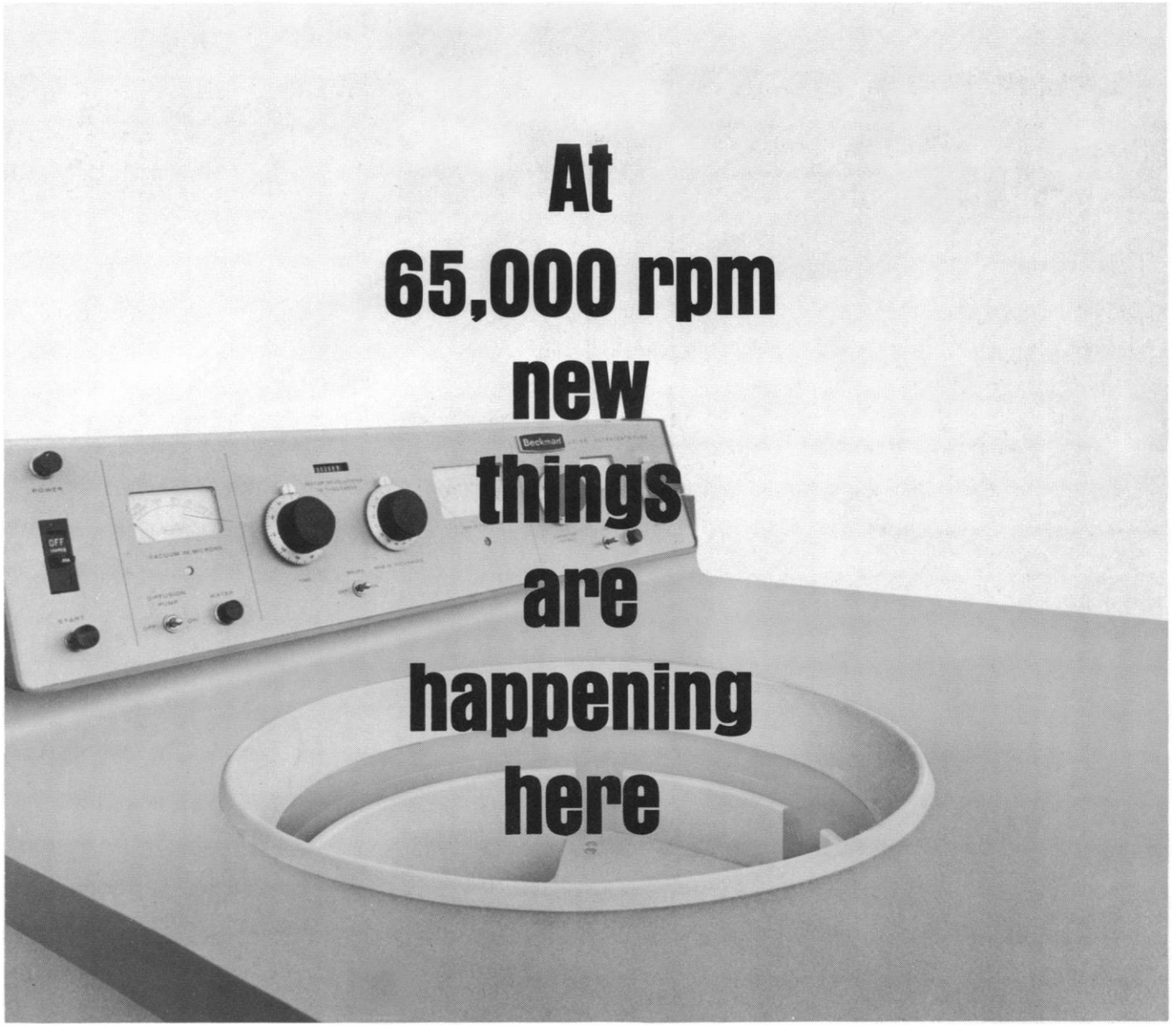
SCIENCE

8 April 1966
Vol. 152, No. 3719

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



The Type 65 Fixed Angle Rotor. 65,000 rpm. 368,000 g.

The SW65 Swinging Bucket Rotor. 65,000 rpm. 420,000 g.

The kinds of things that happen in the rotor chamber of the new Beckman Model L2-65 Preparative Ultracentrifuge may well be worth your consideration. With rotors going to 65,000 rpm, you can subject samples to greater forces than ever before—up to 420,000 *g*. Sedimentation times are reduced to speed your research. Separations are noticeably better to give you purer fractions in preparative work and more exact measurements when you use swinging buckets for analytical work. It is highly possible, too, that you will find some unexpected particles in zones, pellets, or supernatants.

If this extra centrifugal "muscle" would benefit any part of your investigations, put a Model L2-65 in your laboratory. Two 65,000 rpm rotors are already available for it. More are on their way. In addition, the L2-65 accepts all Beckman Model L and L2-50 rotors for an unprecedented variety of speeds, forces, and capacities. The L2-65 is built by Spinco Division of Beckman, the people who have been serving the scientific world with dependable ultracentrifuges for nearly 20 years; you can depend on this new one. For more details, write for Data File L2-65-5.

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SPINCO DIVISION
PALO ALTO, CALIFORNIA • 94304

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND; TOKYO; PARIS; CAPETOWN; LONDON

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SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C. Advancement of Science. Annual subscriptions $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 35¢, except **Guide to Scientific Instruments**, which i School year subscriptions: 9 months, $7, 10 months, $7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip numbers. Send a re

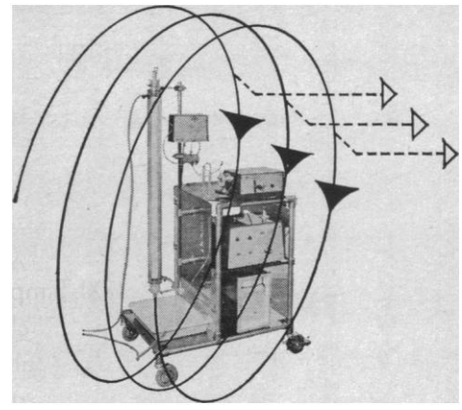
COVER

Gallery system made by scolytid beetles in the phloem of the Douglas fir. The vertical, long gallery is made by the parent female; the numerous, horizontal galleries are made by the growing larvae. In constructing the galleries the insect interrupts the food lines or pores in the phloem, and the tree dies. See page 218. [Julius Rudinsky, Oregon State University]

Introducing the LKB ReCyChrom for

RECYCLING CHROMATOGRAPHY

NEW INSTRUMENTATION FOR A NEW TECHNIQUE* IN CHROMATOGRAPHIC SEPARATION



The ReCyChrom is equally applicable for preparative and analytical separation of mixtures of large-sized or of small-sized molecules. These molecules do not have to be electrolytes and restrictions on the type of buffer used are less than with other types of chromatography. Components within a narrow range of molecular sizes, usually not resolved on simple gel filtration columns, are separated in the ReCyChrom by allowing the sample to pass repeatedly through the bed, thereby multiplying its effective height many times. Separated fractions and uninteresting or disturbing parts of the effluent may be bled out of the stream after any cycle without interrupting the separation of the remaining components.

The apparatus is especially suitable for grading homologous series of polymers, e.g., dextrans; for routine control of the purity of biochemical preparations such as serum proteins, enzymes and hormones; and for separation of heat labile substances.

One unique advantage of recycling chromatography is the need for columns of only moderate length. Columns in two standard lengths, 60 cm and 100 cm, both with 32 mm bore are available at present. The range of sample volumes accommodated by these columns depends greatly on the nature of the sample. For simple desalting operations or for separation of peptides and amino acids from proteins, a sample of up to *150 ml* is not unusual, whereas for purity controls of radioactively tagged concentrated preparations, quantities down to 1/100 of this volume are feasible. Sample application by pipette is eliminated. The pump sucks sample through a selector valve with a holdup of 150 µl—a reproducible and non-critical method.

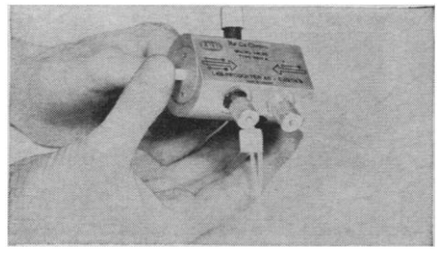
The four main components of the ReCyChrom, namely, a separation column, a peristaltic pump, a selector valve and a flow analyzer are available separately for incorporation into other instrument setups. The specially constructed columns with adjustable plungers at both ends can be sealed completely to eliminate the pressure of water head and permit liquid flow in either direction. Closed system operation and ascending flow maintains even packing and prevents the flow rate from falling off with use, even when beds of material with low mechanical strength (gels) are used.

LKB's specially designed peristaltic pump has a very high flow constancy—0.5% over a period of a week—and a continuously variable pumping rate from 0-390 ml/hr.

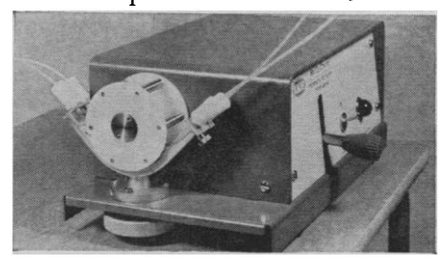
A choice of three flow analyzers, cooling jackets, terminal box, connections and a cart comprise the remainder of the assembly.

Request literature file 4900S4 for details

*According to J. Porath and H. Bennich



The simple push of a button on the Selector Valve alters the flow circuit from injection or bleeding to recycling.



The Peristaltic Pump has many other uses when not in service for the ReCyChrom.

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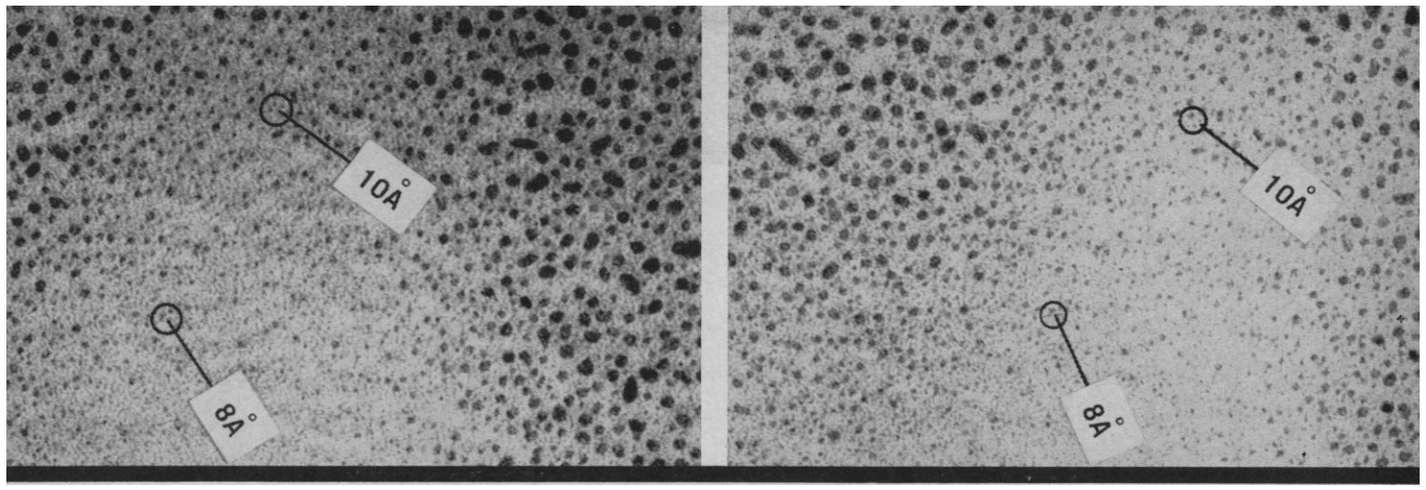
LKB-PRODUKTER AB, P.O. Box 76, Stockholm-Bromma 1, Sweden

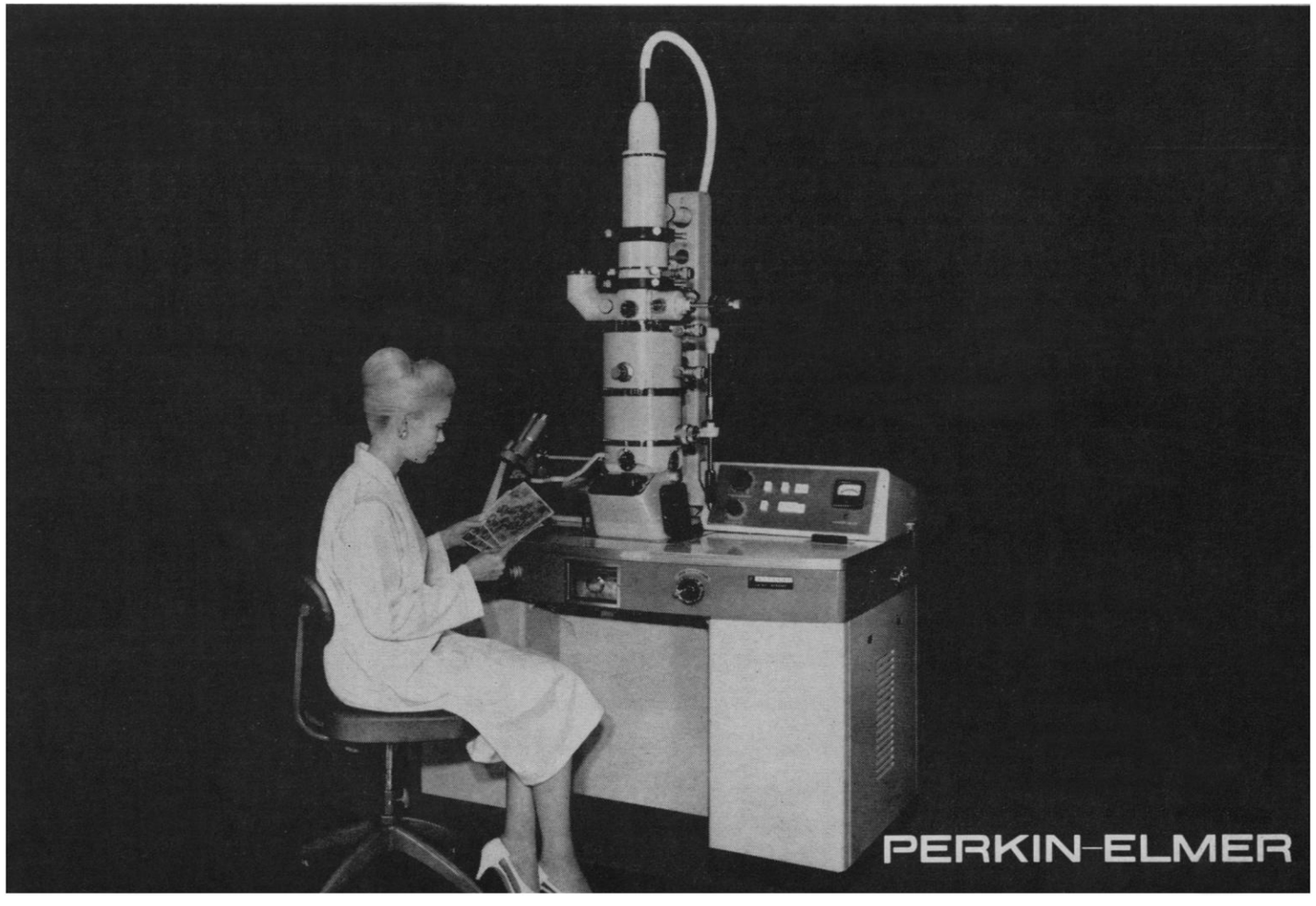


TWO CONSECUTIVE EXPOSURES SHOWING 8 A POINT RESOLUTION.

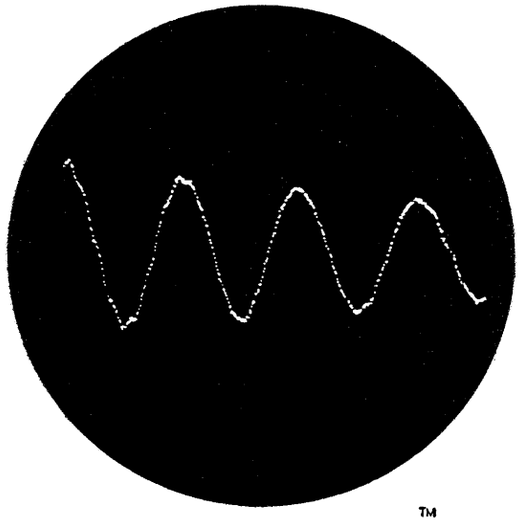
NEW FROM HITACHI: THE HS-7S--THE FIRST HIGH RESOLUTION COMPACT ELECTRON MICROSCOPE

Here are some of the important features of the HS-7S: High resolution: 8 A guaranteed. Direct magnification 1000X to more than 80,000X, permitting final magnification to 1,000,000X. Binocular viewer (7X). Simple, fast and reliable operation. Click stop positioning of interchangeable condenser and objective apertures (four apertures each). Push button vacuum system including vacuum locked specimen and camera chambers. Takes 18 lantern slides (3¼"x4") per magazine load with additional 18 in prepump chamber. Double condenser lens for improved contrast (four micron spot diameter). Stigmator for objective lens. Step focusing. Built-in anticontamination device for specimen chamber. Built-in exposure meter. Full range of accessories available including the new TV image intensifier system. Compact: 49x32 inches floor space. Price $24,000 duty free. For further information contact Perkin-Elmer Corporation, Distributor Products, Department 723, Main Avenue, Norwalk, Conn.

(Prices subject to change without notice.)

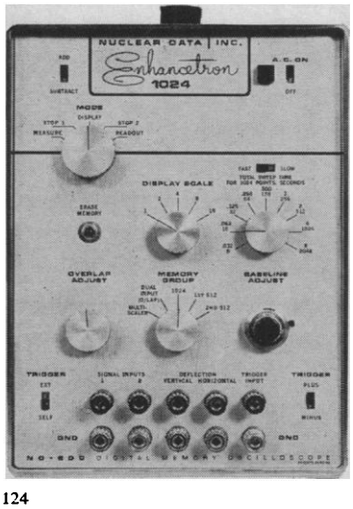


THAT'S NOISE...



THAT'S ENHANCETRON!™

New major instrument extracts signals from noise!



What's Enhancetron? What does it do? Enhancetron 1024 extracts the signal of interest from non-filterable noise. It's a portable signal-averaging digital computer that enhances signal-to-noise ratios. It's a new electronic measurement tool that finds immediate application in astronomy, bio-medicine, physics, electrophysiology, mass spectrometry, and other fields.

The illustration shows how Enhancetron works. Signals obscured by noise are digitized at 1024 time intervals, and the results are recorded as 1024 numbers in a magnetic core memory. Subsequent sweeps are added numerically. The repetitive signal of interest adds in direct proportion to the number of samples taken; noise adds in proportion to the square root of the number of samples taken. The signal of interest literally "grows" out of the noise, as you can see, and is displayed on an external oscilloscope.

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- ☐ n-Heptane
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- ☐ Pyridine

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The CTD — World's Standard Cryostat

If your needs are for routine sectioning, space saving and economy, the CTD is ideal at $1725

This is the famous IEC Microtome-Cryostat that revolutionized frozen sectioning techniques. From tissue to slide in 3 minutes vs. hours for paraffin methods. Model CTD is compact, low priced, ideal for routine sectioning. It features: ±1° C temp. control; internal quick freezing; a Minot Custom Microtome.

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If your needs call for routine sectioning plus research work, the model CTI is a superior and economical choice at $1990.00.

This new, compact, advanced microtome cryostat is ideally suited for both research work and routine frozen sectioning. It features: ±1° C Temp. control; an internal quick-freeze block; a vacuum port for freeze drying. Quick defrost. Tissue to slide takes less than 3 minutes. Numerous other features and accessories. Of course the famous Minot Custom Microtome is standard equipment.

