SCIENCE
16 December 1966
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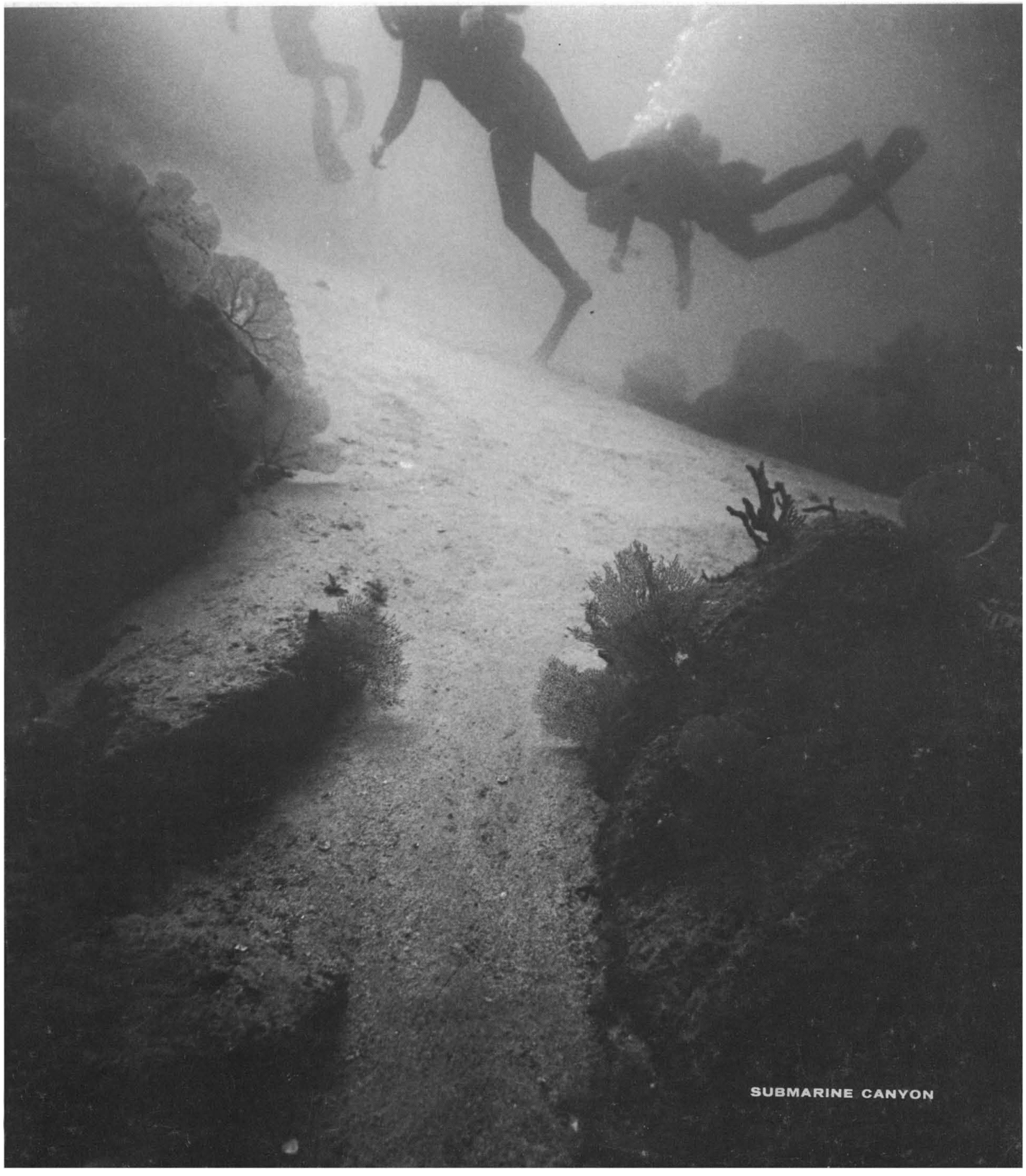
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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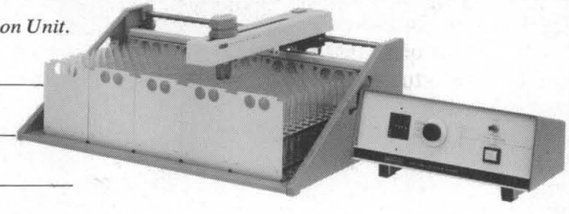
If this drop is radioactive, pathogenic, or valuable, don't let it fall between the tubes. Get a Beckman Fraction Collector

—the one that doesn't spill sample between tubes. The delivery head of the Beckman Model 132 Fraction Collector closes—and stays closed—until it is properly positioned over each successive tube. This took a little doing in the design department, but samples being what they often are, it's a feature of value to careful investigators.

The Beckman Collector has a number of other such practical, but relatively sophisticated advantages. Not the least of them is the method of keeping the collector and its contents cool. You place the entire Fraction Collector in a handy-sized Refrigeration Unit whose design is equally oriented to the investigator's needs. For example, you look down on the collector through a glass lid so you can quickly pick out the tubes you want. The unit is mobile. For chromatography, up to four columns can be mounted on the outside of it and can be cooled—or heated—via a built-in temperature control system, while the fractions in the collector are held at a steady 4°C.

For more information, just send us the coupon. There's a lot more to be said for the Beckman Fraction Collector!

Please send information on the Model 132 Fraction Collector and its Refrigeration Unit.



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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

San Lucas Submarine Canyon, at the tip of Baja California, Mexico, is used as a natural laboratory for the study of how sediments move into the deep sea. Here, at a depth of 150 feet, sand set in motion by storm swell moves slowly down slope as a "river-of-sand." The preferential orientation of filter-feeding gorgonian corals encrusting the granite walls reflects the prevailing downslope movement of organically rich bottom current generated by sand flows. See review of *Submarine Canyons and Other Sea Valleys,* page 1433 [U.S. Navy Electronics Laboratory, Robert F. Dill]

December, 1966

FISHER PRODUCT REPORT

News about instruments, apparatus and reagent chemicals that make your work quicker, surer, safer and easier.

