wormley, Godalming Surrey, United Kingdom)

2-4. **Hyperbaric Medicine**, 4th intern. Congr., Sapporo, Japan. (T. Iwa, Dept. of Thoracic and Cardiovascular Surgery, Sapporo Medical College and Hospital, So. 1. West 16, Sapporo 060)

3-11. International Assoc. of **Statistics in Physical Sciences**, London, England.

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(J. Neyman, Dept. of Statistics, Univ. of California, Berkeley 94720)

4-9. **Ferroelectricity**, 2nd intern. conf., Tokyo, Japan. (H. Takahashi, Faculty of Science, Univ. of Tokyo, 7 Hongo, Bunkyo-ku Tokyo, Japan)

5-10. **International Clay Conf.**, Tokyo, Japan. (S. Iwao, Secretary General, Organizing Committee, The Conference, Science Council of Japan, Ueno Park, Tokyo 110)

7-12. **Conference on Atomic Collision Phenomena in Solids**, Brighton, England. (Meetings Office, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

7-12. **Pharmaceutical Sciences**, 29th intern. congr., London, England. (J. C. Bloomfield, Pharmaceutical Soc. of Great Britain, 17 Bloomsbury Sq., London, W.C.1)

7-14. **International Symp. on Unproven Methods of Cancer Diagnosis and Treatment**, São Paulo, Brazil. (A. C. C. Junqueira, % Hospital A.C. Camargo, P.O. Box 5217, São Paulo)

8-12. **Congenital Malformations**, 3rd intern. conf., The Hague, Netherlands. (Local Secretary, % Holland Organizing Centre, 16, Lange Voorhout, The Hague)

8-12. **Fiscal Assoc.**, 23rd intern. congr., Rotterdam, Netherlands. (Local Secretary, Holland Organizing Centre, 16, Lange Voorhout, The Hague, Netherlands)

8-12. **Symposium on In Vitro Procedures with Radioisotopes in Clinical Medicine and Research**, Vienna, Austria. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

8-12. **International Symp. on Man-Machine Systems**, Cambridge, England. (L. R. Young, Room 37-155, Massachusetts Inst. of Technology, Cambridge 02139)

8-12. **International Assoc. of Seismology and Physics of the Earth's Interior**, Madrid, Spain. (J. P. Rothe, General Secretary, The Association, 38 Boulevard d'Anvers, 67 Strasbourg, France)

8-13. **Electrosleep and Electroanaesthesia**, 2nd intern. symp., Graz, Austria. (F. M. Wageneder, Secretary, ISEE, Chirurgisch Universitätsklinik Graz, 8036 Graz)

9-12. **International Symp. on Conformational Analysis**, Brussels, Belgium. (R. C. Smekens, Executive Secretary, ISCA, 49, Square Marie-Louise, Brussels 4)

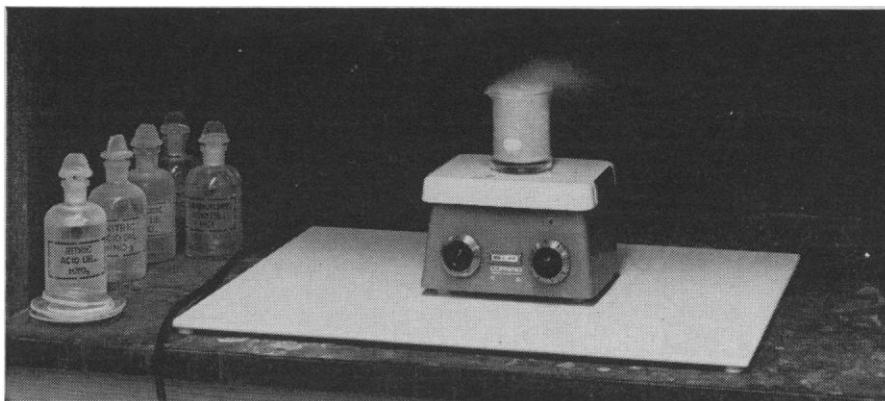
11-12. **Symposium on Earthquake Mechanics**, Madrid, Spain. (L. R. Alldredge, Inst. for Earth Science, ESSA, Boulder, Colo. 80302)