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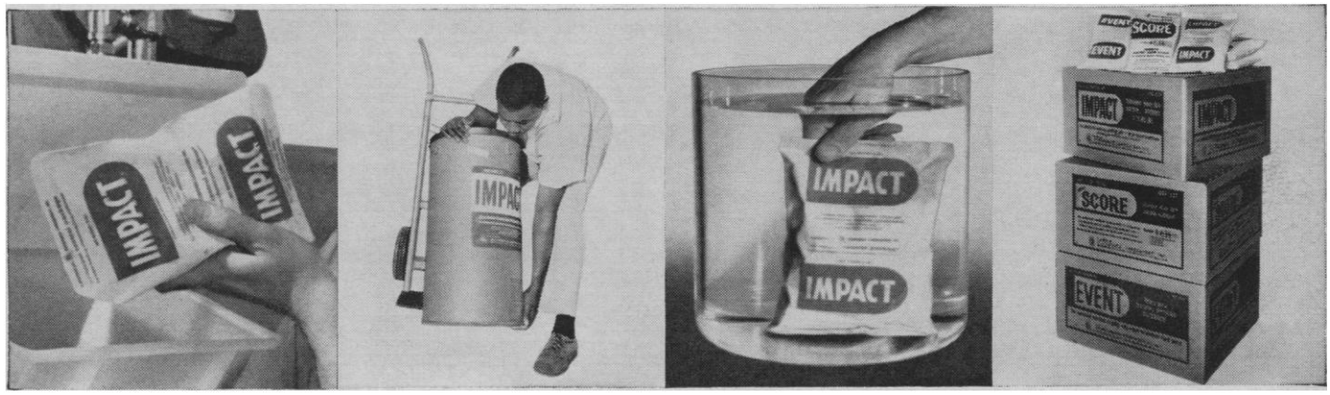
Another EL first... New 2 lb. vapor-proof packets of warewashing detergents!

Package Control at the Bulk Price!



Simplifies Detergent Use

The new EL 2-lb. vapor-proof packet provides a new easy method of detergent dispensing and assures a neat, efficient, economical warewashing operation. Just tear off the corner and pour contents directly into the detergent reservoir. No waste.

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No more open, bulky, back breaking drums or cans next to the dishmachine. Eliminate detergent misuse, waste and caking. Detergents stay fresh until used. No chance of skin irritation.

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EL's new 2-lb. packets can actually be dunked in water, because of the special polyethylene liner that seals out water, air and moisture. They are the only packages that will hold high performance detergents such as IMPACT and SCORE and without loss of cleaning power.

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Save time and money! EL's new 2-lb. packet comes 30 to a case (total case weight only 60 lbs.) and they stack easily. Less chance of waste or misuse. Simplifies employee training for detergent dispensing.

Want to see for yourself the convenience of EL's new 2-lb. vapor-proof packet? Do you want a demonstration of how high performance detergents such as IMPACT and SCORE can improve your warewashing results? Write in for a free, no obligation, demonstration by one of our 535 Warewashing Specialists.

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Gentlemen:

Yes, I'd like a Free demonstration of EL's new 2 lb. vapor-proof packets of high performance warewashing detergents. Have your EL Warewashing Specialists call.

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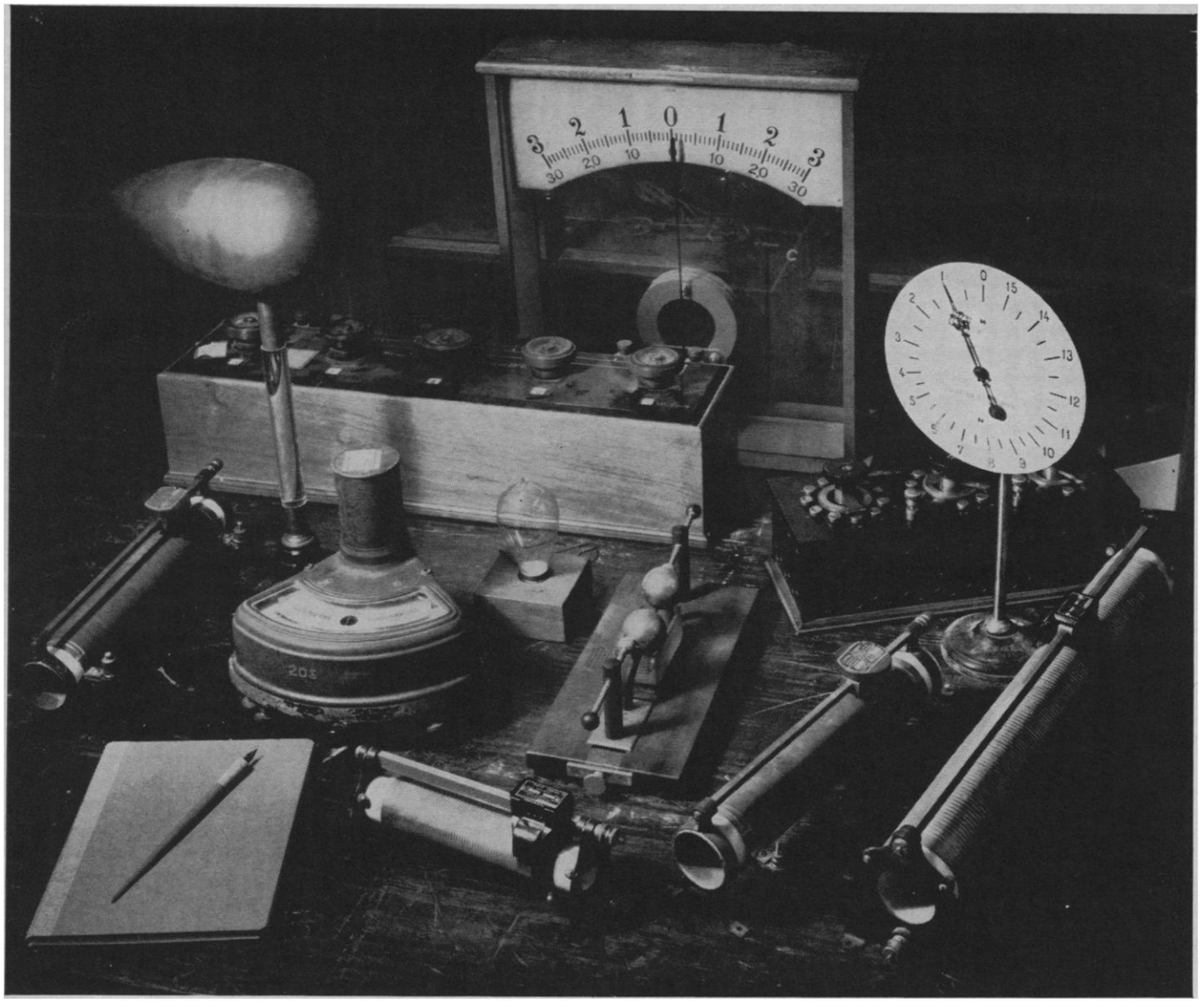

the physics lab has a new potentiometer...

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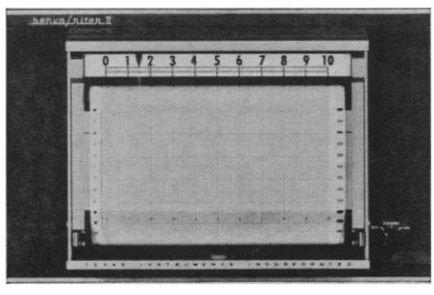

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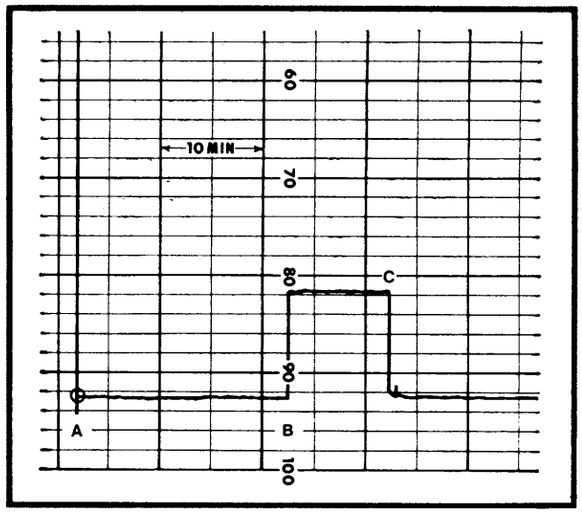
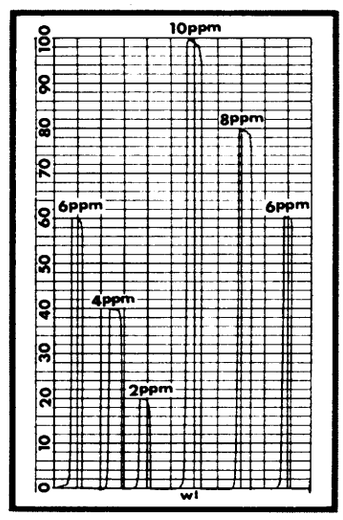


Model 303 double-beam system eliminates the effects of drift in lamp, detector, and electronics. Here, Ca is run from a cold start. Burner is lighted at A, 1 ppm Ca inserted at B, withdrawn at C. Quiet, stable baseline commonly produces 5X improvement in detection limit and precision.

Model 290 readout in concentration requires no tedious calculations. Here, direct readings on an accessory linear recorder are obtained for 2, 4, 6, 8, and 10 ppm Calcium.



performance-proved instruments for ATOMIC ABSORPTION ANALYSIS

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Atomic absorption for the determination of metallic elements is today's fastest-growing analytical technique. Perkin-Elmer, a leader from the beginning, has the kind of competence that produced its Analytical Methods Book, which gives detailed guidance for 64 elements and over 300 analyses. Perkin-Elmer also publishes the Atomic Absorption Newsletter, the only technical journal devoted to the new technique.

Clearly, such deep analytical experience can result in first-class atomic absorption equipment. Indeed, Perkin-Elmer's two instruments are designed expressly for the special needs of atomic absorption: they are not compromises, accessories, or adaptations of equipment originally developed for other needs.

The Model 303 double-beam system offers speed, precision and sensitivity: With built-in 10X scale expansion, it is possible to detect very small deviations from the stable baseline shown above, left. The ability to measure tiny signals produces the best possible detection limits.

With the DCR-1 accessory, the Model 303 reads out directly in concentration in any desired units on a four-digit illuminated display. A determination can be completed in four seconds. The DCR-1 will also automatically take and present the average of 4, 8, or 16 readings of the same sample.

The Model 290 Reads Directly in Concentration: The most time-consuming portion of conventional atomic absorption analysis is the conversion of linear transmittance readings to their logarithms, followed by curve plotting. With the 290, all this is eliminated. The 5-inch readout scale is linear in concentration.

The Model 290 is a big instrument in a small container. A 50-inch optical path has been folded into a neat 25-inch package; detection limits are therefore equal to or better than those of much larger single-beam instruments. And the price for the complete instrument is only $2900.

Both instruments can determine over 60 elements with Perkin-Elmer-built single and multi-element hollow-cathode lamps and the versatile premix burner. The nitrous oxide burner head enables analysis for Al, Ti, V, Si, the rare earths and other refractory elements. The new three-slot Boling head, for air-acetylene, does not clog with solutions containing 40% sugar, 20% lead, or undiluted serum. Yet another head provides a short optical path to reduce sensitivity and avoid dilutions.

Free training and literature: Subscriptions to the Atomic Absorption Newsletter, a bi-monthly technical journal, are available free on request. A summary of applications reprints can be obtained by writing for AA322. Instrument users receive free training courses in Chicago, Houston, Los Angeles, San Francisco, or Norwalk, Connecticut.

For details, including information on specific applications, write to the Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut.

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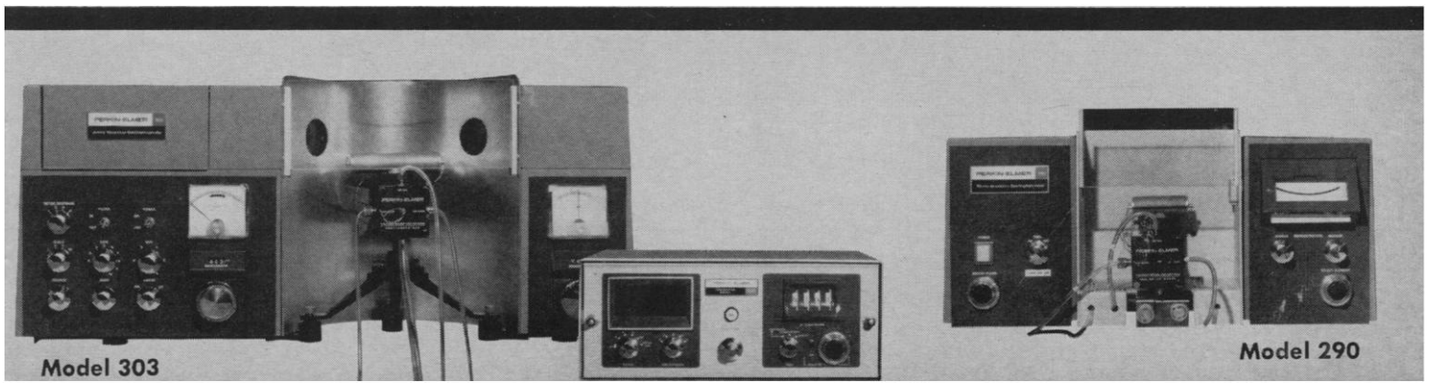

Store specimens here, in an inert state.

It's the LINDE Liquid Nitrogen Refrigerator, model LR-35-9. Dependable, nonmechanical storage for biological specimens. Nine canisters hold up to 1080 ampules (1.2 ml.) or 486 cu. in. bulk storage.

The LR-35 holds specimens as long as 48 days at −196°C (−185°C in the vapor space) without adding LN_2.

All-welded stainless steel construction provides exceptional durability. Patented LINDE Super Insulation holds LN_2 loss to a minimum.

But specimen storage is only one function of the LR-35-9. Add a special necktube and freezer assembly, and you...

Now freeze them, too, at the proper rate:

It's converted to the LINDE BF-5 Biological Freezer. It cools up to nine 1.2-ml. ampules at selected rates from 0.5°C to 7°C/minute. At the same time, specimen storage goes on unimpeded.

Operation is simple. Refrigerant is the cold nitrogen gas evolving from LN_2 in the refrigerator. An O-ring adjusts ampule level in the necktube to regulate cooling rate.

Want to know more about these, or any other of the large family of cryogenic products from Union Carbide? Fill out the coupon, attach it to your letterhead and mail to us.

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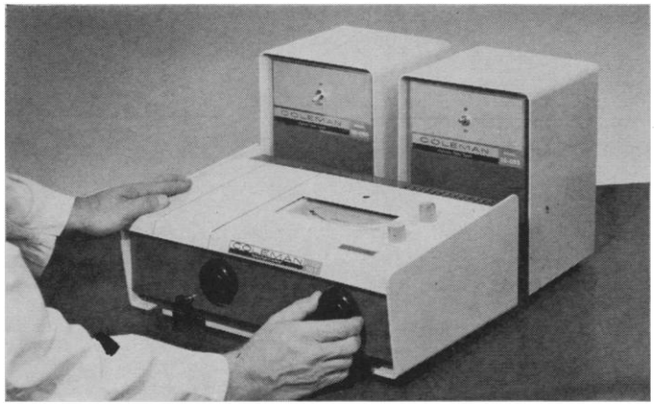
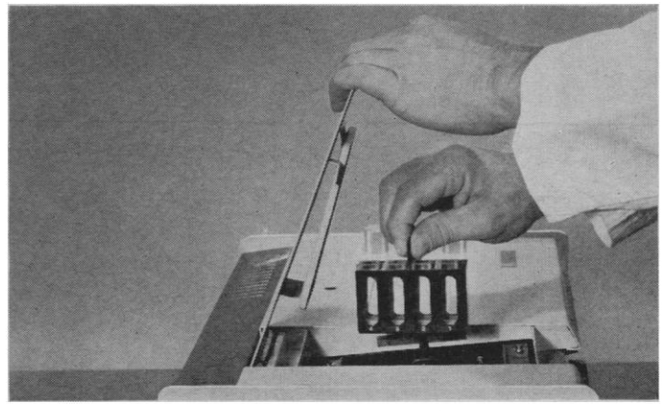
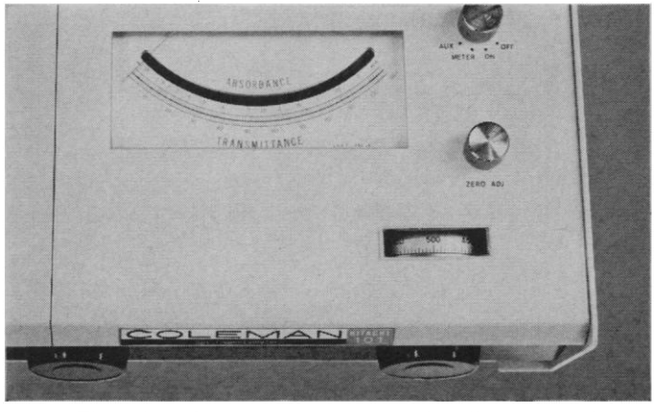
Coleman demonstrates an excellent instrument for barbiturate detection, enzyme analysis and a wide range of additional clinical and pharmaceutical applications.



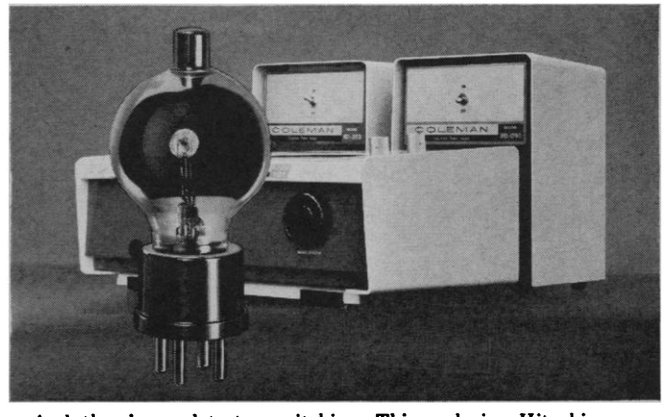
New Coleman Model 101 Hitachi Spectrophotometer covers the range from 220 to 900 mμ, where 95% of all analytical spectrophotometric data is obtained. Its photometric accuracy and stray light characteristics are the equal of instruments costing twice as much.



Operation is simple. When you open the sample compartment, an interlock mechanism automatically protects the optical system. You insert the cell holder, containing reference and three sample cells, and adjust for zero without any further manipulations.



Then shut the compartment, set 100% T and run three determinations in rapid sequence without re-opening the sample compartment. Wavelength scale is linear. The digital wavelength readout is located right next to the transmittance/absorbance meter.