PERFORM STANDARD COLORIMETRIC TITRATIONS AUTOMATICALLY WITH THE NEW FISHER PHOTOMETRIC TITRALYZER®:

EDTA Water Hardness (Total)
EDTA Water Hardness (Calcium)
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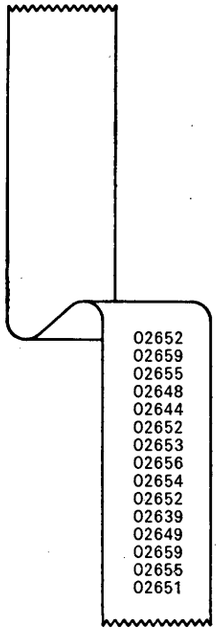
Now it's as easy to make colorimetric titrations automatically with the Fisher Titralyzer as it is to run potentiometric titrations. Set the end-point color, put the samples (up to 15 of them) in the turntable, and push the "Start" button. The Titralyzer will titrate each sample accurately, print out the volume of titrant to the nearest 0.01 ml, and go on to the next. Meanwhile, you're making up more samples or doing other, more important work.

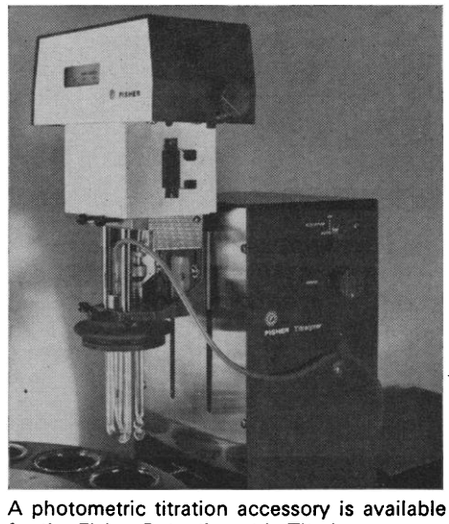
With its double-beam fiber-optics system, the new Photometric Titralyzer detects end-point color changes slighter than you can see. Every titration is run to precisely the same end point; random errors are reduced. There's no fatigue, no eyestrain, no variation in lighting, no difference in color vision to produce errors. The digital print-out eliminates mistakes in reading burets or jotting down figures. (If you now have a Potentiometric Titralyzer, an accessory assembly will adapt it for colorimetric titrations.)

Most important of all, the Photometric Titralyzer can use *standard* analytical methods. There is no "new chemistry" to learn, and adaptations for the automatic process are minor. For your convenience, our chemists have spelled the procedure out for four widely used analyses: Water Hardness (Total) by EDTA Titration (APHA procedure); Water Hardness (Calcium) by EDTA (APHA); P & M Alkalinity/Acidity (also APHA); and Neutralization Numbers of Petroleum Products (ASTM procedures). Ask for copies; there are more to come.

The new Photometric Titralyzer is the equivalent of an extra technician on your staff, and it can do more than a technician any workday. We think its $3300 price is not only reasonable but downright attractive.



Typical Titralyzer Print-Out Tape, showing analysis of calcium determination with EDTA following APHA determination or procedure. Average = 26.52. Standard Deviation = ±0.05.



A photometric titration accessory is available for the Fisher Potentiometric Titralyzer.

WOULD YOU LIKE TO TALK *to our instrument specialist about the Fisher Photometric Titralyzer? If so, call your nearest Fisher branch. If you want to study more details, get our free brochure. Write Fisher Scientific Company, 100 Fisher Building, Pittsburgh, Pa. 15219.*

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Some computers emphasize computational speed. Others, flexibility. Still others, low cost. The new EAI 640 offers all three.

The balanced design of the EAI 640 assures high computer performance – in systems or for general purpose computation – at a price you'll find hard to believe.

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The EAI 640 is not only a good, general-purpose digital computer, it can also be easily integrated into hybrid or special-purpose systems because of its extremely flexible I/O structure. Or it can be mated with scientific simulation systems, data acquisition/reduction systems, process control, and biomedical systems. It's a truly versatile computer!

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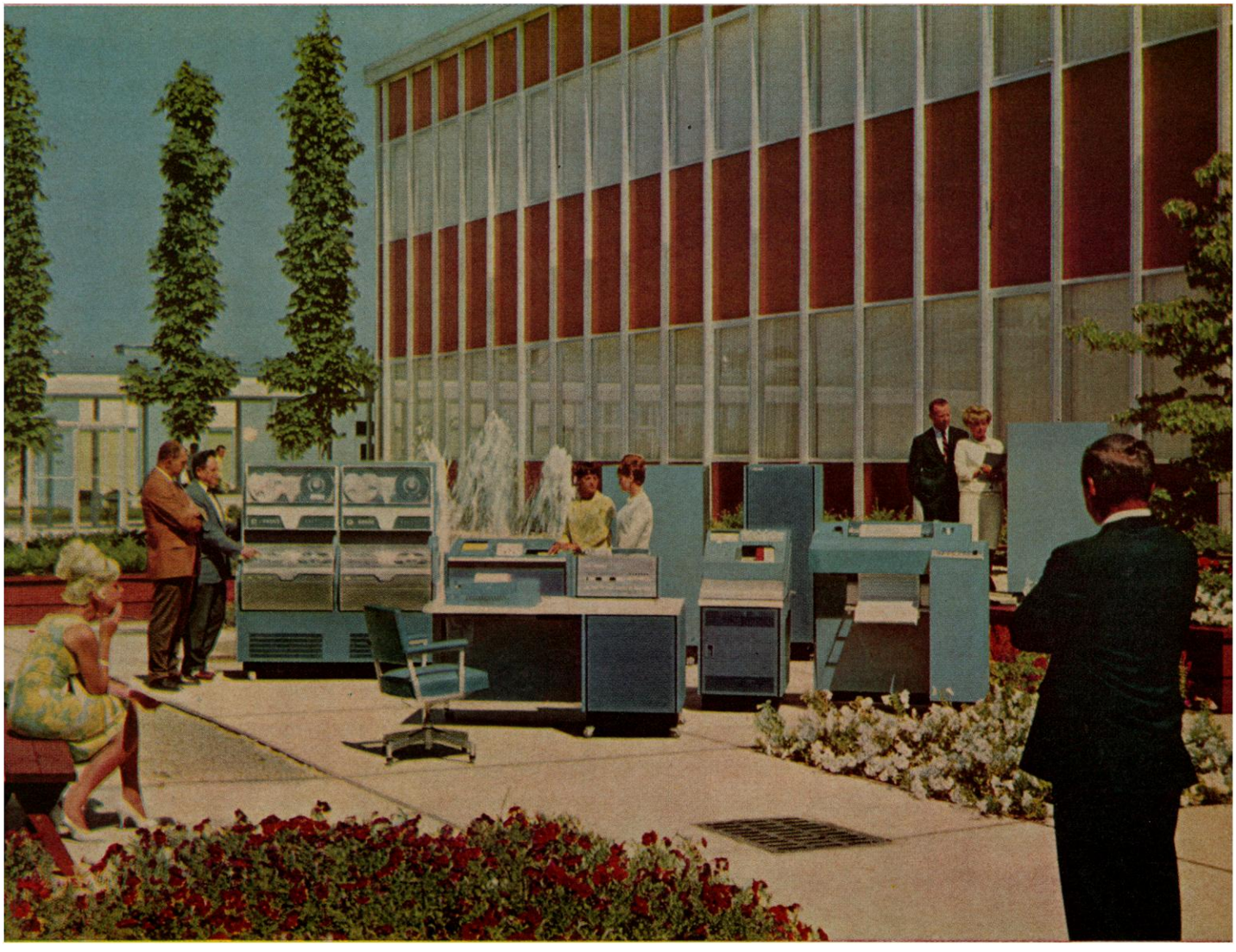