11-13. **History of Science**, intern. congr., Cordoba, Argentina. (A. Marsal, Casilla Postal 130, Cordoba, Argentina)

14-19. **International Soc. for Rehabilitation of the Disabled**, 11th world congr., Dublin, Ireland. (C. J. Sweeney, National Rehabilitation Board, 18, Merrion Rd., Dublin 4)

15-18. **Internal Medicine**, 10th intern. congr., Warszawa, Poland. (M. Tulczynski, ul. Lekarska 11, Warszawa 22)

15-20. **International Symp. on Design and Application of Logical Systems**, Brussels, Belgium. (J. Florine, Laboratoire d'Electronique Industrielle, Université Libre de Bruxelles, 50, Avenue F. D. Roosevelt, Bruxelles, 5, Belgium)

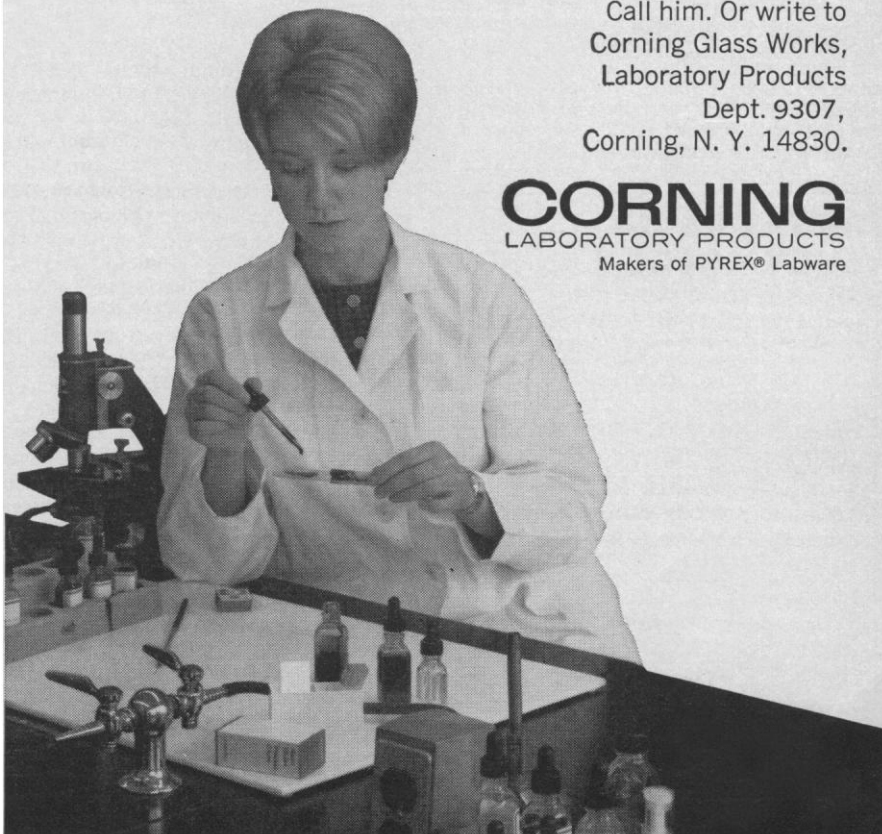


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June 1969, 728 pp., \$29.50

Volume 14; **LIPIDS**

edited by **JOHN M. LOWENSTEIN**, *Graduate Department of Biochemistry, Brandeis University, Waltham, Massachusetts*
Third quarter, 1969, 704 pp., \$29.50

Volume 15; **STEROIDS AND TERPENOIDS**

edited by **RAYMOND B. CLAYTON**, *Stanford University School of Medicine, Palo Alto, California*
August 1969, 796 pp., \$32.50

Volume 16; **FAST REACTIONS**

edited by **KENNETH KUSTIN**, *Department of Chemistry, Brandeis University, Waltham, Massachusetts*
Fourth quarter, 1969, about 438 pp.

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BOOKS RECEIVED

(Continued from page 168)

Collier-Macmillan, London, 1969. xii + 252 pp., illus. Paper, \$4.95.

Mathematical Papers. William Kingdon Clifford. Robert Tucker, Ed. Chelsea, New York, 1968. lxxii + 658 pp., illus. \$15. Reprint of the 1882 edition.