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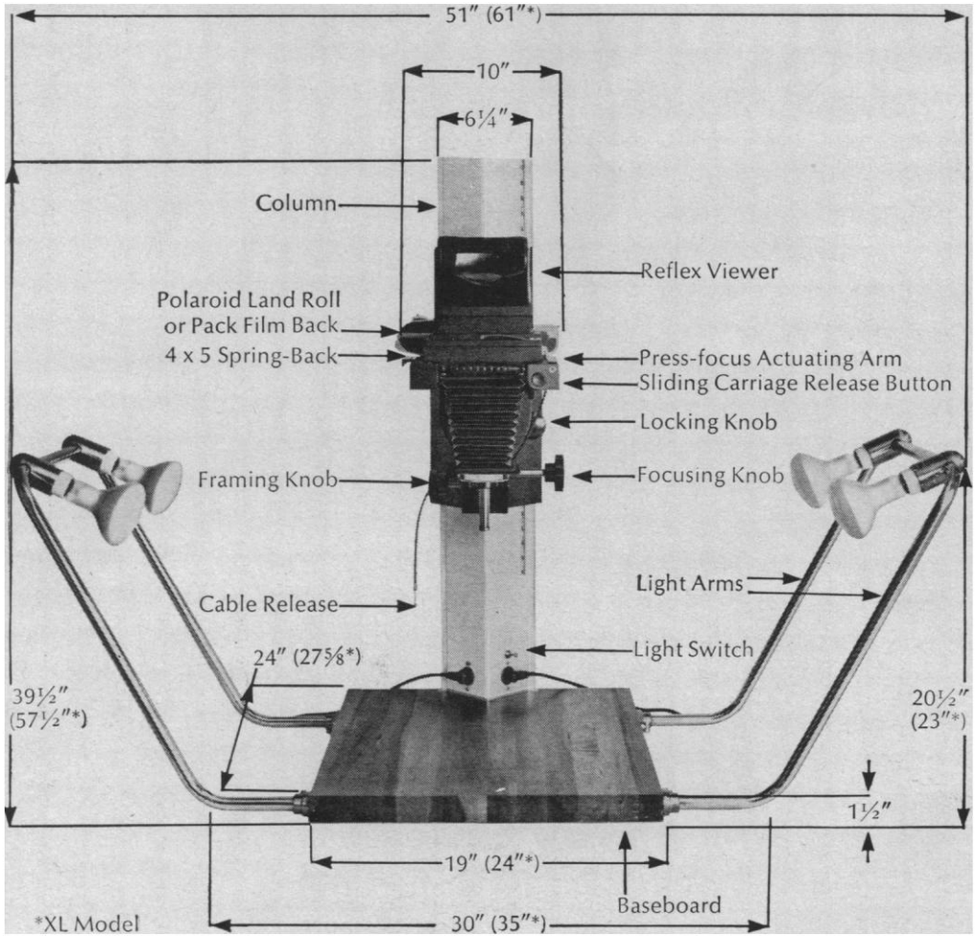

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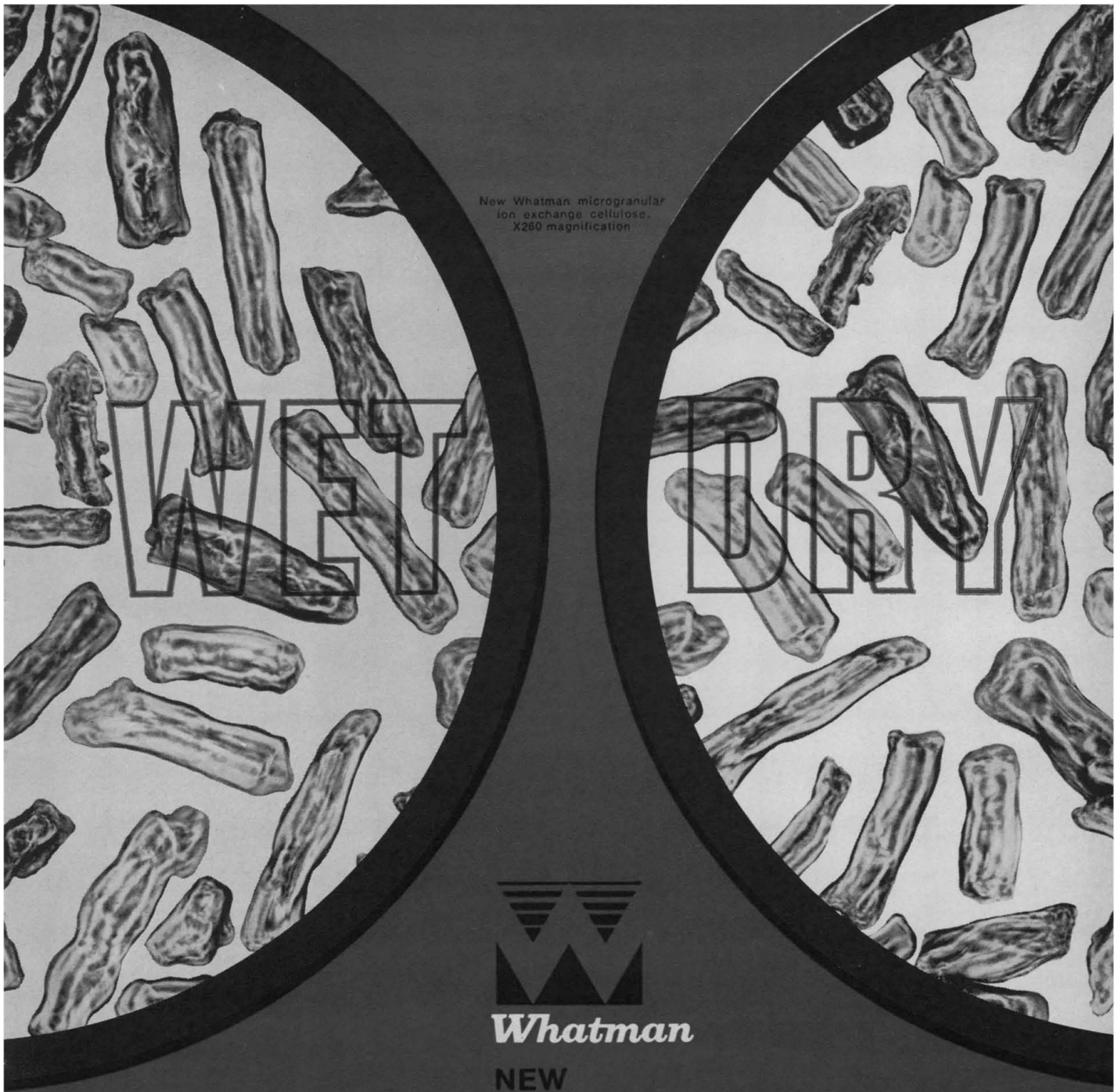

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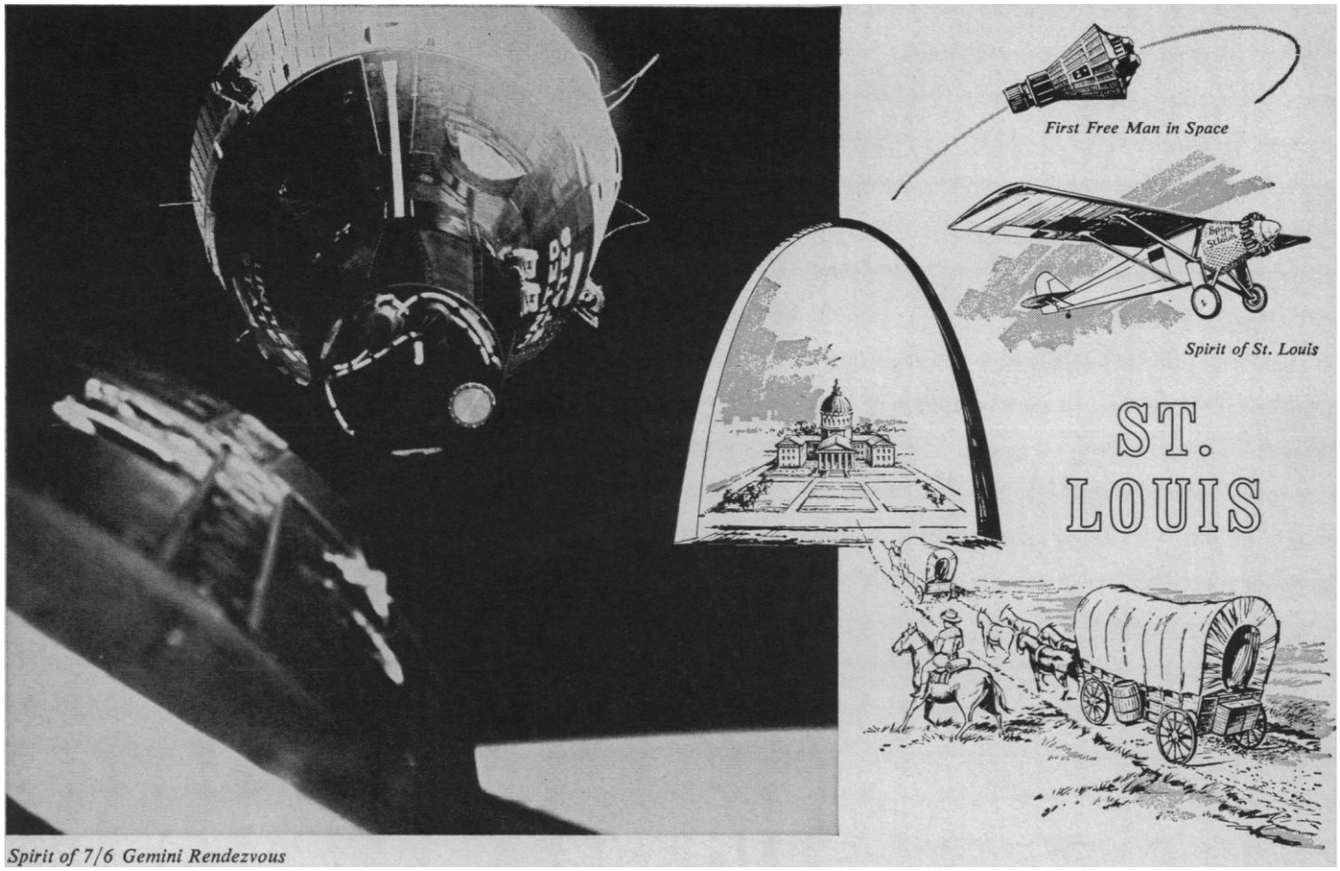

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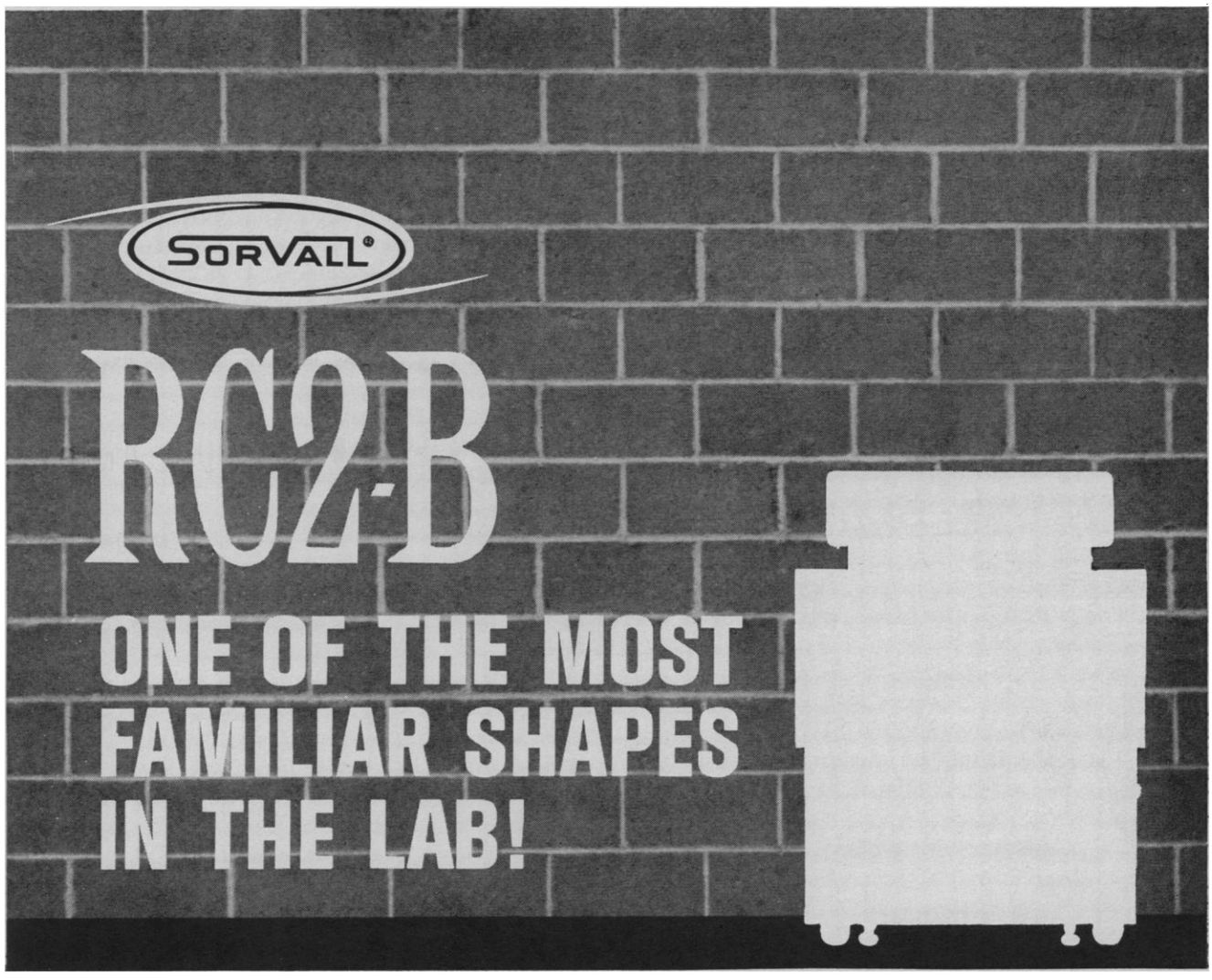

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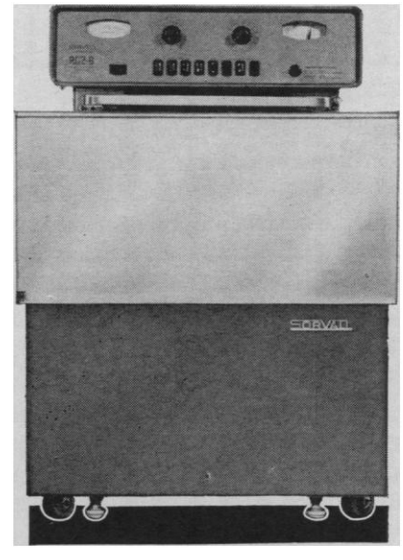

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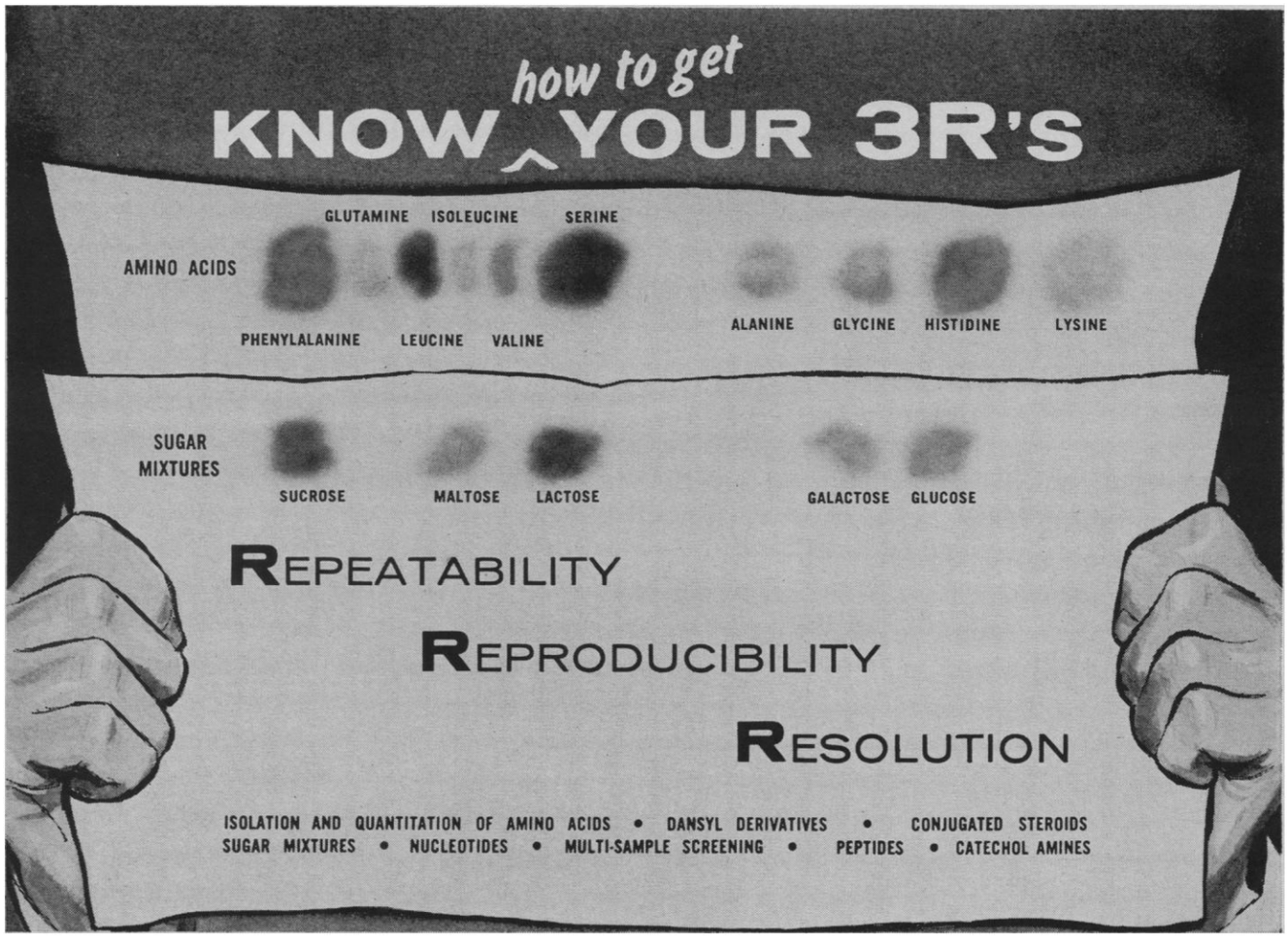

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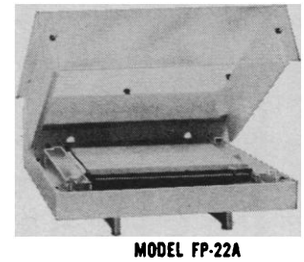
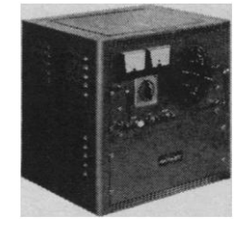


MODEL FP-22A



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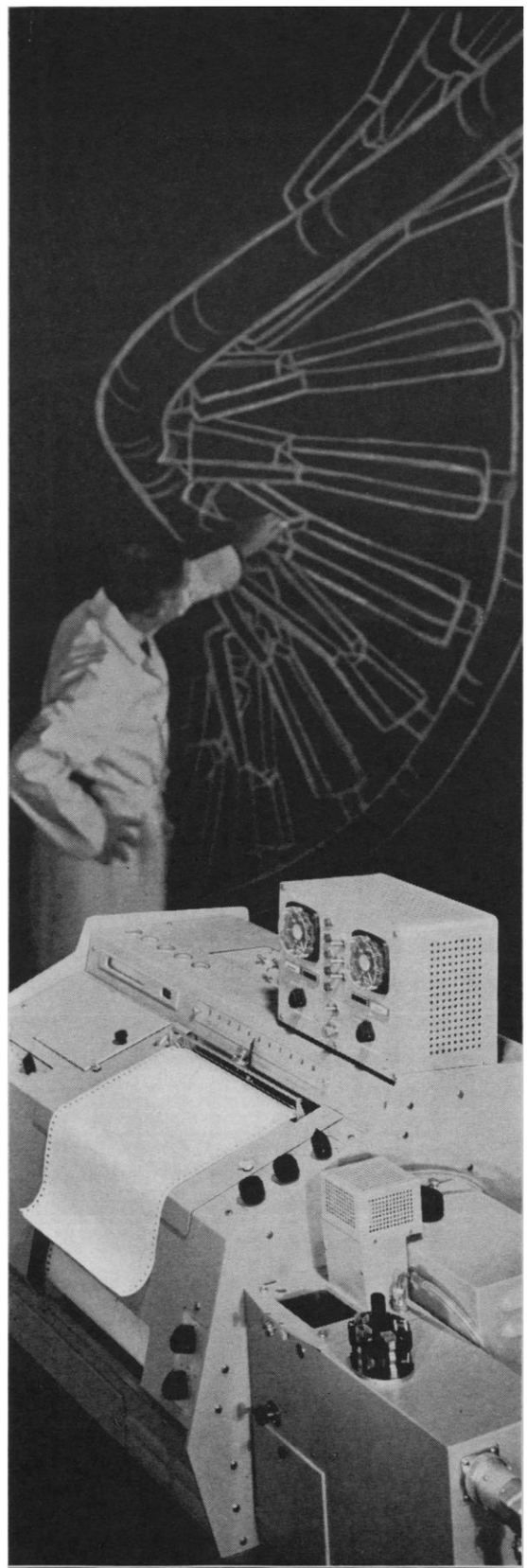

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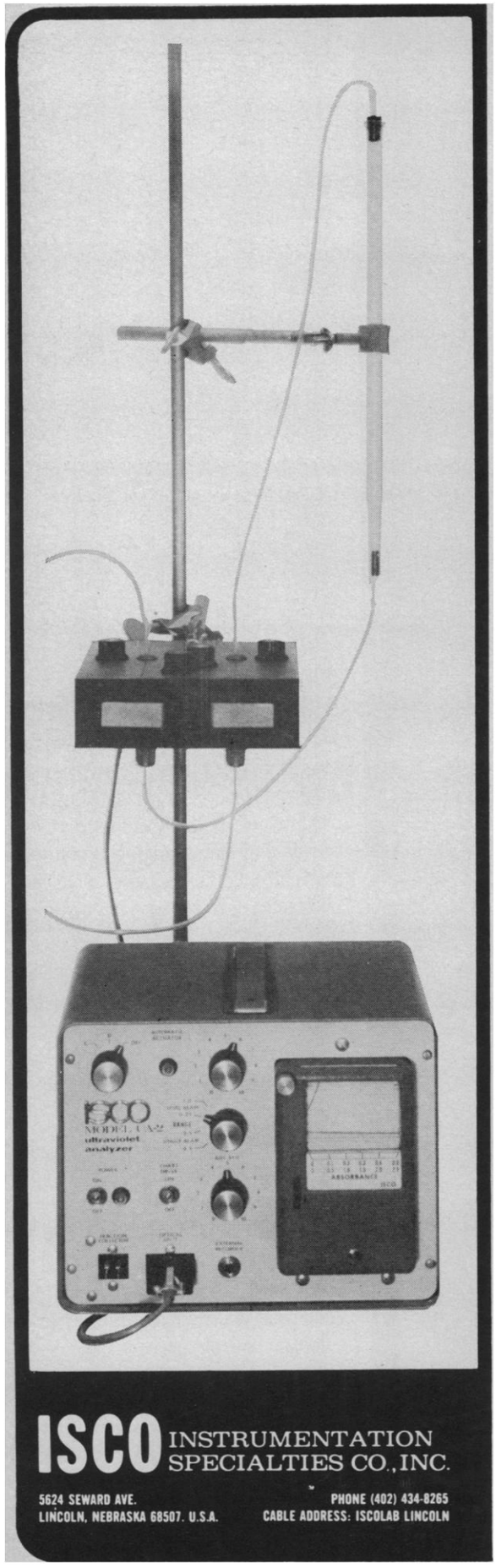

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DUAL-BEAM OPERATION

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Most column effluents can be monitored at 254 mμ. However, certain proteins and amino acids have maximum absorption at 280 mμ; at 254 mμ their absorbance is too weak for adequate sensitivity and too dependent on pH for adequate accuracy. Monitoring at either 254 or 280 mμ can now be accomplished by merely flicking a switch on the ISCO Models UA-2 and 222 analyzers.