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For those dreaming of computers for Christmas, or instrumentation using digital techniques, we have two free gifts for you — that really should be opened first.

Just published is a 540-page Handbook of Small Computers, which begins with a primer (or, what everyone should know about small computers), and goes on to describe, in detail, three of the most exciting small computers in the industry. The PDP-8/S, the PDP-8, and the LINC-8 are general purpose, on-line, real time, Fortran-speaking machines that are friendly, approachable, creatively adaptable . . . Prices begin at $10,000 for a complete computer.

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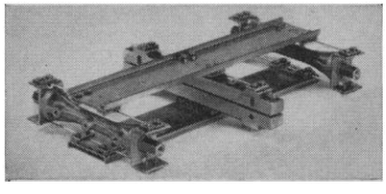
All the finest analytical balances used to have knife edges

until the EA-1

It used to be that the finest analytical balances were of knife-edge construction. (As a matter of fact, The Torsion Balance Company's own Christian Becker Division has made top-quality balances of this type since 1836 and still makes the world's best two-pan knife-edge balances.) But now Torsion, manufacturer of more precision balances than any other company in the world, has found a way to build a balance in the analytical range that eliminates the disadvantages of knife edges—and offers several other desirable features as well:

1 Longer accuracy thanks to friction-free torsion construction

In conventional analytical balances of knife-edge construction, in time the fulcrums become dull or are affected by abrasive or corrosive atmospheres—and initial sensitivity and accuracy suffer. The new Torbal EA-1 is constructed on the unique, proven torsion design principle. In this design there is no movement of parts over one another, hence no friction. Torsion balances retain their initial high sensitivity and accuracy as no other balance can—for 20 years and more!



2 Null Indicator makes accurate weighing easier

The new Torbal EA-1 replaces the conventional optical system with an electronic null indicator; balance beam is always restored to equilibrium position before weight is read. Possibilities of inaccuracies in weighing due to variations in deflection sensitivity (when knife edges become worn, dirty, or damaged) are completely eliminated.

3 Complete digital readout to 0.1 mg.—*without vernier*

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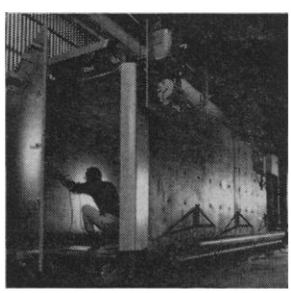
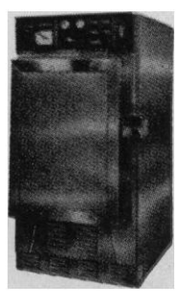
we build sterilizers

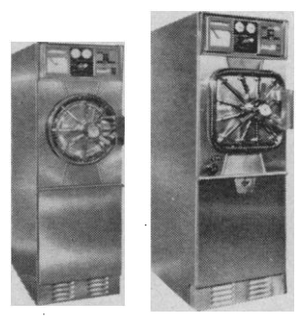
Huge ones for industrial applications . . . small ones for lab or clinic use . . and all the sizes in between. Sterilization reliability is a constant factor in every one That's what our reputation is based on. And it's been a good one for over 75 years. If you'd like to write us outlining your sterilization requirements, we'll be glad to give you full details on the Castle Sterilizer to best meet your needs.



Castle Industrial PowerClave Systems. Whatever the application, Castle can engineer an industrial PowerClave sterilization system to your needs in a wide choice of standard or custom sizes and controls. Utilizing the unique power-operated door design proven in medium rectangular hospital sterilizers, Castle can provide any chamber size or configuration desired. And equally varied is the selection of controls available; from manual operation to sophisticated automatic programming for steam, ethylene oxide, or the new air displacement ethylene oxide system.



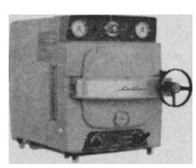
Castle PowerClave Sterilizers. Famous Electrilock Door allows pushbutton operation of the entire sterilization cycle. Consistent locking pressure, assured by power closure mechanism and long-lasting silicone rubber O-ring gasket provides simplicity of operation and safe, efficient processing. The PowerClave sterilizer, a standard in hospital central supply rooms, is available in four high-capacity chamber sizes with a wide choice of controls ranging from manual steam operation to high vacuum steam, ethylene oxide gas, or combination steam/gas cycles. Choice of freestanding cabinet or recessed models.