Mechanical Engineering for Professional Engineers' Examinations. Including Questions and Answers for Engineer-in-Training Review. John D. Constance. McGraw-Hill, New York, ed. 2, 1969. xx + 492 pp., illus. \$11.50.

Mechanisms of Molecular Migrations. Vol. 2. B. S. Thyagarajan, Ed. Interscience (Wiley), New York, 1969. x + 470 pp., illus. \$22.50.

Medical Thermography. Proceedings of a Boerhaave Course for Postgraduate Medical Education Given in Collaboration with the Netherlands' Society of Radiology, Leiden, 1968. S. F. C. Heerma van Voss and P. Thomas, Eds. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). viii + 224 pp., illus. Paper, \$15.60. Bibliotheca Radiologica, No. 5.

Methoden der Organischen Chemie. Vol. 7, Part 4. Sauerstoffverbindungen II, Part 4. Eugen Müller, O. Bayer, H. Meerwein, and K. Ziegler, Eds. Thieme Verlag, Stuttgart, ed. 4, 1968 (U.S. distributor, Intercontinental Medical Books, New York). xxx + 508 pp., illus. DM 178.

The Mutants of Maize. A pictorial survey in color of the usable mutant genes in maize with gene symbols and linkage map positions. Arranged by chromosome location. M. G. Neuffer, Loring Jones, and Marcus S. Zuber. Crop Science Society of America, Madison, Wis., 1968. vi + 74 pp., illus. Cloth, \$6; paper, \$5.

Orbitals and Chemical Bonding. P. F. Lynch. Mifflin, Boston, 1968. viii + 56 pp., illus. Paper, \$1.75. Concepts in Chemistry.

The Organic Compounds of Lead. Hymn Shapiro and F. W. Frey. Interscience (Wiley), New York, 1969. xiv + 498 pp., illus. \$18. Chemistry of Organometallic Compounds.

Origin and Distribution of the Elements. An international symposium, Paris, 1967. L. H. Ahrens, Ed. Pergamon, New York, 1968. xviii + 1178 pp., illus. + 2 plates. \$48. International Series of Monographs in Earth Sciences, vol. 30.

The Origins of Intellect: Piaget's Theory. John L. Phillips, Jr. Freeman, San Francisco, 1969. xviii + 150 pp., illus. Paper, \$2.75. Psychology Series.

Palladium Alloys. E. M. Savitskii, V. P. Polyakova, and M. A. Tylkina. Translated from the Russian edition (Moscow, 1967) by R. E. Hammond. Primary Sources, New York, 1969. x + 214 pp., illus. \$24.50.

Plant Cell Organelles. Proceedings of the Phytochemical Group Symposium, London, 1967. J. B. Pridham, Ed. Academic Press, New York, 1968. xiv + 264 pp., illus. \$9.50.

The Prairie World. David F. Costello. Crowell, New York, 1969. xiv + 242 pp., illus. \$7.95.

Principles of Zoophysiology. In two volumes. B. Rybak. Vol. 1. Translated from the French edition (Paris, 1962).

Pergamon, New York, 1968. viii + 600 pp., illus. \$25. International Series of Monographs in Pure and Applied Biology: Zoology, vol. 39.

Psycholinguistics. Experiments in Spontaneous Speech. F. Goldman Eisler. Academic Press, New York, 1968. viii + 172 pp., illus. \$8.50.

The Radio Amateur's Handbook. Headquarters Staff, American Radio Relay League. Doug DeMaw, Ed. American Radio Relay League, Newington, Conn., ed. 46, 1969. 702 pp., illus. Cloth, \$6.50; paper, \$4. Radio Amateur's Library, Publication No. 6.

Reality and Dream. Psychotherapy of a Plains Indian. George Devereux. Psychological tests edited and interpreted by Robert R. Holt. Anchor (Doubleday), Garden City, N.Y., 1969. 1 + 622 pp. + 8 plates. Paper, \$3.95. Revised version of the 1951 edition.

Reforming American Education. The Innovative Approach to Improving Our Schools and Colleges. Alvin C. Eurich. Harper and Row, New York, 1969. xviii + 270 pp. \$6.50.

Rock and Mineral Analysis. John A. Maxwell. Interscience (Wiley), New York, 1968. xviii + 590 pp., illus. \$24.50. Chemical Analysis, vol. 27.

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