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QUANTITATIVE RESULTS IN BOTH SINGLE AND DUAL-BEAM UNITS

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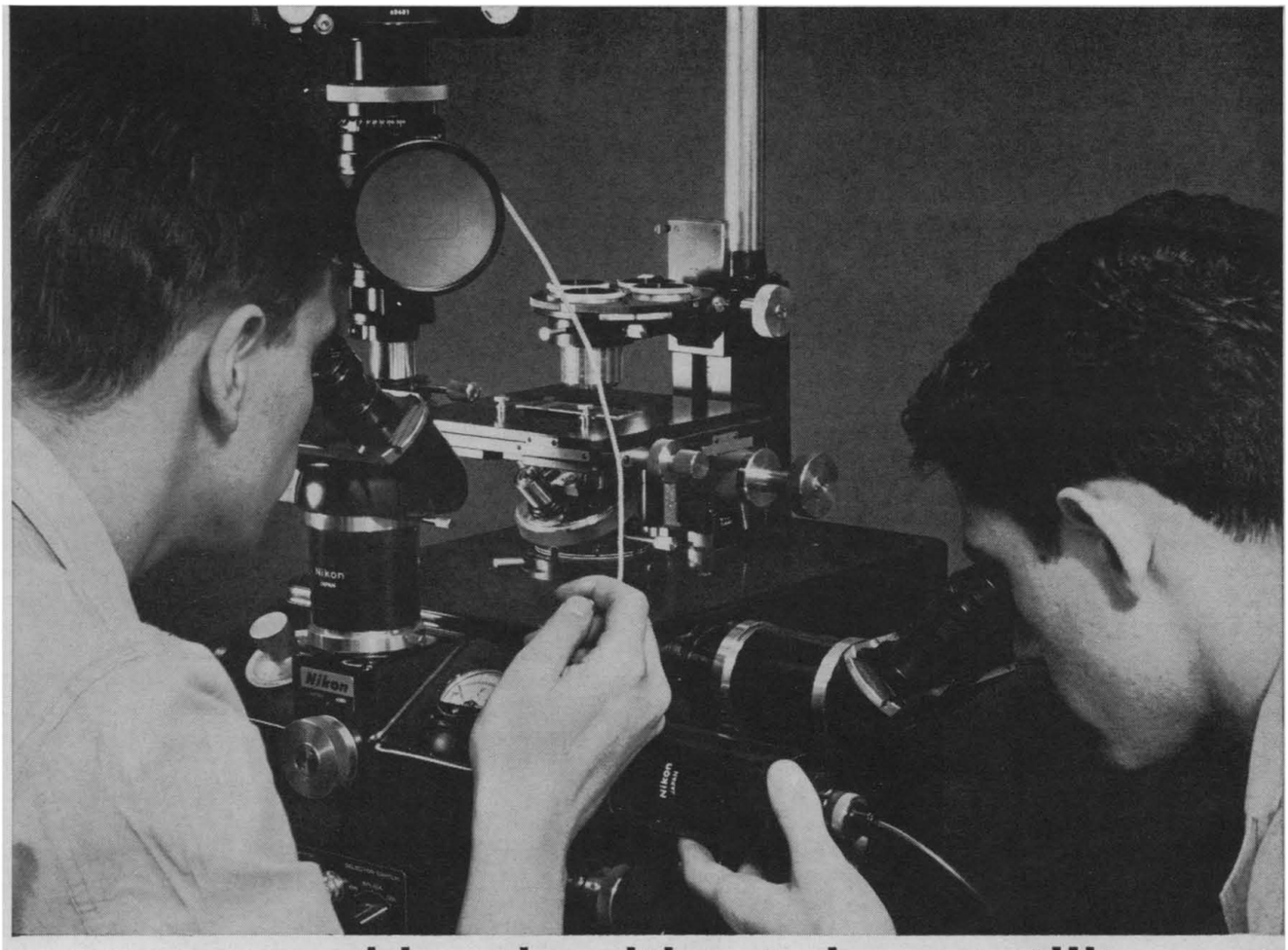

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The new Nikon M can be relied upon to deal with the most exacting demands arising in industrial, biological and medical research. Its capabilities are almost limitless, embracing every aspect of reflected- and transmitted-light microscopy, bright-field, dark-field, phase-contrast, interference-phase, fluorescence, and photomicrographic techniques.

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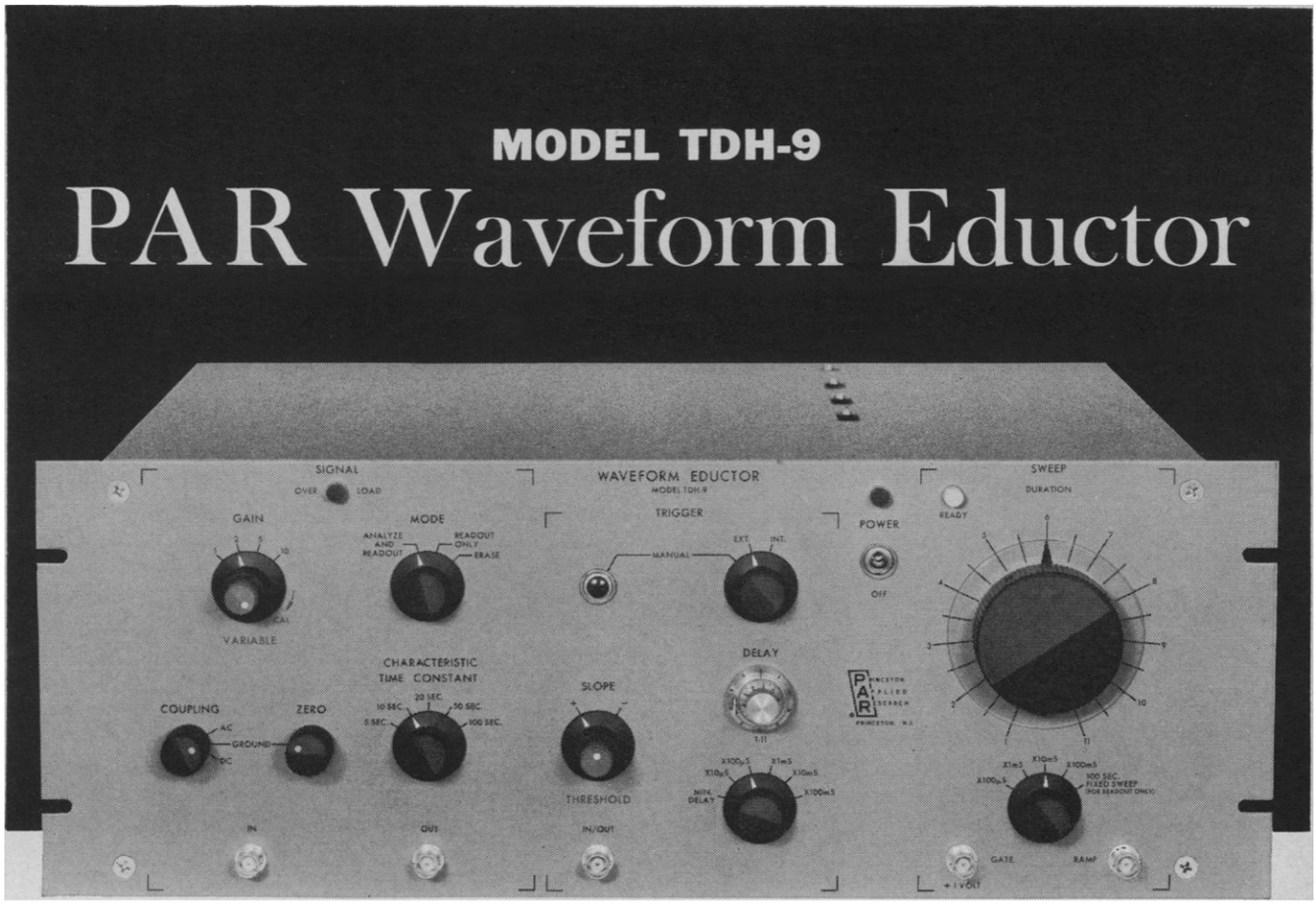
Nikon M Inverted Microscope

MODEL TDH-9

PAR Waveform Eductor



The PAR WAVEFORM EDUCTOR extracts repetitive waveforms or transients from noise.

Experimental information in the form of repetitive waveforms can best be extracted from noisy signal channels by obtaining the cross-correlation function of the waveform-plus-noise with a train of delta-functions having the same repetition rate. The cross-correlation function will be the waveform of interest, noise having averaged to zero. Approximations of this operation may be performed digitally, but generally there are drawbacks in time efficiency, speed, and expense. The PAR TDH-9 WAVEFORM EDUCTOR is an analog averaging instrument having one hundred channels of capacitor memory. The cross-correlation approximation is obtained by dividing that part of the input waveform of interest into one hundred segments. These are switched sequentially and synchronously through a resistor to the memory capacitors where the average is obtained and stored. The information in the memory bank is continuously observable on a monitor scope and the average can finally be photographed or read out on an X-Y or strip-chart recorder. The TDH-9 has the advantages of speed, efficiency, and low price.

SPECIFICATIONS

Resolution: 100 channels. Output smoothing provides continuous output waveform rather than "stairstep."

Sweep Duration: Continuously adjustable from 100 μS to 11 Sec in five ranges. (Dwell time/channel: 1 μS to 110 mS.)

Characteristic Time Constants: 5 Sec to 100 Sec in 1-2-5 sequence. The characteristic time constant is that time constant with which the output waveform responds to changes in the input waveform. Because the stored waveform is held during the time between sweeps, the observed time constant can be larger than the setting of the Characteristic Time Constant Switch.

Sweep Delay: A delay of 10 μS to 11 Sec can be inserted between receipt of trigger pulse and initiation of sweep.

Output: Full scale is $\pm$10 volts, capable of driving oscilloscopes, X-Y recorders, and strip chart recorders. Readout can be as slow as 100 Sec (dwell time/channel 1 Sec).

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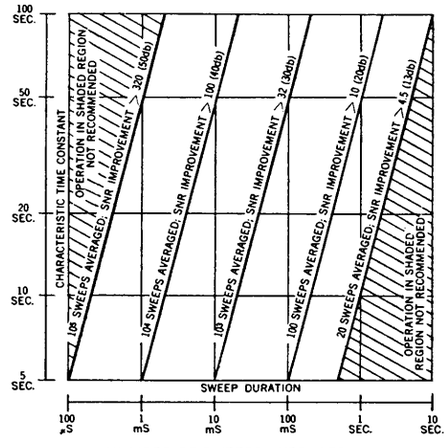
Price: $4200.00 Request Bulletin 126.



NUMBER OF SWEEPS AVERAGED AND VOLTAGE SIGNAL-TO-NOISE RATIO IMPROVEMENT AS A FUNCTION OF CHARACTERISTIC TIME CONSTANT AND SWEEP DURATION

References and Notes

1. *Ground-Based Astronomy, A Ten-Year Program* (National Acad. of Sciences, Washington, D.C., 1964).
2. See M. Hoskin, *Endeavour* **23**, 18 (1964).
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4. H. Hoover, *The Memoirs of Herbert Hoover: Years of Adventure, 1874–1920* (Macmillan, New York, 1951), p. 132.
5. G. Reber, *J. Franklin Inst.* **281** (1966).
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7. G. Reber, *Castanea* **25**, 122 (1960).
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Conservation of What?

I heartily agree with P. T. Flawn ("Geology and the new conservation movement," 28 Jan., p. 409) that the absence of geologists from today's conservation groups is unfortunate. It is also unfortunate that the training of geologists, foresters, wildlife biologists, and others who can contribute to conservation is usually deficient in the humanities and the social sciences. . . . The conservation movement is severely handicapped by a shortage of men of broad vision. . . .

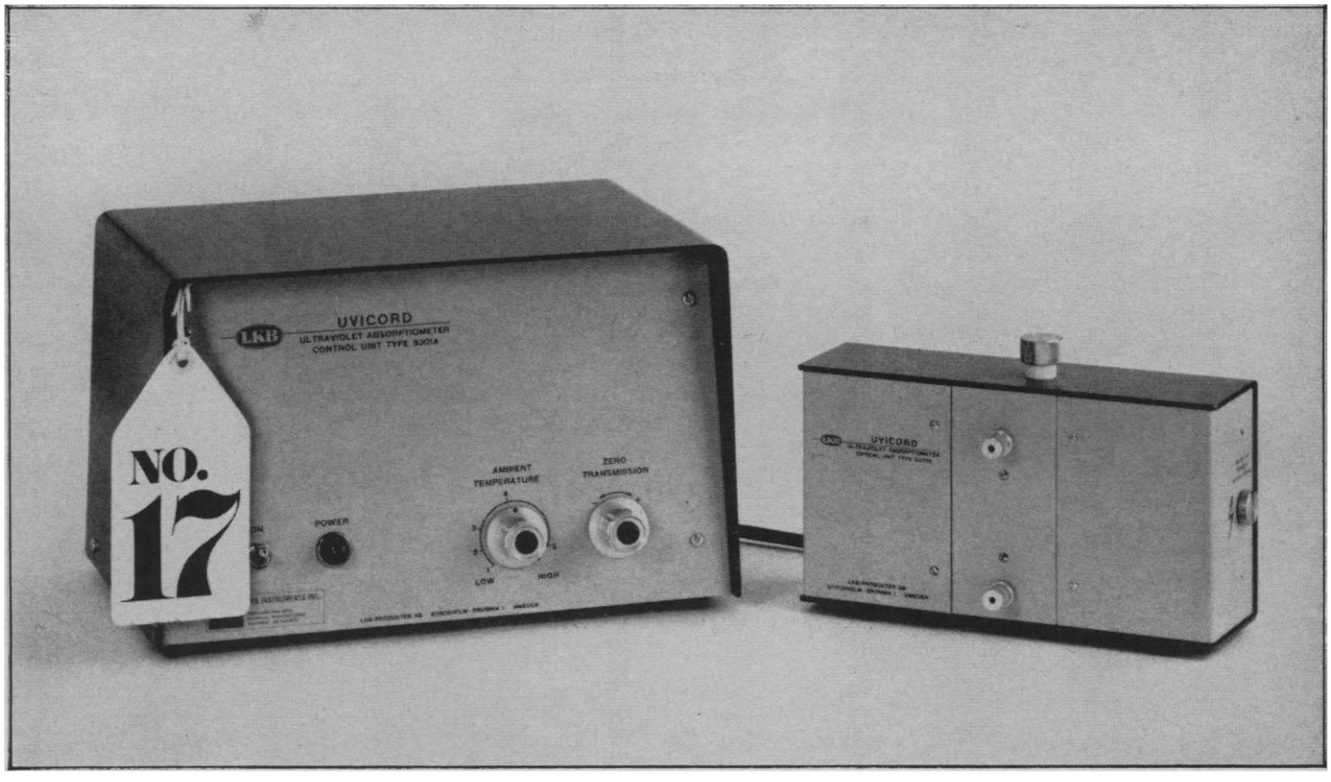
Flawn criticizes "preservationists" as being unrealistically "opposed to change." But preservation of noneconomic values has its place along with sensible exploitation of natural resources. It is shortsighted to say, as Flawn does, "The preservation of an old building simply as an architectural and historical monument in the midst of a growing city where there is great demand for space can hardly be justified unless the building can be converted to serve a useful purpose as well as being a monument. This is multiple use." In this sweeping statement, the University of Texas professor says, in effect, that the Alamo in San Antonio is useless, that it should either be destroyed or converted into—for example—a shopping center. Can a dollar value be placed on the Alamo? It is a priceless shrine to patriots who died for the sake of Texas liberty. Texans unborn deserve the opportunity to visit the Alamo. As a citizen of Illinois, I would gladly pay taxes to preserve the Alamo. Illinois has some old buildings, too. How much is the Lincoln home in Springfield worth? The house is near the state capitol, and the site would be desirable for an office or an apartment building. Would its destruction be progress? Would the destruction of the Acropolis in Athens and the construction of a hotel on its site be progress? How about Mount Vernon as the site of a sewage treatment plant, and Independence Hall as an office building? Wouldn't historians and architects be better qualified than geologists or economists to judge the importance of such buildings and sites?

Flawn continues, "Likewise, preservation of a potential rock-quarry site as a woodland glade constitutes elimination of a valuable mineral resource and costs society a substantial amount of lost tax revenues and lost payroll." But doesn't the value of the glade depend also on its botanical and ecological significance? Who is better qualified to judge the importance of a particular woodland glade, petroleum geologists or a team of plant ecologists, plant taxonomists, landscape architects, and park planners? Gravel pits are needed, but so are woodland glades, especially near centers of population. Certainly the redwoods of California could be eliminated to someone's profit. Grand Canyon can be converted to Grand Lake and enhance the real estate market in Central Arizona. . . .

The starving and impoverished, to be sure, can have little interest in esthetics. In conservation, as in other large problems, there are no short cuts to wisdom. We need master planning for resource use on the international as well as a local scale. But man's future does not rest upon economic expediency alone. We need to define and practice what the late Aldo Leopold referred to as the land ethic. Both tangible and intangible values must be considered. Why shouldn't we be willing to pay a price for the preservation of beauty, of flora, fauna, and geological wonders, and of reminders of history, all of which enrich the quality of man's existence?

H. E. WEAVER
Department of Recreation and Municipal Park Administration, University of Illinois, Champaign 61822

. . . Flawn picks a questionable example to illustrate what he refers to as "the multiple-use concept." Discussing the choice between preservation of a woodland glade and operation of a rock quarry, he writes: "In line with the multiple-use concept, the rock could be quarried over the economic life of the deposit and thereafter the area could be landscaped and restored for other uses." What he proposes is not multiple use; it is one kind of use followed by another kind of use, and



There are at least 16 UV monitors already available (and one of them is even ours). Whatever possessed us to develop number 17?

Unbounded optimism. That, and the rather firm conviction that it was now time for a first-rate, fully quantitative flow analyzer for monitoring UV absorption at either 254 or 280 mμ.

This new analyzer, the Uvicord II, is now available as a particularly useful tool for continuous measurement of the UV absorption of electrophoretic or chromatographic effluents containing fractions which absorb at 254 or 280 mμ. And it is especially suited for cold room use because: (1) the light source compartment is insulated and has its own built-in heating coil, and (2) the control unit *and/or* recorder can be physically separated from the detector unit, thanks to a very long cable. (One of several advantages of a *separate* recorder.)

The primary source of the 254 mμ in the Uvicord II is a stable, long-lived, low-pressure mercury lamp. But then getting the desired 280 mμ was quite another matter and proved to be somewhat of a strain on the aforementioned unbounded optimism. The eventual elegant exclusive solution: the 254 mμ from the mercury lamp is used to excite a transparent rod which has been specially activated to fluoresce strongly. This rod then emits UV in a relatively narrow peak with a maximum at 280 mμ. Unwanted radiation is eliminated by using black glass and selective interference filters. This latter interference filter was also developed by us and provides unique assurance of getting the essentially monochromatic light needed for quantitative measurements.

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in the process the original woodland glade would be destroyed.

The criticism may seem carping and picayunish, but it has a most serious purpose. In this hypothetical case, as in most actual cases, a selection must be made from among conflicting uses. By no stretching of the imagination can the choice of one at the expense of others be made to constitute "multiple" use. The so-called "preservationist" point of view rests pretty strongly on this basic fact. Supporters of the multiple-use idea promise something for everyone; "preservationists" are only too well aware that this is an impossible goal.