Castle Straightline and Cylindrical Sterilizers. Designed for a wide variety of laboratory uses, these low-priced units offer four standard control choices. Standard steam controls are available for manual or automatic operation. Laboratory by-pass piping is available for flowing steam processing; inspissation, or fractional sterilization. Multitherm offers finer control of low temperature sterilization. Straightline models are also available with ethylene oxide controls for gas sterilization. Both straightline and cylindrical models are available in a variety of sizes and mountings.

CASTLE AUTOCLAVES

Model 999-C Autoclave. Finest in portable autoclaves. Fits most countertops. Easy-to-operate controls make sterilization routine simple for almost any employee. Big 9" x 16" chamber lets you handle more items per cycle.



Model 7 SpeedClave. Operation is automatic and positive. Just load, close and dial—in 3-4 minutes from a warm start you've reached sterilizing temperatures of 270°F. 14½" x 7½" chamber holds two trays, has room for a third.

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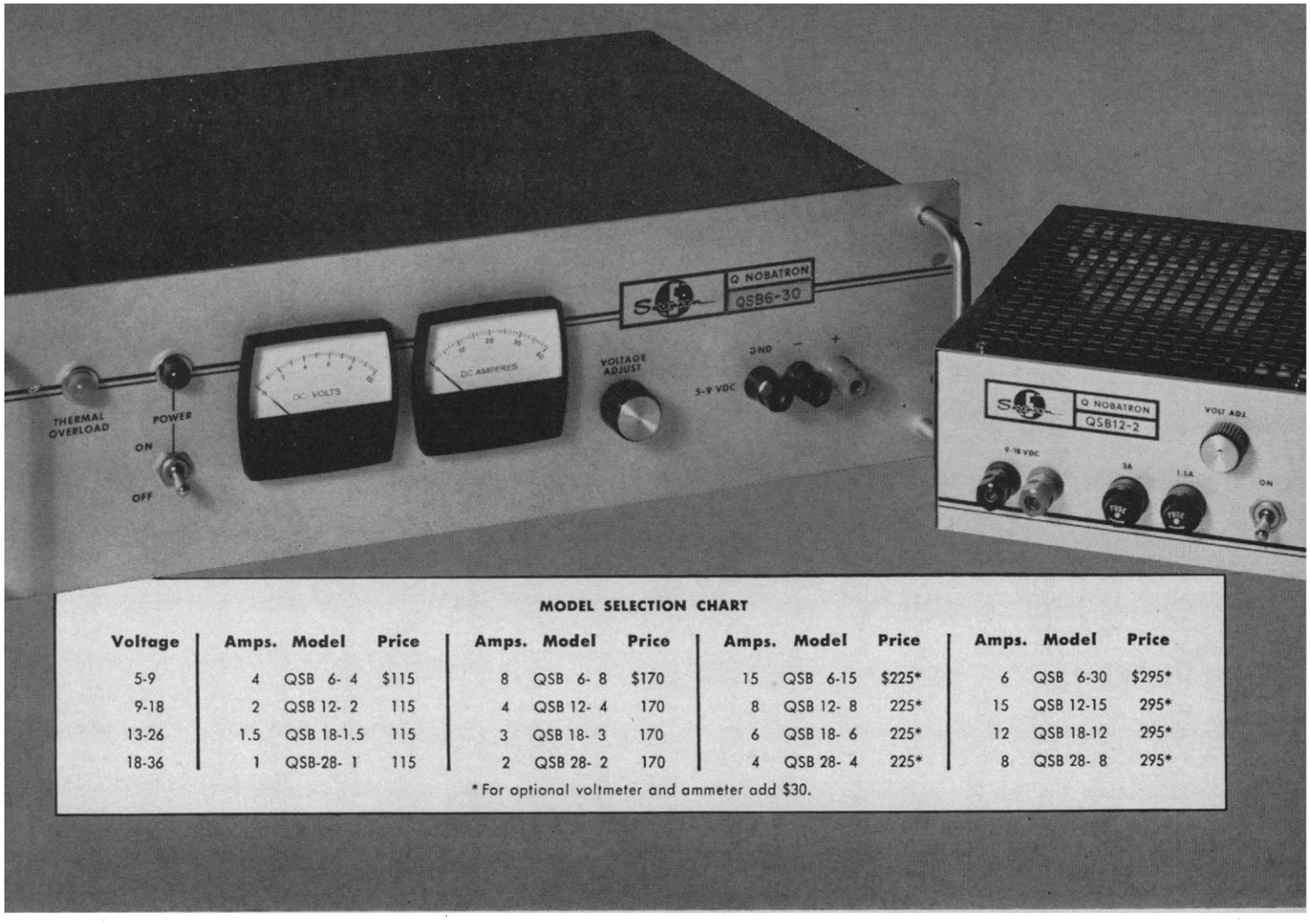

MODEL SELECTION CHART

Voltage	Amps.	Model	Price	Amps.	Model	Price	Amps.	Model	Price	Amps.	Model	Price
5-9	4	QSB 6- 4	$115	8	QSB 6- 8	$170	15	QSB 6-15	$225*	6	QSB 6-30	$295*
9-18	2	QSB 12- 2	115	4	QSB 12- 4	170	8	QSB 12- 8	225*	15	QSB 12-15	295*
13-26	1.5	QSB 18-1.5	115	3	QSB 18- 3	170	6	QSB 18- 6	225*	12	QSB 18-12	295*
18-36	1	QSB-28- 1	115	2	QSB 28- 2	170	4	QSB 28- 4	225*	8	QSB 28- 8	295*

* For optional voltmeter and ammeter add $30.