CHESTER B. BEATY
Department of Geography, University of Montana, Missoula 59801

. . . While on some points Flawn questions the continued serviceability of our private-property system, he seems to me too orthodox in uncritically accepting much of the economic mythology of valuation and growth. For example, the objection to "locking up" space in the face of economic demand by preserving an old building (it is easy to stretch this outlook to local parks, bird sanctuaries, and the like), and the complaint about "lost tax revenues and lost payroll," should be extended to the speculative holding of land, which keeps much more acreage out of use. And in an age when a single 4- by 6-foot Rembrandt seems worth $2,300,000 to the trustees of an art museum (all of them hard-headed businessmen), who is to say how much we can or cannot afford for open space?

Flawn says, "Although conservation is frequently defined as effecting a harmony or balance between man and his environment, such a goal can never be achieved in an industrial environment. . . ." I challenge this notion. Our consumption of raw materials, as Flawn recognizes, need not disfigure the landscape. Government can, without assuming "complete authority" in planning, foster better use of the land than our "accidental century" (see Michael Harrington's 1965 book of the same name) has so far produced. The government's role is to set limits. The mining of Texas of oyster-shell reefs which Flawn describes is an excellent example of why more far-sighted policy by industry, the states, and the federal government is needed. The uses to which the shell is now being put—chemicals, aggregate, and road base—are all lower uses; the highest use, now being disregarded, is biological productivity. These shallow Gulf Coast bays are indispensable as producers of shrimp, finfish, and shellfish; great colonies of colorful birds depend on them; and these resources, whether labeled business, sport, tourism, or pleasure, are worth more to society in the long run than whatever return the liquidation of the shell banks is bringing to a few politicians and a small segment of the industry. If the dredges are allowed to finish excavating, these bays will become sterile sinks, because deep water is relatively unproductive. The tragedy of shortsightedness is that we could have both kinds of products from the bays; not, however, if the cost of mammoth dredges has to be amortized within a few months!

ROLAND C. CLEMENT
National Audubon Society, 1130 Fifth Avenue, New York 10028

. . . A major obstacle to conservation is the lack of understanding by the general public and by political leaders of the nature of economic growth. It is generally assumed that economic growth is always good and that a decreasing rate of growth is bad. . . . Progress is measured largely by the rate at which physical goods increase. This assumption may have been valid in the past for the major industrial nations, and may still be valid for the underdeveloped nations. But it needs more careful scrutiny in the light of what we know about the nature of the growth process. . . . If we blindly insist upon maintaining a constant rate of economic growth and use of natural resources on the present basis, we practically guarantee an "explosive" situation. Not only does a constant rate of growth of production entail consumption of raw materials and energy at an explosive rate, but along with that go production of pollutants and other adverse alterations of the environment at explosive rates. The situation is even worse if population also grows explosively—that is, at a constant rate.

Thus, in a broad sense conservation implies reexamination of some long-cherished goals and values of our society. Some activities, such as producing and riding in two-ton cars, are enormously wasteful of probably irreplaceable raw materials and energy. Other activities, such as reading books, watching plays, dancing, art, music, en-

tail very small use of matter and energy. Perhaps we should begin to designate a conservation index for various activities—high indices for activities that imply little use of resources, and low indices for those that are wasteful of matter and energy. Increased efficiency of production and use will help, obviously, but we must also begin to encourage participation by consumers in those activities that have a high conservation index. Certain economic activities—production of food, water, and shelter—should, obviously, have high priorities. War and production for war are, of course, the most wasteful of all activities, since they consume raw materials and energy without any basic contribution to human welfare. . . . Some may believe, as a matter of faith, that scientists can solve any problems that arise, so long as they are given enough money. Many scientists are becoming increasingly uncertain that they can fill the bill. The world is finite and its resources are finite.

HY RUCHLIS
160 Parkside Avenue, Brooklyn, New York 11226

. . . I commend Flawn for presenting many important conservation ideas in his addresses before organizations made up of individuals who may have relatively little understanding of the concepts. But he errs in saying that the rape of the Appalachian coal fields, which conservationists criticize today, all took place 50 years ago. Conservationists are rightly protesting the very recent forms of exploitation based on the use of large, modern earth-moving equipment.

I would like to point out a few ways that geologists might actually aid in conservation of man's environment. Our profession can and should point out the lack of judgment often exhibited by state and federal agencies in locating and building dams on sites chosen for political motives. We should advise on proper watershed management as a means of permanent flood control that would eliminate dependence on temporary check-dams and reservoirs. Local, state, and federal planning agencies are badly in need of scientific advice on land use, and geologists can make a major contribution to this. They can counsel against extensive construction on unstable substrates or areas subject to rare but devastating flooding. Existing forest practices, carried out without regard for

the long-term effects of soil-cover destruction and concomitant flooding, are seriously in need of revision in the state of California and other areas; geological opinions and facts are needed to help formulate effective legislation. In short, the geologist should have the ability to see the temporal position of mankind and his fellow organisms in the total environment of the surface of this planet, and he, above all, should advise his fellow men of their role in this evolving, dynamic interplay.

I am pleased to learn that the theme of the AAAS meeting in Washington this year will be conservation. Before that meeting, let us at least try to agree on a definition of that term.

ROBERT R. CURRY
Department of Geology and Geophysics, University of California, Berkeley

Flawn has done a service both to geologists and to conservation in pointing out that "geologists are conspicuous by their absence from today's natural-resource planning groups, local, state, and federal . . . [perhaps because] geologists are regarded in government circles as champions of the mineral industry, rather than as conservationists." The same could be said of mining and petroleum engineers, probably because, as Flawn notes, "There is a disturbing aspect of the new conservation movement in that the extractive industries and the mineral industries in particular are regarded as rapacious despoilers and looters of the nation's resources." The use of this vituperative vocabulary to disparage the development of resources by American private enterprise for the use of the American people, and thereby to promote government control, has been going on for a long time. The intention to use the conservation movement to bring about what most dictionaries call socialism was clearly stated in Gifford Pinchot's article "Breaking new ground," published some 40 years after the famous 1908 White House Conference on Conservation (and reprinted as "What it all means" in *Readings in Resource Management and Conservation*, I. Burton and R. W. Kates, Eds., Univ. of Chicago Press, 1965). Pinchot said: "Conservation is the application of common sense to the common problems for the common good. Since its objective is the *ownership, control, development, processing, distribution, and use* [emphasis mine] of natural resources for the benefit of the people, it is by its very nature the antithesis of monopoly." Many sound and sincere conservationists, including geologists and engineers, want no part of the scheme to use the conservation movement to socialize natural resources.

Geologists and engineers have done a spectacularly effective job, without publicity in conservation literature. It is no coincidence that there have been adequate oil and other mineral supplies for the 20th-century wars and for the maintenance of the economy in the meanwhile. It has been due to the operation of the scientific, engineering, executive, and technological talents and skills of the most capable discovery and development personnel in the world—almost all in private industry. Transfer of access to undiscovered mineral resources from this capable body to "resource managers" or government agencies by wholesale segregation of land under the mining and leasing laws could be a national catastrophe.

The Multiple Use Act (Public Law 88-607, 19 Sept. 1964) might be interpreted to do just that. Parts of section 1 provide for the Secretary of the Interior to determine which lands "shall be retained . . . in Federal ownership and managed for . . . mineral production." Section 4 provides that classification for retention "shall have the effect of segregating such land from . . . disposal under . . . the mining and mineral leasing laws. . . ." The Multiple Use Act is temporary, enacted "pending the implementation of recommendations to be made by the Public Land Law Review Commission." Flawn's alert regarding the absence of mineral exploration and development experts from high conservation councils is most timely. The portents of government management are indeed ominous. Geologists, engineers, and everybody else, including the Public Land Law Review Commission, need to be aware of this potential for nullifying the most successful land policy in all history.

WILLIAM W. PORTER II
244 South Gramercy Place, Los Angeles 4, California

Linear Algebra: Teacher's Problem

I am a physicist with the usual sort of background in mathematics and am teaching mathematics to high school students. It has been my observation

that to many high school and beginning college students, too intelligent to be ignored, "pure mathematics is to applied mathematics as crossword puzzles are to literature." These potential users of mathematics need to see mathematics work, in order to appreciate it and be excited by it.

In group theory and in linear algebra, which are now beginning to come into high school math, and particularly in the teaching of matrices, I have been able to find very few significant applications which do not require extensive training in other disciplines in order to be understood. One tells the student that matrices, for example, are indispensible in many fields in order to avoid a quagmire of symbols. Can this be demonstrated in applications that are reasonably easy to understand?

I should be grateful for suggestions in whatever field of application, showing the significance and use of change of basis, matrices, linear transformations, and group theory. Details, please.

R. K. JARVIS

Groton School,
Groton, Massachusetts

AAAS Election System

The news (18 Feb., p. 843) that the Council of AAAS defeated a constitutional amendment which would have given all Fellows the privilege of electing officers of the association will surely be greeted by many with surprise and disappointment. It has sometimes been claimed that the association is a democratic organization, but terms must be carefully scrutinized when it is realized that the members of the council, who now retain all elective power in addition to their legislative power, are usually appointed.

It is a remarkable feature of the contemporary scene that in a country whose institutions offer many notable examples of democracy, the one scientific organization which seemingly has the potentiality of becoming an authentic representative of American science, by the criterion of popular election by a qualified constituency, chooses to reject that opportunity. If we knew the reasons for this action, we might have significant clues to the contemporary scientist's approach to the problems of power and responsibility.

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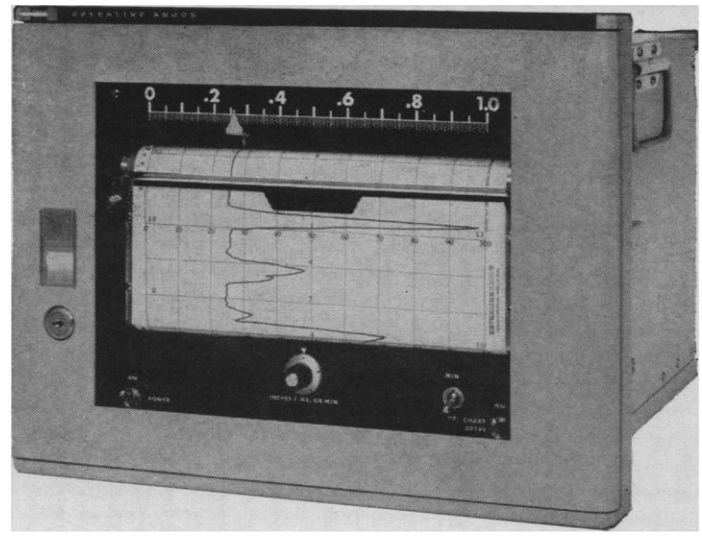

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Peaceful Uses of the Earth's Atmosphere

An experiment for observing the world's weather—continuously, in three dimensions, all over the globe—has recently been proposed in a report of a National Academy of Sciences panel headed by Jule Charney of M.I.T.* The development of such a system, for experimental and operational purposes, is now being vigorously explored by the Environmental Science Services Administration and the World Meteorological Organization. The system is to be called the World Weather Watch. Charney and his associates are cautiously optimistic that, given adequate worldwide data and improved computers, weather forecasting can be upgraded in quality and extended in range. They envision 2-week forecasts of the accuracy now possible for 2- to 3-day predictions. The report gives substance to an old and shining dream of John von Neumann, who saw in applications to the atmosphere the full justification of the science of modern computers.

There are three critical elements needed to satisfy the dream: (i) repeated global weather observations at various atmospheric levels; (ii) a fast, worldwide, high-capacity communication system; and (iii) a computer of enormous capacity and great speed, containing an adequately realistic "numerical model" of the atmosphere. Some of the more modest components are already being tested.

There would be enormous rewards from even a few months of pilot operation of such a global weather system. It would almost surely bring progress toward more accurate, longer-range forecasting and toward understanding the interactions of atmospheric motions and processes on many scales. With such high stakes, an IGY-like international effort is clearly justified.

But there is a dimension to the World Weather Watch that is far more sweeping in potential. It is also far more speculative, and it is only vaguely hinted at in the report. With the World Weather Watch data, and with an adequate computer and a global mathematical model, a vast array of experiments on weather and climate modification can be "performed" by numerical computation rather than in nature. The beneficial consequences can be evaluated and compared to the expected costs. The full effect and the potential hazards can be determined without risk to life and property. For example, a dam can be "built" across the Bering Strait for an infinitesimal fraction of its real-life cost, and we can evaluate its effect on the Kamchatka or Canada wheat-growing season without actually taking the risk of unforeseen adverse effect, or of no effect at all. We can model a megalopolis and its atmospheric cesspool, examine the extent to which it acts as an inadvertent weather modifier, then "clean up" the atmosphere and see the difference. We can do this without taxes, political strife, vast engineering expense—in a computer.

Weather and climate modification, if achieved, will surely have effects that transcend international boundaries. For this reason, research on them should be conducted under international auspices. When we come to understand the extent of public benefit or hazard involved, the nations of the world will then be in a far better position to exploit or control both. Global weather modification is, in potential for benefit or destruction, the analog of atomic energy; if we can develop it under cooperative international sponsorship and with participation of scientists of many nations, then perhaps we can guarantee that it will be used solely under international sanction and exclusively for beneficial, peaceful uses. No lesser goal should guide our nation's participation in the World Weather Watch.—WALTER ORR ROBERTS, *Director, National Center for Atmospheric Research, Boulder, Colorado*

* "The Feasibility of a Global Observation and Analysis Experiment," *Nat. Acad. Sci.–Nat. Res. Council Publ. 1290* (1966). $4.

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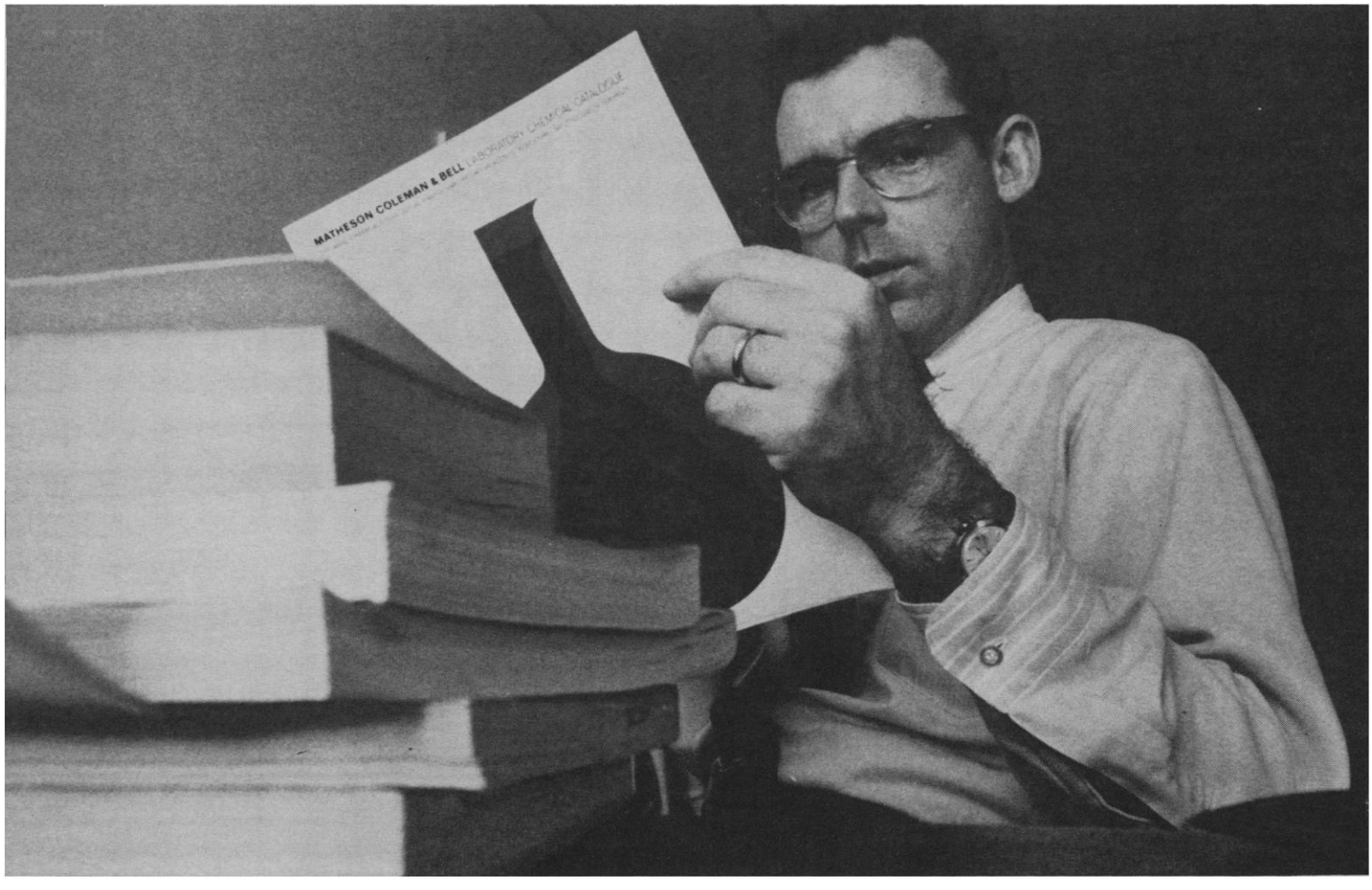

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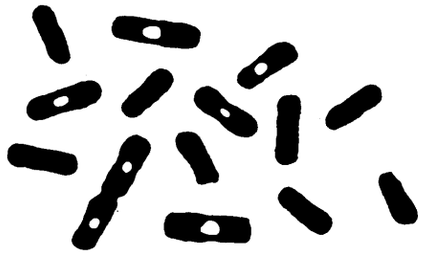

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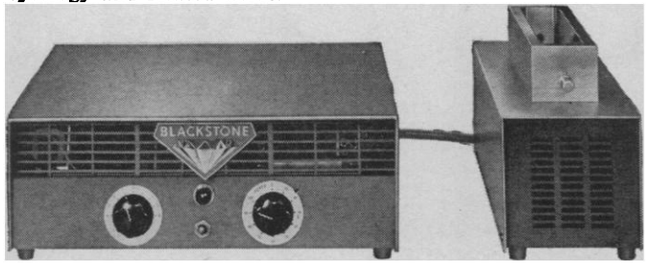

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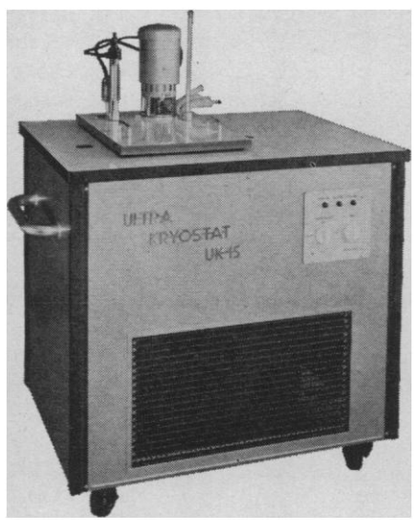

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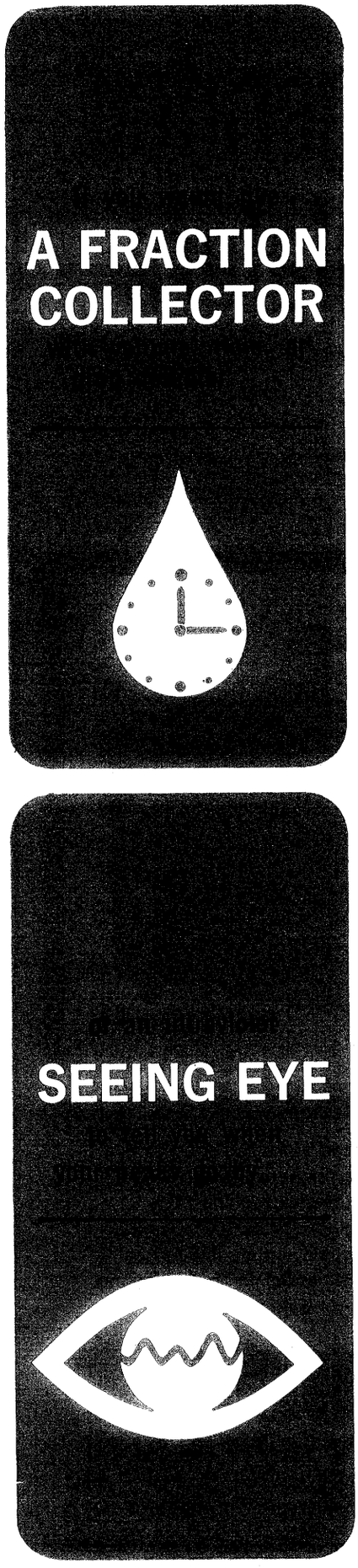

were similarly prepared. After 4 days, precipitates were found in capillaries containing the fraction from glial cells but not in tubes containing the neuron fraction.

Using fluorescent-antibody technique with frozen cell samples, Hydén found *S*100 localized in the nuclei of glial cells and in scattered spots of the membrane system. By this means he also found *S*100 in the nuclei of nerve cells. Because the nucleus amounts to only about 3.5 percent of the mass of this nerve cell, nuclear concentration of *S*100 did not show up in precipitation analysis.

Does *S*100 move from glial nuclei to the nuclei of nerve cells? If so, this unidentified protein might be an inducer substance (*1*).

Acetylcholine Esterase Studied

Some workers have reported that norepinephrine is a transmitter in the reticular formation of the brain stem. Others have reported that acetylcholine is the transmitter in reticular pathways. Most of these reports have come from electrophysiologists; few biochemical studies have been made.

Rudi Pavlin, Ljubljana University, Yugoslavia, told the symposium that he used a new magnetic microdiver technique (*2*) to study choline esterase activity in single nerve cells and in clumps of glial cells dissected from reticular nuclei of rat. The dissection was made according to the method of Hydén, with whom Pavlin had worked earlier. In most experiments the giant cells from the nucleus reticularis pontis caudalis were used. Certain nerve fibers descending from the cortex and the corpus striatum terminate in this nucleus. The microdiver technique was described at the symposium by one of its inventors, Miro Brzin, also of Ljubljana University (*2*).

Pavlin said he found evidence of active choline esterase in all cells examined. Enzyme activity of single cells from the same nucleus varied widely, but he found no correlation of activity with either cell volume or cell surface.

Acetylcholine and three higher choline esters are known to occur in rat brain. Selective esterase inhibitors were used to measure, differentially, enzyme activity specific for each choline ester.

In young rats, acetylcholine esterase activity is higher in glial cells than in neurons, Pavlin said. After 80 days of life, acetylcholine esterase activity had increased by 300 percent in neurons and by only 10 percent in glial cells.

In other experiments Pavlin studied LSD as a possible inhibitor of acetylcholine esterase. While LSD in low concentration inhibited hydrolysis of acetylcholine in homogenates of brain stem tissue, inhibition in single nerve cells was found only at concentrations higher than 20 micromoles per liter. Since concentrations used to produce the LSD effect in humans are much lower, inhibition of acetylcholine esterase in the brain stem can probably be ruled out as the mechanism of LSD effect.

Pavlin said he will develop the microdiver technique to study the action of several enzymes operating simultaneously in a single nerve cell. Further work by this and other techniques, he said, might lead to the "recognition that both cholinergic and adrenergic fibers terminate in the same neuron."

The above is only a sampling of a rich program. The full report of the symposium will be published by the Foundation.

T. L. CAMPBELL

AAAS

References and Notes

1. For a full report of this work, see H. Hydén and B. McEwen, *Proc. Nat. Acad. Sci. U.S.* **55**, 354 (1966).
2. The magnetic microdiver is described in Brzin, Dettbarn, Rosenberg and Nachmansorn, *J. Cell Biology* **26**, 353 (1965).

Forthcoming Events

April

15–16. Iowa **Acad. of Science**, Pella. (G. W. Peglar, Dept. of Mathematics, Iowa State Univ., Ames)

15–16. Minnesota **Acad. of Science**, annual mtg., Macalester College, St. Paul. (W. Larson, The Academy, 3100 38th Ave. S., Minneapolis 55406)

15–16. Montana **Acad. of Sciences**, Missoula. (L. H. Harvey, Univ. of Montana, Missoula 59801)

15–17. American Soc. of **Internal Medicine**, New York, N.Y. (A. O. Whitehall, 3410 Geary Blvd., San Francisco, Calif.)

16–18. **Lateral Line Detectors**, intern. conf., New York, N.Y. (P. H. Cahn, Stern College, Yeshiva Univ., 253 Lexington Ave., New York 10016)

17–20. **Electron and Ion Beam Science and Technology**, 2nd intern. conf., American Inst. of Mining, Metallurgical, and Petroleum Engineers, New York, N.Y. (H. N. Appleton, 345 E. 47 St., New York 10017)

18–19. American **Otological** Soc., San Juan, P.R. (W. H. Bradley, 1100 E. Genessee St., Syracuse, N.Y.)

18–20. Thermodynamics of **Ceramic**

Systems, mtg., London, England. (J. P. Roberts, British Ceramics Soc., Houldsworth School of Applied Science, Univ. of Leeds, Leeds 2, England)

18–20. Technical **Microbiology**, symp., Berlin, Germany. (S. Windisch, Inst. für Gärungsgewerbe, Seestrasse, 13, 1 Berlin 65)

18–20. **Structures and Materials**, 7th conf., Cocoa Beach, Fla. (R. W. Leonard, NASA–Langley Research Center, Mail Stop 188C, Langley Station, Hampton, Va.)

18–21. **Aerospace Medical** Assoc., 37th annual scientific mtg., Las Vegas, Nev. (C. A. Berry, Chief of Center Medical Programs, NASA–Manned Spacecraft Center, Houston, Tex. 77058)

18–21. International **Scientific Radio** Union, U.S. natl. committee, mtg., Washington, D.C. (USNC–URSI, 2101 Constitution Ave, NW, Washington, D.C.)

18–21. **Tectonic Levels** in the Earth's Crust, intern. symp., Neuchatel, Switzerland. (J.-P. Schaer, Dept. of Geology, University, 11 rue Emile Argand, 200 Neuchatel)

18–22. American Assoc. of **Corrosion Engineers**, 22nd annual mtg., Miami Beach, Fla. (N. E. Hamner, The Association, 980 M&M Bldg., Houston, Tex.)

18–22. Applications of **Liquid Fuels**, conf., Torquay, England. (Inst. of Fuel, 18 Devonshire St., Portland Pl., London, W.1, England)

18–22. American College of **Physicians**, New York, N.Y. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia 4, Pa.)

19–22. American **Geophysical** Union, 47th annual mtg., Washington, D.C. (W. E. Smith, AGU, 1145 19th St., NW, Washington, 20036)

18–23. International Soc. for **Photogrammetry**, technical commissions, Munich, Germany. (G. Krauss, Deutsche Gesellschaft für Photogrammetrie, Waasemstr. 19-21, Bad Godesberg, Germany)

19–21. **Frequency Control**, 20th annual symp., U.S. Army Electronics Command, Atlantic City, N.J. [Director, Electronics Components Laboratory, U.S. Army Electronics Command, Attn: AMSEL-KT-ST (M. F. Timm), Fort Monmouth, N.J. 07703]

19–22. **Microwave Communications**, 3rd colloquium, Budapest, Hungary. (Valko Peterne, Szabadsag ter 17, Budapest)

19–23. **Scientific and Technical Books and Journals**, 2nd intern. exhibition, Paris, France. (F. Retailliau, Intern. Exhibition of Scientific and Technical Books and Journals, 117 Blvd. St. Germain, Paris 6)

20–22. Institute of **Electrical and Electronics Engineers**, southwestern conf., Dallas, Tex. (R. Carrel, Collins Radio Co., Dallas 75207)

20–22. American **Laryngological, Rhinological, and Otological** Assoc., San Juan, P.R. (V. R. Alfaro, 917 20th St., NW, Washington, D.C. 20006)

20–22. **Magnetics**, 4th intern. conf. (INTERMAG), Stuttgart, Germany. (E. W. Pugh, I.B.M. Corp., 1000 Westchester Ave., White Plains, N.Y.)

20–23. Application of **Physicochemical Methods in Chemical Analysis**, conf., Budapest, Hungary. (M. K. Egyesülete, Szabadsag ter 17, Budapest 5)

20–23. **Solar Energy** Soc., 2nd annual mtg., Boston, Mass. (F. Edlin, Solar En-

ergy Soc., Arizona State Univ., Tempe 85281)

21–22. **Space Navigation**, natl. mtg., Boston, Mass. (E. S. Keats, Westinghouse Electric Corp., Box 1897, Baltimore, Md. 21203)

21–23. Ohio **Acad. of Science**, 75th annual mtg., Columbus. (J. H. Melvin, 505 King Ave., Columbus 43201)

21–23. Southwestern **Psychological** Assoc., 13th annual conv., Arlington, Tex. (C. Cleland, 2104 Meadowbrook Dr., Austin, Tex.)

21–23. West Virginia **Acad. of Science**, Institute. (J. B. Hickman, West Virginia Univ., Morgantown 26506)

22. **Computer Aided Basic Research**, symp., Hoboken, N.J. (I. Flores, Electrical Engineering Dept., Stevens Inst., Hoboken 07030)

22. Illinois **Acad. of Science**, Illinois State Univ., Normal. (N. D. Levine, Univ. of Illinois, Urbana)

22–23. National Council of **Teachers of Mathematics**, Greeley, Colo. (J. D. Gates, 1201 16th St., NW, Washington, D.C. 20036)

23–24. American **Laryngological** Assoc., San Juan, P.R. (L. Richards, 12 Clovelly Rd., Wellesley Hills, Mass.)

24. Society for **Clinical Ecology**, 1st annual mtg., Chicago, Ill. (T. G. Randolph, Human Ecology Research Foundation, 720 N. Michigan Ave., Chicago 11, Ill.)

24–26. American Assoc. of **Colleges of Pharmacy**, Dallas, Tex. (C. W. Bliven, 1507 M St., NW, Washington, D.C. 20005)

24–27. American Soc. of **Abdominal Surgeons**, Chicago, Ill. (B. F. Alfano, 663 Main St., Melrose 76, Mass.)

24–27. American **Oil Chemists'** Soc., Los Angeles, Calif. (C. H. Hauber, The Society, 35 E. Wacker Dr., Chicago, Ill. 60601)

24–28. **Infectious Pathology**, 4th intern. congr., Stuttgart, Germany. (G. Hoffman, Hugstetterstr. 55, 78 Frieburg im Briesgau, Germany)

24–29. American College of **Allergists**, 22nd annual congr., Chicago, Ill. (J. D. Gillespie, 2141 14th St., Boulder, Colo. 80302)

24–29. American Soc. of **Hospital Pharmacists**, annual mtg., Dallas, Tex. (J. A. Oddis, 2215 Constitution Ave., NW, Washington, D.C. 20037)

24–29. American **Pharmaceutical** Assoc., Dallas, Tex. (W. S. Apple, 2215 Constitution Ave., NW, Washington, D.C. 20037)

25–27. **Antidepressant Drugs**, symp., Milan, Italy. (S. Garattini, Inst. di Ricerche Farmacologiche "Mario Negri," Via Eritrea, 62, Milan)

25–27. **National Acad. of Sciences**, 103rd annual mtg., Washington, D.C. (Home Secretary, NAS, 2101 Constitution Ave., NW, Washington, D.C. 20418)

25–27. American Acad. of **Pediatrics**, Montreal, P.Q., Canada. (E. H. Christopherson, 1801 Hinman Ave., Evanston, Ill. 60204)

25–27. Academy of **Religion and Mental Health**, annual mtg., Chicago, Ill. (G. C. Anderson, 16 E. 34 St., New York, N.Y.)

25–28. Society of **Economic Paleontologists and Mineralogists**, St. Louis, Mo. (R. Tener, The Society, Box 979, Tulsa, Okla.)

25–28. American Assoc. of **Petroleum Geologists**, St. Louis, Mo. (N. C. Smith, Box 979, Tulsa, Okla.)

25–28. Improving Effectiveness in **Research and Development Administration**, 11th annual inst., American Univ., Washington, D.C. (P. W. Howerton, Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C. 20006)

25–29. **Radioecological Concentration Processes**, intern. symp., Stockholm, Sweden. (Inst. of Radiophysics, Stockholm 60)

25–30. American Acad. of **Neurology**, Philadelphia, Pa. (T. D. Swedien, 7100 France Ave., Minneapolis, Minn.)

25–7. **Psychotherapy**, 16th Lindauer week, Lindauer, Germany. (H. Stolze, Adalbert-Stifterstr. 31, 8 München 27, Germany)

26. National **Cystic Fibrosis** Research Foundation, Atlantic City, N.J. (The Foundation, Medical Dept., 521 Fifth Ave., New York, N.Y. 10017)

26–27. **Electromagnetic Relays**, 14th annual natl. conf., Oklahoma State Univ., Stillwater. (D. D. Lingelbach, Dept. of Electrical Engineering, Oklahoma State Univ., Stillwater 74075)

26–28. Joint **Computer** Conf., Boston, Mass. (J. L. Mitchell, P.O. Box 460, Lexington, Mass. 02173)

26–28. Institute of **Electrical and Electronics Engineers**, region 6, annual conf., Tucson, Ariz. (L. P. Huelsman, Dept. of Electrical Engineering, Univ. of Arizona, Tucson 85721)

26–28. **National Acad. of Engineering**, 2nd annual mtg., Washington, D.C. (Secretary, NAE, 2101 Constitution Ave., NW, Washington, D.C. 20418)

27–29. Institute of **Mathematical Statistics**, Upton, L.I., N.Y. (G. E. Nicholson, Jr., Univ. of North Carolina, Chapel Hill)

27–29. American **Pediatric** Soc., Atlantic City, N.J. (C. D. Cook, 333 Cedar St., New Haven, Conn. 06510)

27–1. Technical Union of **Italian Pharmacists**, 9th natl. congr., Naples, Italy. (UTI. Far. Secretariat, Via Balbi 29/4, Genoa)

28–1. Southwestern Assoc. of **Naturalists**, 13th annual mtg., Texas College of Arts and Industries, Kingsville. (J. T. Peacock, Dept. of Biology, Texas College of Arts and Industries, Kingsville, 78363)

28–29. Electrical Conduction Properties of **Polymers**, symp., Pasadena, Calif. (A. Rembaum, Jet Propulsion Laboratory, California Inst. of Technology, 4800 Oak Grove Dr., Pasadena)

28–30. Central States **Anthropological** Soc., annual mtg., St. Louis, Mo. (G. H. Fathauer, Dept. of Sociology and Anthropology, Miami Univ., Oxford, Ohio 45056)

28–30. Economic and Social Aspects of **Technological Transfer**, conf., Airlie House, Warrenton, Va. (D. L. Spencer, Dept. of Economics, Howard Univ., Washington, D.C. 20001)

28–30. **Wildflower Pilgrimage**, 16th annual, Gatlinburg, Tenn., and Great Smoky Mountain Natl. Park. (A. J. Sharp, Dept. of Botany, Univ. of Tennessee, Knoxville)

29–30. Georgia **Acad. of Science**, Georgia Southern College, Statesboro. (J. T. May, School of Forestry, Univ. of Georgia, Athens)

29–30. Mississippi **Acad. of Sciences**, Mississippi State Univ., State College. (C. Q. Sheeley, Box 574, State College 39762)

29–30. **Population** Assoc. of America, New York, N.Y. (A. S. Lunde, Natl. Center for Health Statistics, U.S. Public Health Service, Washington, D.C. 20201)

29–30. American Assoc. of **University Professors**, Atlanta, Ga. (W. P. Fidler, The Association, 1785 Massachusetts Ave., NW, Washington, D.C.)

29–1. Association of **Clinical Scientists**, Chicago, Ill. (R. P. MacFate, 300 N. State St., Chicago, Ill. 60610)

29–1. American Soc. for the Study of **Sterility**, Chicago, Ill. (H. H. Thomas, 944 S. 18 St., Birmingham, Ala.)

May

1. American Federation for **Clinical Research**, Atlantic City, N.J. (J. F. Bryan, 2000 P St., NW, Washington, D.C. 20036)

1–4. **AAAS**, Southwestern and Rocky Mountain Div., Las Cruces, N.M. (M. G. Anderson, P.O. Box AF, University Park, N.M. 88070)

1–4. American Soc. for **Clinical Investigation**, Atlantic City, N.J. (G. W. Liddle, School of Medicine, Vanderbilt Univ., Nashville, Tenn.)

1–4. American College of **Obstetricians and Gynecologists**, Chicago, Ill. (R. A. Kimbrough, 79 W. Monroe, Chicago 60603)

1–5. American Soc. for **Microbiology**, annual mtg., Los Angeles, Calif. (R. W. Sarber, The Society, 115 Huron View Blvd., Ann Arbor, Mich. 48103)

1–6. **Electrochemical Soc.**, annual spring mtg., Cleveland, Ohio. (The Society, 30 E. 42 St., New York 10017)

1–6. International College of **Surgeons**, North American Federation, congr., Houston, Tex. (S. E. Henwood, 1516 Lake Shore Dr., Chicago, Ill. 60610)

2–3. Canadian **Aeronautics and Space** Inst., annual mtg., Ottawa, Ontario. (The Institute, 77 Metcalfe St., Ottawa 4)

2–3. **Bioengineering**, 3rd annual Rocky Mountain symp., University of Colorado, Boulder. (J. C. Daniel, Dept. of Biology, Univ. of Colorado, Boulder 80304)

2–3. American Inst. of **Mining, Metallurgical**, and **Petroleum Engineers**, Inst. of Petroleum Engineers, Wichita Falls, Tex. (Executive Secretary, 345 E. 47 St., New York 10017)

2–4. Council of **Biology Editors**, Univ. of Notre Dame, Notre Dame, Ind. (R. E. Gordon, Dept. of Biology, Univ. of Notre Dame, Notre Dame)

2–4. **Communications Satellite Systems**, conf., American Inst. of Aeronautics and Astronautics, Washington, D.C. (W. J. Brunke, AIAA, 1290 Sixth Ave., New York 10019)

2–5. **Isochronous Cyclotrons**, intern. conf., Gatlinburg, Tenn. (R. S. Livingston, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 27831)

2–7. International Inst. of **Optics**, conf., Paris, France. (Conference Secretariat, Inst. for Optics, 3, blvd. Pasteur, Paris 15)

3–5. British Joint **Computer** Conf., Eastbourne, England. (Secretariat, Inst. of Electrical Engineers, Savoy Place, London W.C.2, England)

3–5. **Industrial Waste**, 21st conf., Purdue Univ., Lafayette, Ind. (D. E. Bloodgood, School of Civil Engineering, Purdue Univ., Lafayette 47907)

3–6. American Chemical Soc., Div. of **Rubber Chemistry**, San Francisco, Calif. (G. N. Vacca, Bell Telephone Laboratories, Murray Hill, N.J.)

3–8. Mechanism of Action of **Fungicides and Antibiotics**, intern. symp., Biological Soc. of the GDR, Reinhardsbrunn, East Germany. (H. Lyr, Inst. für Forstwissenschaften, Alfred-Möllerstr., 13 Eberswalde die Berlin)

4. Society for **Analytical Chemistry**, mtg., Bristol, England. (The Society, 14 Belgrave Sq., London, England)

4–6. **Genetics** Soc. of Canada, 11th annual mtg., Banff, Alberta. (C. O. Person, Dept. of Genetics, Univ. of Alberta, Edmonton, Canada)

4–6. Society for Experimental **Stress Analysis**, spring mtg., Detroit, Mich. (B. E. Rossi, 21 Bridge Sq., Westport, Conn. 06882)

4–7. **Virginia Acad.** of Science, Madison College, Harrisonburg. (R. C. Berry, Virginia Acad. of Science, P.O. Box 8203, Richmond 23226)

4–8. **Laboratory Medicine**, 12th congr., Bad Kissengen, West Germany. (W. Albath. Katharinengasse 3, 87 Würzburg, Germany)

4–11. **Instability Phenomena in Galaxies**, symp., Armenian SSR. (A. N. Hakopian, Acad. of Sciences of the Armenian SSR, Erevan)

5–6. **Human Factors in Electronics**, 7th symp., Minneapolis, Minn. (C. A. Baker, Honeywell, Inc., 2700 Ridgeway Rd., Minneapolis)

5–6. **Rabies**, natl. symp., Atlanta, Ga. (J. R. Ray, American Veterinary Medical Assoc., Chicago, Ill.)