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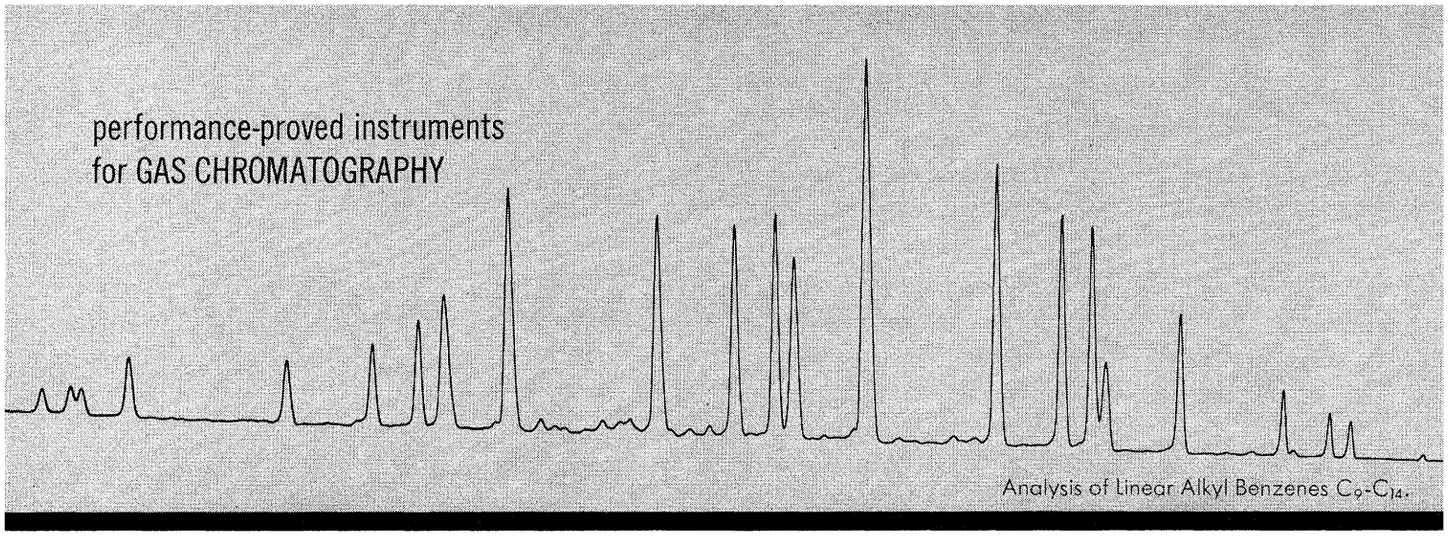
New Sorensen QSB's give you OEM prices with laboratory performance.

The Sorensen QSB Series, medium range power supplies available in 25, 50, 100 watt models (6, 12, 18 and 28 Vdc nominal) provide laboratory performance in compact bench or rack packages that are ideally suited for budget-type OEM computer, communications and test instrumentation applications. Features such as: precise regulation (±.005% line and load for most models), low ripple (250 μV rms, 1 mV peak to peak), response time (30 μs), all combined with prices starting at $115. Other features include: inputs 105-125/200-240/210-250 Vac, 47-420Hz; current regulation ±.01%; temp. range 0-71°C; temp. coefficient .015%/°C; stability .025%/8 hrs.; remote programming and sensing; series/parallel operation. For additional QSB details, or for data on other standard/custom power supplies, AC line regulators or frequency changers, contact your local Sorensen representative, or Raytheon Company, Sorensen Operation, Richards Ave., Norwalk, Connecticut 06856. Telephone: 203-838-6571. TWX 710-468-2940.

RAYTHEON



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Here's the new gas chromatograph that stands as the sum of Perkin-Elmer's twelve years of development and manufacture in gas chromatography: the Model 880.

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■ Easy service—all parts accessible, and readily removable. New dual flame and hot-wire thermal conductivity detectors... and a new electron capture detector, ruggedly built to the exacting standards you asked for.

■ A modern, solid-state, electrometer-amplifier—providing reliable unattended operation, particularly when coupled with today's electronic digital data and integration systems.

ANALYTICAL VERSATILITY

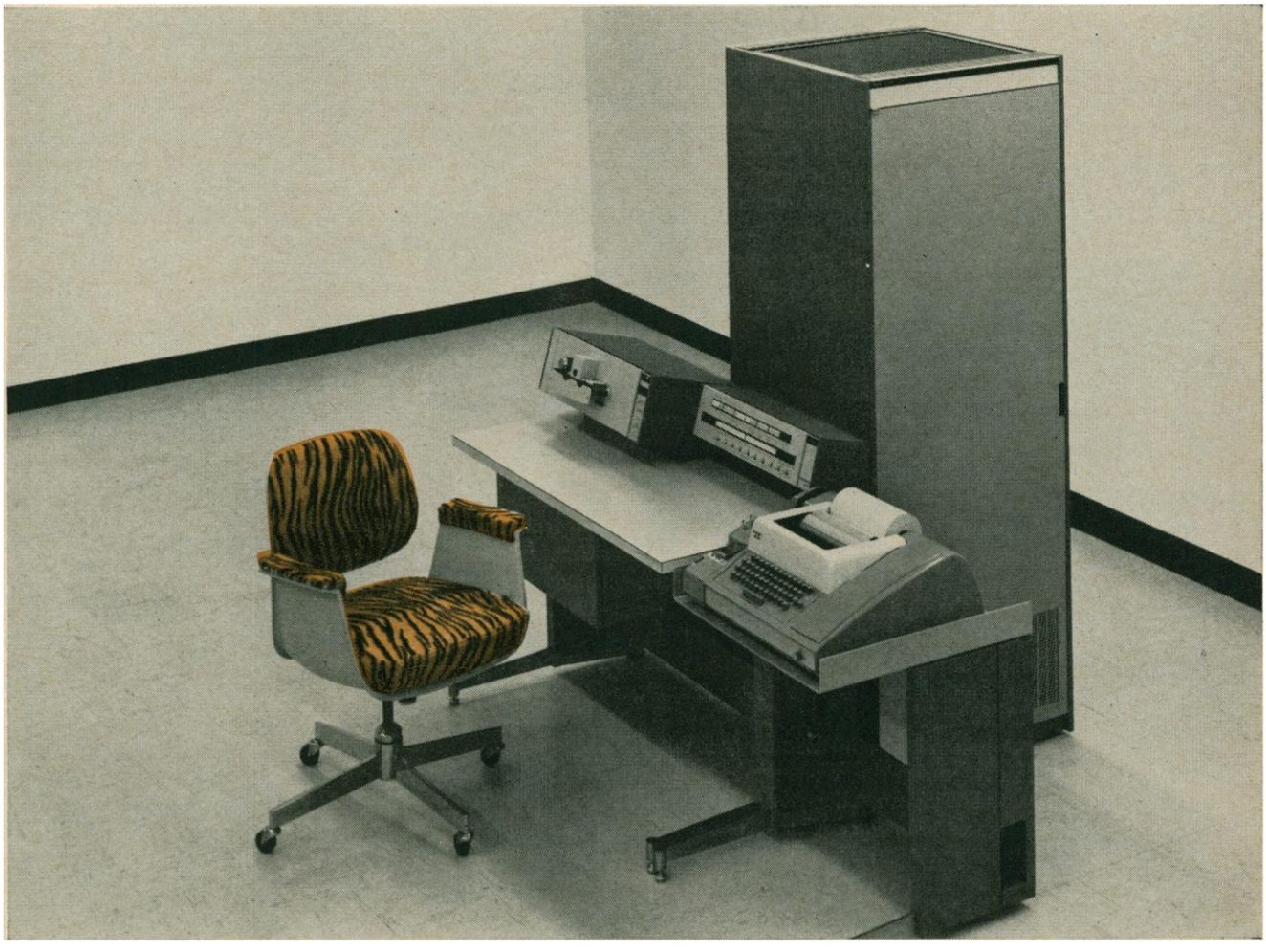
■ Initial isothermal period control, with a new multi-purpose dial-controlled timer.