5–6. **Strontium Metabolism**, intern. symp., Annan, Scotland. (J. H. Martin, United Kingdom Atomic Energy Agency, Chapelcross Works, Annan, Dumfriesshire, Scotland)

5–7. Society for American **Archaeology**, 31st annual mtg., Univ. of Nevada, Reno. (D. D. Fowler, Dept. of Anthropology, Univ. of Nevada, Reno 89507)

5–7. New Jersey Soc. of **Professional Engineers**, 42nd annual conf. and exhibition, Atlantic City. (K. G. Stanley, The Society, 495 West State St., Trenton 08618)

5–7. Midwestern **Psychological** Assoc., Chicago, Ill. (F. A. Mote, Psychology Dept., Univ. of Wisconsin, Madison)

5–8. **Protides of the Biological Fluids**, 14th annual colloquium, Bruges, Belgium. (P.O. Box 71, Bruges)

6–7. Institute on **Lake Superior Geology/Mineralogical** Soc. of America/Soc. of **Economic Geologists**, mtg., Michigan Technological Univ., Saulte Ste. Marie. (A. K. Snelgrove, Michigan Technological Univ., Houghton 49931)

6–7. **North Carolina Acad.** of Science, Catawba College, Salisbury. (J. A. Yarbrough, Meredith College, Raleigh, N.C.)

6–7. **North Dakota Acad.** of Science, North Dakota State Univ., Fargo. (B. G. Gustafson, Univ. of North Dakota, Grand Forks)

6–8. Society for Applied **Anthropology**, 25th annual mtg., Milwaukee, Wis. (The

Society, Rand Hall, Cornell Univ., Ithaca, N.Y.)

6–8. **Wisconsin Acad.** of Sciences, Arts, and Letters, Lawrence Univ., Appleton, Wis. (D. J. Behling, 720 Wisconsin Ave., Milwaukee 53202)

6–9. American **Psychoanalytic** Assoc., Atlantic City, N.J. (H. Fischer, 1 E. 57th St., New York, N.Y.)

7–8. Academy of **Psychoanalysis**, Atlantic City, N.J. (A. H. Rifkin, 125 E. 65 St., New York 10021)

7–12. American **Ceramic** Soc., 68th annual mtg., Washington, D.C. (The Society, 4055 N. High St., Columbus, Ohio 43214)

8–10. Society of the **Plastics Industry**, Canadian section, 24th annual mtg., Montreal, P.Q. (The Society, 250 Park Ave., New York 10017)

8–11. **Administrative Management** Soc., 47th intern. conf., Boston, Mass. (W. H. Latham, Willow Grove, Pa. 19090)

8–12. Association of American State **Geologists**, annual mtg., Univ. of Indiana, Bloomington. (W. C. Hayes, Missouri Geological Survey, P.O. Box 250, Rolla 65401)

8–12. **Organic Sulphur Compounds**, symp., Univ. of Groningen, Groningen, Netherlands. (M. J. Janssen, Dept. of Organic Chemistry, Univ. of Groningen, Groningen)

8–15. **Stereochemistry**, conf., Bürgenstock, Switzerland. (D. Arigoni, Dept. of Organic Chemistry, Univ. of Zurich, Zurich, Switzerland)

9–10. **Circuit Theory**, 9th midwestern symp., Oklahoma State Univ., Stillwater. (D. R. Wilson, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74045)

9–11. Nuclear Applications of **Non-Fissile Ceramics**, conf., Washington, D.C. (A. Boltax, Westinghouse Astronuclear Laboratory, P.O. Box 10864, Pittsburgh, Pa. 15236)

9–11. Numerical Solution of **Nonlinear Differential Equations**, symp., Madison, Wis. (D. Greenspan, Mathematics Research Center, U.S. Army, Univ. of Wisconsin, Madison 53706)

9–12. **Cell Nucleus Functions and Radio-Sensitivity**, symp., Rijswijk, Netherlands. (H. M. Klouwen, Radiobiological Inst., Organization for Health Research, T.N.O., 151 Lang Kleigweg, Rijswijk)

9–12. **Standards Laboratory** conf., Natl. Bureau of Standards, Gaithersburg, Md. (W. R. Tilley, NBS, Washington, D.C. 20234)

9–13. Society of **Photographic Scientists** and **Engineers**, annual conf., San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco, Calif.)

9–13. American **Psychiatric** Assoc., annual mtg., Atlantic City, N.J. (P. Woodward, 1700 18th St., NW, Washington, D.C. 20009)

9–14. **Condensation Nuclei**, 6th intern. symp., Albany, N.Y. (D. G. Barry, Atmospheric Sciences Research Center, State Univ. of New York, P.O. Box 7185, Albany 12224)

10–12. **Telemetering**, natl. conf., Boston, Mass. (F. Nieman, NASA Electronics Research Center, 575 Technology Sq., Cambridge, Mass. 02139)

10–14. American Assoc. of **Mental Deficiency**, Chicago, Ill. (G. E. Milligan, 1601 Broad St., Columbus, Ohio)

10–19. Committee on **Space Research**, 9th plenary mtg., Vienna, Austria. (COSPAR, 55, blvd. Malesherbes, Paris 8, France)

11. **Electroluminescence and Semiconductor Lasers**, seminar, Stevens Inst. of Technology, Hoboken, N.J. (G. J. Herskowitz, Dept. of Electrical Engineering, Stevens Inst. of Technology, Hoboken, N.J. 07030)

11–13. **Analysis Instrumentation**, 12th natl. symp., Houston, Tex. (G. I. Doering, Industrial Nucleonics Corp., 650 Ackerman Rd., Columbus, Ohio 43202)

11–13. American Inst. of **Chemists**, 43rd annual mtg., New Orleans, La. (C. L. Hoffpauir, Southern Regional Research Laboratory, New Orleans 70119)

11–13. **Industrial Research** Inst., spring mtg., Buck Hill Falls, Pa. (The Institute, 100 Park Ave., New York 10017)

11–13. **Military Oceanography**, 3rd U.S. Navy symp., San Diego, Calif. (Office of the Oceanographer of the Navy, Washington, D.C.)

11–14. American Assoc. for the **History of Medicine**, Rochester, Minn. (J. B. Blake, Natl. Library of Medicine, Bethesda, Md.)

11–14. Society for **Industrial and Applied Mathematics**, natl. mtg., Univ. of Iowa, Iowa City. (J. B. Rosser, Mathematics Research Center, Univ. of Wisconsin, Madison)

11–14. **Plant Disease Epidemics**, Analysis and Implications, workshop, Pennsylvania State Univ., University Park. (P. J. Wuest, Dept. of Plant Pathology, Pennsylvania State Univ., University Park 16802)

11–14. Society of Technical **Writers and Publishers**, 13th annual mtg., Fort Worth, Tex. (N. J. Kennedy, Box 3706, Columbus, Ohio 43214)

11–21. **Photographic Systems** for Engineers, seminar, San Francisco, Calif. (J. B. Bell, 1525 Tennessee St., San Francisco)

12–13. **Information Retrieval**, 3rd natl. colloquium, Univ. of Pennsylvania, Philadelphia. (A. W. Speakman, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

12–14. **Diabetology**, 7th annual mtg., Paris, France. (M. Rathery, Hotel-Dieu, 1, pl. du Parvis-Notre Dame, Paris 4)

12–14. Czechoslovak Soc. of **Urology**, congr., Brno. (M. Jerabek, Clinique Urologique, 53, Pekarska, Brno)

13. **Desert Environment**, mtg., Fullerton Junior College, Fullerton, Calif. (M. D. Brown, Div. of Life Sciences, Fullerton Junior College, Fullerton)

14. **Reliability**, 7th annual West Coast symp., Univ. of Southern California, Los Angeles. (R. J. Guarino, TRW Systems, One Space Park, Redondo Beach, Calif.)

15–18. American Inst. of **Chemical Engineers**, 59th annual mtg., Columbus, Ohio. (The Institute, 345 E. 47 St., New York 10017)

15–18. **Kinetics and Catalysis**, intern. symp., Columbus, Ohio. (P. B. Weisz, Socony Mobil Research and Development Labs., Paulsboro, N.J. 08066)

15–19. **Radiation Chemistry**, 2nd symp., Tihany, Hungary. (A. Somogyi, Research Inst. for the Plastics Industry, Hungaria krt. 114, Budapest 14, Hungary)

15–21. Dynamic Role of **Molecular**

Constituents in Plant-Parasite Interaction, U.S.—Japan seminar, Gamagori, Japan. (C. J. Mirocha, Dept. of Plant Pathology and Physiology, Univ. of Minnesota, St. Paul)

16–17. **Plant Growth**, conf., New York, N.Y. (J. F. Frederick, Dodge Chemical Co., Research Labs., 3425 Boston Rd., Bronx, N.Y. 10469)

16–18. **Aerospace Electronics**, 18th natl. conf., Dayton, Ohio. (J. M. Mayer, 4525 Fernbrook St., Kettering, Ohio 45440)

16–18. Society of German **Engineers**, conf., Berlin. (The Society, Postfach 10 250, 4 Düsseldorf 10, Germany)

16–18. Institute of Electrical and Electronics Engineers, Group on **Microwave Theory and Technique**, symp., Palo Alto, Calif. (L. Young, Stanford Research Inst., Menlo Park, Calif. 94025)

16–18. **Power Instrumentation**, 9th natl. symp., Detroit, Mich. (R. C. Austin, Detroit Edison Co., 2000 Second Ave., Detroit 48226)

16–18. American Assoc. for **Thoracic Surgery**, Vancouver, B.C., Canada. (A. Henvey, 311 Carondelet Bldg., 7730 Carondelet Ave., St. Louis, Mo.)

16–19. **Biomedical Sciences Instrumentation**, 4th natl. symp., Anaheim, Calif. (T. B. Weber, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif.)

16–20. American Soc. of **Civil Engineers**, Denver, Colo. (W. H. Wisley, 345 E. 47 St., New York, N.Y. 10017)

16–20. **Disposal of Radioactive Wastes** into the Seas, Oceans, and Surface Waters, symp., Intern. Atomic Energy Agency, Vienna, Austria. (IAEA, 11 Kärntnerring, Vienna 1)

16–20. American **Industrial Hygiene** Assoc., Pittsburgh, Pa. (A. D. Hosey, 1014 Broadway, Cincinnati, Ohio 45202)

16–20. **Water Resources Engineering**, conf., American Soc. of Civil Engineers, Denver, Colo. (W. H. Wisley, The Society, 345 E. 47 St., New York 10017)

17–19. **Fast Breeder Reactors**, intern. conf., London, England. (H. C. Dunn, British Nuclear Energy Soc., Risley, Warrington, Lancashire, England)

18–20. **Operations Research** Soc. of America, 29th natl. mtg., Santa Monica, Calif. (J. E. Walsh, System Development Corp., 2500 Colorado Ave., Santa Monica 90406)

18–25. **Warm-Water Pond Fish Culture**, world symp., U.N. Food and Agriculture Organization, Rome, Italy. (T. V. R. Pillay, FAO, Via delle Terme di Caracalla, Rome)

19–20. **Membrane Processes** for Industry, symp., Southern Research Inst., Birmingham, Ala. (J. H. Strickland, SRI, 2000 Ninth Ave. S., Birmingham 35205)

19–21. **Organellogenesis**, regional conf., Soc. for Developmental Biology, Ames, Iowa. (J. M. Arnold, Dept. of Biochemistry and Biophysics, Iowa State Univ., Ames 50010)

19–22. **Exfoliative Cytology**, intern. congr., Rio de Janeiro, Brazil. (E. von Haam, Ohio State Univ., Columbus)

19–22. German Bunsen Soc. for **Physical Chemistry**, 65th general assembly, Freudenstadt. (The Society, Varrentrappstr. 40-42, 6 Frankfurt am Main, West Germany)

20–21. **Surface Physics**, 4th symp., Washington State Univ., Pullman. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman 99163)

20–22. Royal **Astronomical** Soc. of Canada, general assembly, Univ. of Manitoba, Winnipeg. (R. J. Lockhart, Dept. of Mathematics, Univ. of Manitoba, Winnipeg)

20–22. Society for **Experimental Medicine** of the German Democratic Republic, 3rd general conf., Leipzig, East Germany. (Secretariat, The Society, Friedrichstr. 129, Block F, 104 Berlin, East Germany)

21. **Southern Calif. Acad.** of Sciences, annual mtg., California State College, San Diego. (C. Rozaire, The Academy, Los Angeles Museum, Exposition Park, Los Angeles, Calif.)

22–26. Institute of **Food Technologists**, 26th annual mtg., Portland, Ore. (C. L. Willey, 176 W. Adams St., Chicago, Ill. 60603)

22–26. American **Orthopedic** Assoc., Colorado Springs, Colo. (S. W. Banks, 29 E. Madison St., Chicago, Ill.)

23–24. **High Temperature Reactors** and the Dragon Project, symp., London, England. (Secretary, British Nuclear Energy Soc., Inst. of Civil Engineers, 1-7 Great George St., London S.W.1)

23–25. American **Astronautical** Soc., 12th annual mtg., Los Angeles and Anaheim, Calif. (L. Larmore, Douglas Aircraft, 3000 Ocean Park Blvd., Santa Monica, Calif.)

23–25. **Chemical and Petroleum Instrumentation**, 7th natl. symp., San Francisco, Calif. (J. T. Ward, E. I. duPont de Nemours & Co., Wilmington, Del. 19898)

23–25. Dynamics of **Chemical Reactions**, intern. symp., Padua, Italy. (Direzione Istituto di Impianti Chimici, Univ. degli Studi, Padua)

23–26. Association for Research into **Periodontal Disease**, 18th mtg., West Berlin, Germany. (M. J. Matthey, 2 rue Bartholini, Geneva, Switzerland)

23–26. **Spaceflight**, 6th European symp., Brighton, England. (British Interplanetary Soc., 12 Bessborough Gardens, S.W., London, S.W.1, England)

23–28. International Assoc. for the Study of the **Bronchi**, 16th congr., Athens, Greece. (The Association, 189 Blvd. St.-Germain, Paris 7, France)

23–28. **Hormonal Steroids**, intern. congr., Milan, Italy. (L. Martini, Inst. di Farmacologia, Via Andrea del Sarto 21, Milan)

24–26. **Solid Propulsion**, conf., Chicago, Ill. (Chemical Propulsion Information Agency, 8621 Georgia Ave., Silver Spring, Md.)

24–26. **Ultrasonic Testing** of Materials, 2nd intern. symp., Berlin, Germany. (Kammer der Technik FV "Maschinenbau," Clara-Zetkinstr. 115-117, 108 Berlin)

25. American Soc. for **Gastrointestinal Endoscopy**, Chicago, Ill. (B. H. Sullivan, Jr., 2020 E. 93 St., Cleveland, Ohio 44106)

25–27. Society of **Radiographers**, 20th annual conf., Brighton, England. (The Society, 32 Welbeck St., London, W.1, England)

25–27. **Sulfamic Acid** and Its Electrometallurgical Applications, symp., Milan, Italy. (R. Piontelli, Laboratorio di Elettrochimica, Clinica-Fisica e Metallurgia del Politecnico di Milano, 32 Piazza Leonardo da Vinci, Milan)

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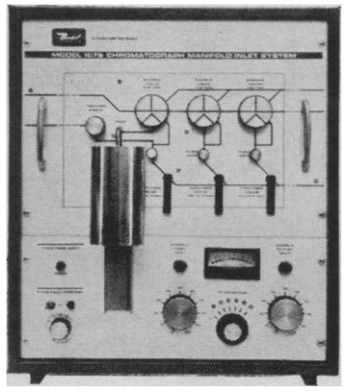

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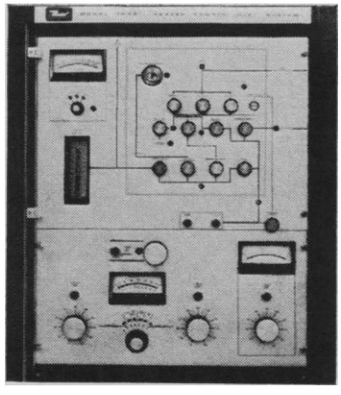

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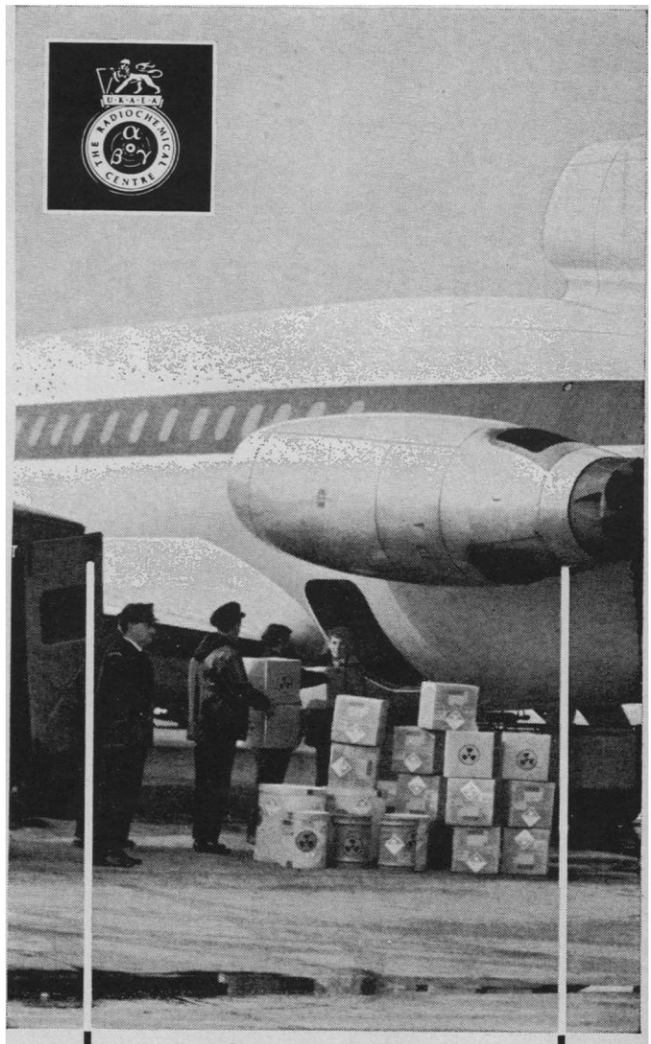

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NEW BOOKS

(Continued from page 195)

Organization. Warren G. Bennis. McGraw-Hill, New York, 1966. 235 pp. Illus. $6.95.

Cheese and Fermented Milk Foods. Frank Kosikowski. The Author, Cornell Univ., Ithaca, N.Y., 1966. 445 pp. Illus. $15.

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A Preface to Economic Geography. Harold H. McCarty and James B. Lindberg. Prentice-Hall, Englewood Cliffs, N.J., 1966. 271 pp. Illus. Paper, $5.25.

Psychology: The Fundamentals of Human Adjustment. Norman L. Munn. Houghton Mifflin, Boston, ed. 5, 1966. 732 pp. Illus. $8.50.

Readings in Physical Anthropology. Thomas W. McKern. Prentice-Hall, Englewood Cliffs, N.J., 1966. 207 pp. Illus. Paper, $4.95. Eighteen papers and an introduction by S. L. Washburn.

The Two Worlds of the Washo: An Indian Tribe of California and Nevada. James F. Downs. Holt, Rinehart, and Winston, New York, 1966. 125 pp. Illus. Paper, $1.50. Case Studies in Cultural Anthropology, edited by George Spindler and Louise Spindler.

Conference and Symposium Reports

Acta Imeko, 1964. vol. 4. Proceedings of the Third International Measurement Conference (Stockholm), September 1964. Hungarian Scientific Soc. for Measurement and Automation, Budapest, 1965. 740 pp. Illus. The papers are in Russian, English, or German.

Advances in Biology of Skin. vol. 6, *Aging*. Proceedings of a symposium (Portland, Ore.), May 1964. William Montagna, Ed. Pergamon, New York, 1965. 289 pp. Illus. $15. Seventeen papers: "Morphology of the aging skin: The cutaneous appendages" by William Montagna; "Effects of aging on the papillary body of the hair follicles and on the eccrine sweat glands" by H. Oberste-Lehn; "Age changes in the human melanocyte system" by Thomas B. Fitzpatrick, George Szabó, and Ruth E. Mitchell; "Nerve changes in aging skin" by R. K. Winkelmann; "The effects of aging on the receptor organs of the human dermis" by Nikolajs Cauna; "The anatomy of

the human scalp" by Luigi Giacometti; "The effect of aging on the activity of the sebaceous gland in man" by Peter E. Pochi and John S. Strauss; "The effect of age on human eccrine sweating" by Alene F. Silver, William Montagna, and Ismet Karacan; "Effect of aging on human dermis: Studies of thermal shrinkage and tension" by D. M. Rasmussen, Khalil G. Wakim, and R. K. Winkelmann; "Percutaneous absorption in aged skin" by Enno Christophers and Albert M. Kligman; "The effect of topical steroids on the aged human axilla" by Christopher M. Papa and Albert M. Kligman; "Alterations in human dermal fibrous connective tissue with age and chronic sun damage" by W. Mitchell Sams, Jr., and J. Graham Smith, Jr.; "Human cutaneous acid mucopolysaccharides: The effects of age and chronic sun damage" by J. Graham Smith, Jr., Eugene A. Davidson, and Ralph W. Taylor; "Temporal changes in collagen—aging or essential maturation?" by D. S. Jackson; "Biophysical aspects of aging in connective tissue" by Harry R. Elden; "The chemistry of elastin and its relationship to structure" by Karl A. Piez, Edward J. Miller, and George R. Martin; and "Structure and metabolism of skin polysaccharides" by E. A. Davidson.