■ Controls for both hydrogen and helium flows, hydrogen individually controlled to each side of the dual flame ionization detector. For capillary column operation, there's a switch-operated helium flow control bypass.

■ Improved gas sampling valve: extremely low dead volume, with one valve serving either column.

Add the already-proven features of Perkin-Elmer gas chromatographs: dual columns, packed or capillary—dual differential detection—linear temperature programming to 400°C—thermally stable, high-velocity circulating air Dynathermal oven—fully-proportional oven temperature control—and you have an instrument that can't be overlooked when you're shopping for GC hardware. If you require on-column injection and glass columns, with all the features of the Model 880, specify Perkin-Elmer Model 881. For complete details, write Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut.

The new ADVANCE 6130, ready for delivery at $34,500...



...we used to call it the "paper tiger"

Last July we announced the *ADVANCE* 6130, specially designed for real-time data acquisition and control applications.

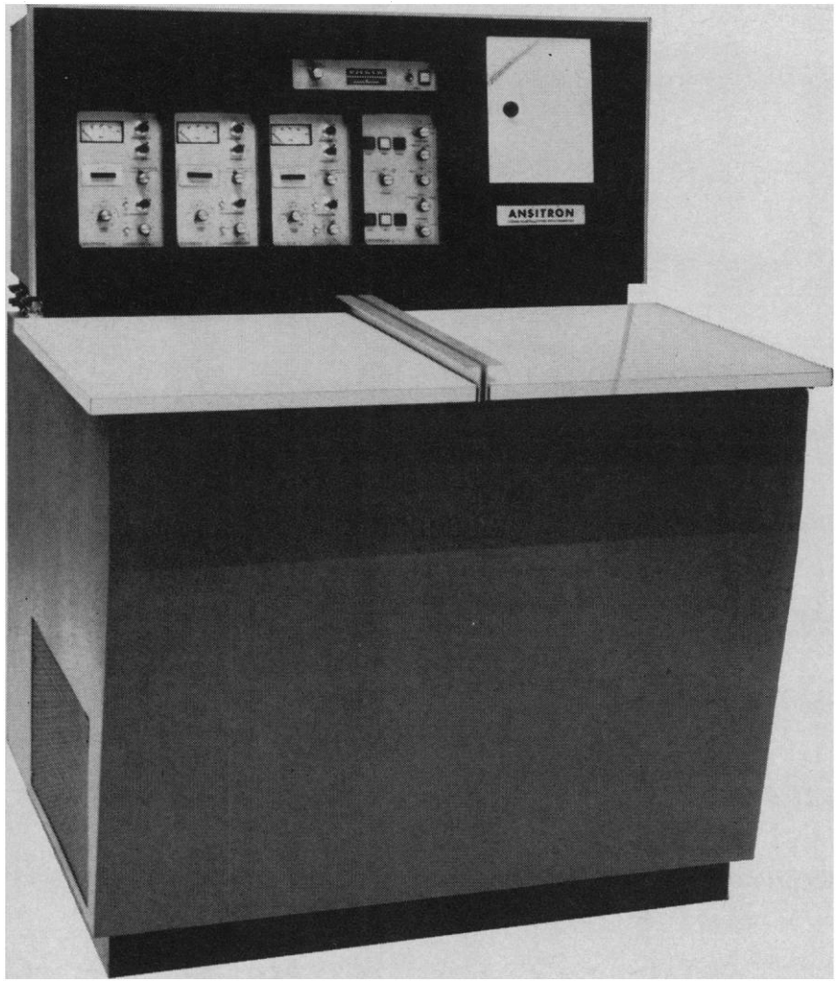
At that time we couldn't promise immediate delivery and frankly called it our "paper tiger".

Right now our tiger is all hardware and purring smoothly. Software is also ready with FORTRAN, symbolic translator, and a real-time and batch processing monitor.

With a 900 nanosecond memory cycle time and 16-bit data word (plus parity and memory protect bits), the all integrated circuit 6130 computer can show its teeth in outperforming all competitive machines, including those most recently announced.

The *ADVANCE* 6130 will be uncaged for the first time at the Fall Joint Computer Conference, San Francisco, November 8-10, Booths 119-121. Should you like more information beforehand, please call or write: Computer Division, Electro-Mechanical Research, Inc. 8001 Bloomington Freeway, Minneapolis, Minn. 55420. Phone: (612) 888-9581.

COMPUTER DIVISION EMR



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LOGARITHMIC AMPLIFICATION... as stable as the linear type. Combined with pulse summation, it enables pulses from 2 keV to 2 MeV to be processed without distortion, overload, or any need for HV and gain controls. Special "B-Set" plug-in discriminator modules insure instant, repetitive, error-free setting of channel windows.

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ELECTRONIC COMPUTATION... reduces total data processing time to less than 12 μsec per three-channel instrument. High-speed computer circuitry is used for the digital display.

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- Channels-ratio capability
- Live timing
- All silicon solid-state circuitry

Add to these the back-up by Picker's own world-wide service organization... and you see why an investment in ANSITRON II is the simple thing to do.

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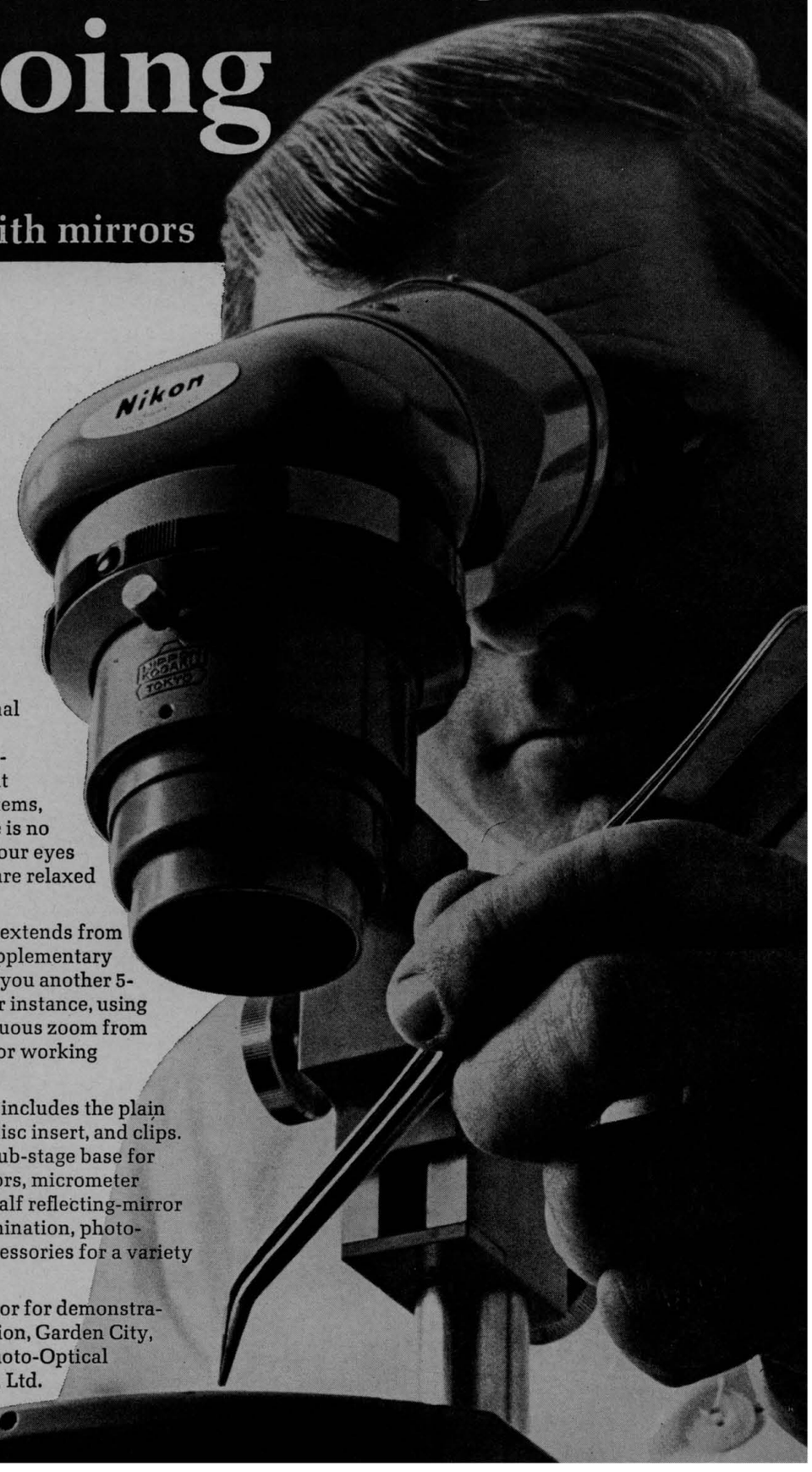
Now the right eye knows what the left eye is doing

And we don't do it with mirrors



Fact is, we use high quality optical glass prisms. All Nikon stereo microscopes do. But that's only part of it.