Advances in Enzyme Regulation. vol. 3. Proceedings of the third symposium (Indianapolis, Ind.), October 1964. George Weber, Ed. Pergamon, New York, 1965. 479 pp. Illus. $17. Twenty-six papers on the following topics: Mechanism of Effect of Corticosteroids on Enzyme-Forming Systems (4 papers); Regulation of Enzyme Activity and Synthesis in Various Mammalian Organs (2 papers); Behavior of Enzyme Forming Systems in Slices and Isolated Organs (4 papers); Development of Enzymes (4 papers); Effects of Actinomycin and Puromycin (2 papers); Problems in Enzyme Regulation (1 paper); Enzyme Regulation in Hepatomas (7 papers); and Concepts in Enzyme Regulation (2 papers).

Biosynthetic Pathways in Higher Plants. Proceedings, Plant Phenolics Group Symposium (Leeds), April 1964. J. B. Pridham and T. Swain, Eds. Academic Press, New York, 1965. 224 pp. Illus. $12. Eleven papers and two summaries: "Biological aspects of chemical reactions in higher plants" by N. A. Burges and H. M. Hurst; "Methods used in the study of biosynthesis" by T. Swain; "The biosynthesis of carotenoids" by T. W. Goodwin; "Regulation of terpenoid synthesis in higher plants" by T. W. Goodwin; "Amino acid biosynthesis" by L. Fowden; "Protein biosynthesis in higher plants" by D. Boulter; "Nucleotides and carbohydrate metabolism: A summary" by G. A. Barber; "The biosynthesis of cellulose" by R. D. Preston; "Biosynthesis of lignin" by F. A. Isherwood; "The biogenesis of the piperidine alkaloids" by B. T. Cromwell; "Anthocyanidins and flavonoids: A summary" by H. Grisebach; "The biosynthesis of chlorophyll" by June Lascelles; and "Plant acids" by S. L. Ranson.

Chemistry and Physics of Interfaces. Based on a symposium sponsored by *Industrial and Engineering Chemistry* and the Division of Industrial and Engineering Chemistry of the American Chemical

Society (Washington, D.C.), June 1964. David E. Gushee, Ed. American Chemical Soc., Washington, D.C., 1965. 187 pp. Illus. $7.50. Fourteen papers.

Dolomitization and Limestone Diagenesis. A symposium (Toronto, Canada), May 1964. Lloyd C. Pray and Raymond C. Murray, Ed. Soc. of Economic Paleontologists and Mineralogists, Tulsa, Okla., 1965. 186 pp. Illus. Paper, $5.50; members, $4. Seven papers, two abstracts of papers, and an introduction by R. C. Murray and L. C. Pray.

Exchange Reactions. Proceedings of a symposium (Upton, N.Y.), May–June 1965. International Atomic Energy Agency, Vienna, 1965 (order from Natl. Agency for International Publications, New York). 427 pp. Illus. $9. Twenty-eight papers and one abstract; most of the papers are in English, the others in French. An abstract of each paper is given in English, French, Russian, and Spanish.

Film in Higher Education and Research. Proceedings of a conference (Birmingham, England), September 1964. Peter D. Groves, Ed. Pergamon, New York, 1966. 344 pp. Illus. Paper, $4.95. The Commonwealth and International Library. The conference was organized by the College Film and Television Advisory Panel, University of Aston. The sections are: The Film and the University; The Supply of Films; Films in Teaching; Films in Research; and The Production of Films.

Fluorescence and Phosphorescence Analysis: Principles and Applications. David M. Hercules, Ed. Interscience (Wiley), New York, 1966. 272 pp. Illus. $12. Eight papers given at a symposium organized by the Analytical Division of the American Chemical Society (Chicago), 1964.

Fundamental Phenomena in Hypersonic Flow. Proceedings of the international symposium sponsored by Cornell Aeronautical Laboratory (Buffalo, N.Y.), June 1964. J. Gordon Hall, Ed. Cornell Univ. Press, Ithaca, N.Y., 1966. 362 pp. Illus. $12.50. Thirteen papers and comments on each.

The Growth of Cereals and Grasses. Proceedings of the Twelfth Easter School (Nottingham, England), March–April 1965. F. L. Milthorpe and J. D. Ivins, Eds. Butterworth, Washington, D.C., 1966. 370 pp. Illus. $19. Twenty-two papers on the following topics: Vegetative Development (3 papers); Reproductive Development (4 papers); The Environment (4 papers); Responses to the Environment (5 papers); Biochemical Aspects of Quality (2 papers); and Agronomic Aspects (4 papers).

High Energy Physics. Lectures delivered at Les Houches Summer School of Theoretical Physics, 1965. C. DeWitt and M. Jacob, Eds. Gordon and Breach, New York, 1965. 521 pp. Illus. Paper, $8.50; cloth, $10.50. Eight lectures: "Group theory, invariance principle, symmetries" by G. C. Wick; "Group combining internal symmetries and spin" by F. Gürsey; "Introduction to the theory of strong interactions" by M. Froissart and R. Omnès; "The analytic S-matrix: A theory for strong interactions" by G. F. Chew; "Quark models for the 'elementary particles'" by R. H. Dalitz; "Particle and polarization angular distribution for two- and three-body decays" by J. D. Jackson; "Peripheral interaction" by J. D. Jackson; and "Theory of weak interactions" by J. S. Bell.

Physics of Quantum Electronics. Proceedings of a conference (San Juan, Puerto Rico), June 1965. P. L. Kelley, B. Lax, and P. E. Tannenwald, Eds. McGraw-Hill, New York, 1966. 891 pp. Illus. $24. Eighty-six papers on the following topics: Nonlinear Effects (14 papers); Raman, Brillouin, and Rayleigh Scattering (14 papers); Laser Materials, Spectroscopy, and Mechanisms (13 papers); Semiconductor Lasers (9 papers); Gas Breakdown (7 papers); Gas Masers (15 papers); and Measurement Theory, Oscillators, and Noise (14 papers).

Proceedings of a Conference on Research Problems in Leprosy (Washington, D.C.), May 1965. Esmond R. Long, Ed. International Leprosy Assoc., Washington, D.C., 1965. 414 pp. Illus. Paper, $10 (order from Leonard Wood Memorial, Washington, D.C.).

Proceedings of the NMSE Systems Performance Effectiveness Conference (Washington, D.C.), April 1965. Robert J. Suslowitz, Ed. U.S. Naval Applied Science Laboratory, Brooklyn, N.Y., 1966. 231 pp. Illus. Paper. Sixteen papers.

Proceedings of the Symposium on Coordination Chemistry (Tihany, Hungary), September 1964. Mihály T. Beck, Ed. Akadémiai Kiadó, Budapest, 1965. 484 pp. Illus. $15. Forty papers and discussions of the papers; papers are in English or German.

Psychophysiological Aspects of Cancer (*Ann. N.Y. Acad. Sci.* **125**). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1965. 282 pp. Illus. Paper, $6. Twenty-seven papers presented at a conference held in April 1965.

Structure and Function of Connective and Skeletal Tissue. Proceedings of an Advanced Study Institute organized under the auspices of N.A.T.O. (St. Andrews, Scotland), June 1964. S. Fitton Jackson and G. R. Tristram, Eds. Butterworth, Washington, D.C., 1965. 559 pp. Illus. $28.50. 101 papers.

The Structure of Glass. vol. 4, *Electrical Properties and Structure of Glass*. O. V. Mazurin, Ed. Translated from the Russian edition (Leningrad, 1962) by E. B. Uvarov. Consultants Bureau, New York, 1965. 164 pp. Illus. $17.50. Thirty papers given at a symposium (Leningrad), December 1962.

Theory of Arch Dams. A symposium (Southampton, England), April 1964. J. R. Rydzewski, Ed. Pergamon, New York, 1965. 796 pp. Illus. $40. Thirty-six papers.

Toward a National Information System. Second annual national colloquium on information retrieval (Philadelphia), April 1965. Morris Rubinoff, Ed. Spartan Books, Washington, D.C., 1965. 250 pp. Illus. $9.50. Seventeen papers on the following topics: State of the National Information System (3 papers); Mechanization (5 papers); Administration and Economics (4 papers); and Current Development (5 papers).

(Continued from page 190)

sión Nacional de Investigación del Espacio (CONIE) will work together in Spain to launch sounding rockets designed to obtain information on the dynamics of atmospheric circulation; the information is to be used in studies of meteorology and planetary atmospheres. Project directors have yet to be appointed.

Harvard University is establishing a **wildlife research** center and field station in Concord, Massachusetts, under the direction of the university's Museum of Comparative Zoology. The new facility includes nearly 800 acres, in two separate tracts, one near the National Fish and Wildlife Refuge of the Concord River. The center's value stems chiefly from its being typical of much of the land in New England and New York State. It has woodlands, open fields, marshes, and ponds which will serve as a laboratory for teaching and research on animal behavior and on the relationships of plants and animals to their environment. Ernst Mayr, director of the Museum of Comparative Zoology, says that the Concord station, about a half-hour's drive from the university, "will enable professors and students to spend time in the field and return to the city the same day for classes or laboratory work." It will be open both to people from Harvard and the other Boston-area institutions.

The University of Southern California has begun a graduate program in the **demography of social disorganization**. Students will take a 4-year course leading to the Ph.D. degree in sociology. Participants are eligible for National Institutes of Mental Health traineeships, which provide fellowships ranging from $1800 through $3000, plus tuition, fees, and a $500 allowance for each dependent. (Maurice D. Van Arsdol, Jr., Department of Sociology and Anthropology, University of Southern California, Los Angeles 90007)

The psychiatry department at Yale University is offering a training program designed "to provide intensive experience in developing research skills in areas which could lead to investigative careers in **mental health**." Participants may choose laboratory training in the fields of their choice (pharmacology, neurochemistry, neurophysiology) and in specialized research areas in

psychology. Work in clinical psychiatry will be provided when required. Applicants may hold an M.D. or Ph.D. degree; those with Ph.D.'s will be offered sufficient clinical training to provide relevant experience for their research interests. Stipends are $6000 the first year, $7000 the second. (Malcolm Bowers, School of Medicine, Yale University, 333 Cedar Street, New Haven, Connecticut)

New Journals

Antarctic Journal of the United States. Vol. 1, No. 1, January–February 1966. Kurt Sandved, Editor. Replacing *Bulletin of the U.S. Antarctic Projects Officer* (Defense Department) and *Antarctic Report* (NSF), as the official informational organ on U.S. programs in Antarctica. (Information Officer, Office of Antarctic Programs, NSF, Washington, D.C. 20550. Bimonthly; free of charge; supply limited)

International Journal of Cancer. Vol. 1, No. 1, January 1966. E. A. Saxon, Editor. Publication of the International Union Against Cancer. Research papers in English or French, summaries in both languages. (Munksgaard Publishers, 47 Prags Blvd., Copenhagen, Denmark. Bimonthly; $25 a year)

Neuroendocrinology. Vol. 1, No. 1, 1965/66. E. Bajusz, Editor. International journal for basic and clinical studies on neuroendocrine relationships. (Albert J. Phiebig, Box 352, White Plains, N.Y. Bimonthly; $15.50 a year)

Grants, Fellowships, and Awards

Hahnemann Medical College and Hospital is offering research fellowships for the 1967 academic year to M.D.'s interested in **cardiology**. The awards are for training in electrocardiography and vectrocardiography, ecocardiography, myocardial metabolism and electrophysiology, or cardiac catheterization. Stipends are $5000 to $6000. Applicants must have had a year of internship and at least 2 years in medical residency. (Bernard L. Segal, Department of Medicine, Hahnemann Medical College and Hospital, 230 N. Broad St., Philadelphia 19102)

Awards for pre- and postdoctoral training in the organic and biological chemistry of **marine organisms** are

available at the University of Oklahoma. Recipients will gain experience in collecting marine organisms in the Caribbean area and in isolating and determining the structure of biologically interesting substances from marine animals and plants. Research carried out by the predoctoral trainees will be used as the basis of their Ph.D. dissertations. The awards include stipends, tuition fees, and field travel. There are no deadlines for applications. (L. S. Ciereszko, Faculty Exchange, Norman, Oklahoma 73069)

The Public Health Service's division of accident prevention offers aid for research and training in **accident prevention**. Since no single discipline has a monopoly on productive work in the area, individuals and institutions interested in accident-prevention research from any academic viewpoint may apply for the grants. The types of aid and the application deadlines for each are:

Research training grants. Support to colleges and universities for their ongoing, degree-granting programs in the field; this will include stipends for students.

Research grants. Support to educational and other nonprofit institutions for the actual research. Deadlines: *1 June, 1 October, 1 February.*

Fellowships. Separate categories for pre- and postdoctoral applicants who want to attend universities which offer research and training of special interest to the individual. Deadlines: *1 January, 1 April, 1 October.* (Leon G. Goldstein, Research Grants Branch, Division of Accident Prevention, PHS, Washington, D.C. 20201)

The AAAS is accepting entries for its annual **socio-psychological prize** contest. A $1000 award will be presented for the paper which the judges consider best furthers understanding of the psychological-social-cultural behavior of human beings. The prize is intended to "encourage studies and analyses of social behavior based on explicitly stated assumptions or postulates leading to conclusions or deductions that are verifiable by systematic empirical research; to encourage in social inquiry the development and application of the kind of dependable methodology that has proved so fruitful in the natural sciences."

Entries should have a complete analysis of a problem and should include relevant data and an interpretation of

these data in terms of the postulates with which the study began. Unpublished manuscripts and papers published since 1 January 1965 are eligible. Deadline: *1 September*. (For instructions on how to submit entries: AAAS Socio-Psychological Prize, 1515 Massachusetts Ave., NW, Washington, D.C.)

The Helen Hay Whitney Foundation is offering fellowships for M.D.'s and Ph.D.'s interested in biological or medical research careers, preferably related to **diseases of the connective tissues**. Applicants may be from any country but may not be over 35 years old. The appointments are made annually and are renewable for 3 years. Stipends start at $6500, with $500 for each dependent and $500 annual increment. Deadline for applications for 1967–68: *15 August*. (Helen Hay Whitney Foundation, 22 East 65th Street, New York 10021)

Meeting Notes

The 1966 **Engineering Foundation** Research conferences will be held 25 July to 26 August. Attendance will be limited to 100 and will be by invitation or acceptance of application. The registration fee is $140. The first four meetings, to take place at Proctor Academy, Andover, New Hampshire, are:

25–29 July, "Technology and Society"

1–5 August, "Industry and the Young Engineer"

8–12 August, "Interdisciplinary Team Approaches in Engineering"

15–19 August, "Changing Science and Technology—Its Effect on the Professional Engineering Societies."

The University of California, Santa Barbara, will be the site of the meeting, 22–26 August, on "Technology and the City Matrix." The final session, "Particulate Matter Systems—Their Simulation and Optimization," will be held at the University School of Milwaukee. (Engineering Foundation, 345 E. 47 Street, New York 10017)

The call for papers has been issued for a **nuclear science** symposium, to be held in Boston 19–21 October. The theme of the meeting will be instrumentation in space and laboratory, and papers are desired on nuclear instruments and circuits, data handling and acquisition, reactor instrumentation, and radiation detectors. Sponsors: Nu-

clear Science Group of the Institute of Electrical and Electronic Engineers, and the National Bureau of Standards. Presentation time: 10 minutes; abstracts: 100 to 300 words; deadline: *13 June*. (J. A. Coleman, Electron Devices Section, National Bureau of Standards, Washington, D.C. 20234)

Colorado State University will present a "tutorial symposium" on advances in **quantum electronics** 20 June to 1 July in Estes Park, Colorado. Attendance will be limited to 100 researchers and advanced students, and no academic credit will be given. The topics to be covered include fundamentals of the optical maser, nonlinear optical effects, quantum noise, application of gas lasers to spectroscopy, and recent advances in pulsed laser technology. The tuition will be $240, and room and board $11 a day. Some fellowships for tuition and lodging will be available. Application deadline: *10 May*. (David F. Edwards, Department of Physics, Colorado State University, Fort Collins 80521)

An international conference on **nuclear physics** will be held 12–17 September in Gatlinburg, Tennessee. The sponsors are the International Union of Pure and Applied Physics, the U.S. Atomic Energy Commission, and Oak Ridge National Laboratory. Invited and contributed papers will be presented. Attendance at the conference is by invitation only; a limited number of invitations are available. Papers deadline: *22 July*. (Alexander Zucker, Oak Ridge National Laboratory, Post Office Box X, Oak Ridge, Tennessee 37831)

Lehigh University will conduct an NSF-sponsored conference on **colloid, surface, and macromolecular chemistry**, 11–23 July. The major purposes of the meeting are to encourage the introduction of these areas into standard undergraduate chemistry courses, to help instructors who want to develop advanced courses in colloid or polymer chemistry, and to present current trends in research. Participation will be limited to 30 college teachers. (Albert C. Zettlemoyer, Department of Chemistry, Lehigh University, Bethlehem, Pennsylvania 18015)

An international symposium on **free radicals in solution** will be held at the University of Michigan, Ann Arbor, 21–24 August. The sponsors are the university and the division of organic chemistry of the International Union of Pure and Applied Chemistry. The meeting is in commemoration of the centennial of the birth of Moses Gomberg, who in 1900 discovered the first stable free radical, triphenylmethyl. Ten plenary lectures will be included; there will be no contributed papers. (R. C. Elderfield, Department of Chemistry, University of Michigan, Ann Arbor 48104)

Courses

A workshop on theory and applications of **fracture mechanics** is scheduled for 7–26 August at the University of Denver. The sponsors are Universal Technology Corporation, Dayton, Ohio, and Denver Rsearch Institute. The first 2 weeks will deal with fundamentals of linear elastic fracture theory, effects of plasticity and stress concentration, laboratory fracture-testing and data interpretation, electron fractography, and incorporation of fracture mechanics in design. The 3rd week will be spent on advanced theoretical topics and on testing and design. Attendance at the first 2-week session is not prerequisite for enrollment. Applicants must have a college-level background, experience in mechanical or metallurgical engineering, and a knowledge of calculus and ordinary differential equations. (David L. Wells, Department 75, Universal Technology Corporation, P.O. Box 7, Dayton, Ohio 45449)

The University of Michigan has published a brochure describing the 38 short courses it will offer between May and August for engineers, scientists, and managers. The booklet, **Engineering Summer Conferences,** lists the title, dates, prerequisites, fee, content, and staff of each course. Copies of the brochure and complete information on the courses are available from Engineering Summer Conferences, West Engineering Building, University of Michigan, Ann Arbor 48104.

An international course on the techniques of **freeze-drying** will be offered 18–27 July in Lyon and Dijon, France. Discussion will center on the basic principles of freeze-drying and its applications to biology, to human and veterinary medicine, and to the pharmaceutical industry. A fee of 1700 francs (about $350) will cover the expenses of the course, along with room,

board, and special programs. An additional 600 francs will be charged for participants' wives, and separate excursions and entertainment are being arranged for them. (International Course of Lyophilization, 17, rue Bourgelat, Lyon, France)

A course on methods for the **preparation and characterization of materials** is scheduled for 31 May to 10 June in the Materials Research Laboratory, Pennsylvania State University. Emphasis will be on high band gap materials such as oxides, sulfides, and halides. (Conference Center, Pennsylvania State University, University Park)

Scientists in the News

Jerome B. Wiesner, dean of the school of science at MIT, has been named a nonresident fellow of the Salk Institute for Biological Studies, San Diego, California. Under the appointment, he will spend part of each year at the Salk Institute, helping to develop its academic and scientific program.

Roy H. Garstang, professor of astrophysics at the University of Colorado, has become chairman of the Joint Institute for Laboratory Astrophysics. The institute is a joint project of the university and the National Bureau of Standards; it conducts research and graduate study in atomic and astrophysics, and in related sciences.

Frederick Reines, chairman of the physics department at Case Institute of Technology, has been appointed professor of physics and dean of physical sciences at the University of California, Irvine.

Kenneth F. Vernon has been appointed director of the Agency for International Development's office of engineering. He had been chief of the engineering division of the AID regional bureau for the Near East and South Asia since 1964.

John J. Karakash, head of the electrical engineering department at Lehigh University, has been appointed dean of the school's college of engineering.

E. Gartly Jaco, professor in the school of public health and the department of sociology at the University of Minnesota, will become chairman of