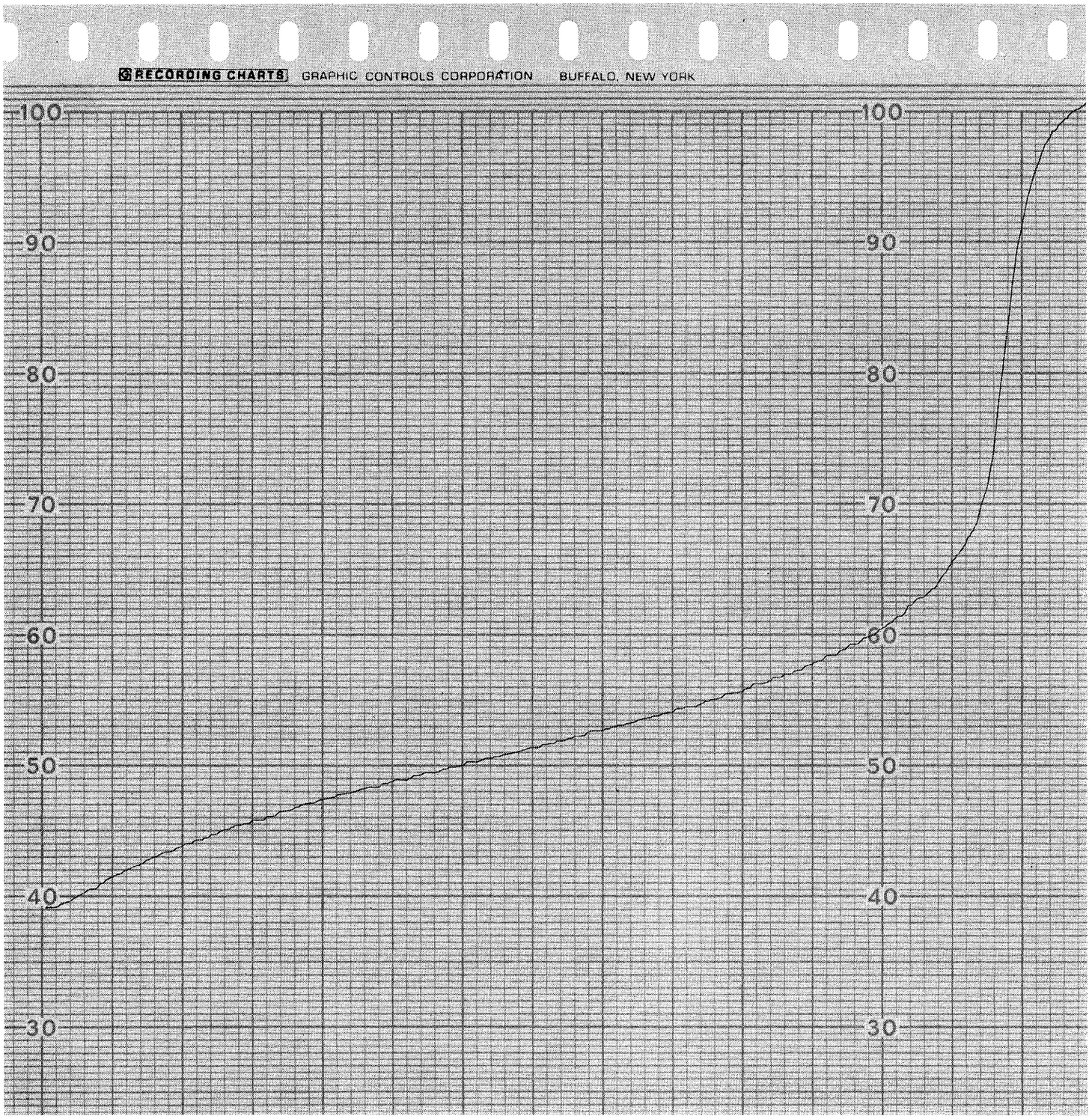
The real secret behind the performance of the Nikon SMZ stereoscopic zoom microscope is in the flawlessly matched right and left eye optical systems, their precise alignment, and the provision for independent dioptric compensation on each eyepiece.

The result is clarity beyond anything you've ever seen—brilliant, 3-dimensional perception without eyestrain or fatigue, even with prolonged use. Once the specimen has been brought into sharp focus, it stays critically sharp in both optical systems, over the entire 5-time zoom range. There is no shift in image focus or image position. Your eyes are not laboring to accommodate. They are relaxed at all times.

The full magnification range of the SMZ extends from 4x to 120x, using different ocular and supplementary objective lens combinations. Each gives you another 5-time zoom range. With 10x eyepieces, for instance, using no supplementary lenses, you get continuous zoom from 8x through 40x without change in focus or working distance.

Standard equipment for the Nikon SMZ includes the plain stand, with reversible black-and-white disc insert, and clips. Optional equipment: universal stands, sub-stage base for transmitted light observation, illuminators, micrometer stages, reticles, polarizing attachment, half reflecting-mirror attachment for shadowless surface illumination, photomicrographic attachments and other accessories for a variety of applications.

For complete stereo microscope catalog or for demonstration, write: Nikon Inc., Instrument Division, Garden City, N. Y. 11533. Subsidiary of Ehrenreich Photo-Optical Industries, Inc. (In Canada: Anglophoto, Ltd. Rexdale, Ontario)



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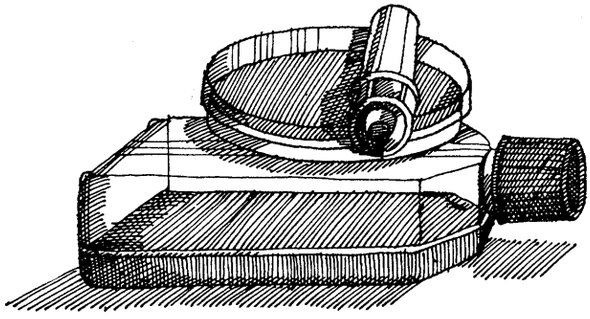
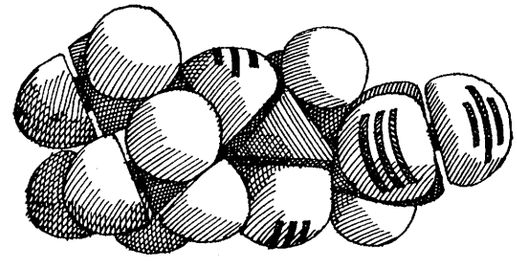


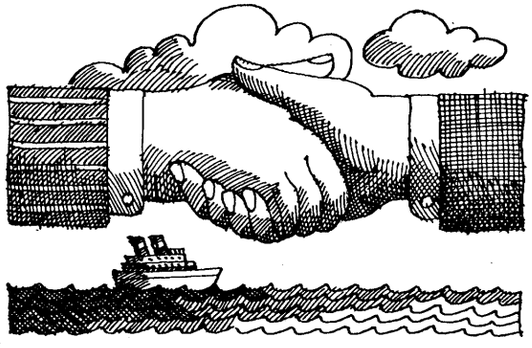
imMEDIAte™ new dry powder instant tissue culture media

Schwarz BioResearch's pre-eminence in the research, development and production of high quality research biochemicals (hundreds of them) has led to a perfectly understandable bit of diversification: tissue culture media. But with a difference. These are stable, homogeneous, unexpectedly inexpensive mixtures of pre-weighed dry powders which are easily reconstituted to yield chemically-defined tissue culture media. And, hence, the trade name imMEDIAte. Certainly better than belaboring you with fast, fast, fast. So if you now use tissue culture media, you ought to know more about our new offerings. (Examples: MEM, #199, NCTC #109-135 Modified.) For an immediate reply, drop us a postcard with the name "imMEDIAte" and your name, address and zip code.



Need atomic models for teaching and/or research? Consider CPK.™

We could easily trot out the traditional superlatives to describe these atomic models. But more pertinent and persuasive is the listing of the blue ribbon sponsorship behind this development. Accordingly: these are improved versions of the original Corey-Pauling space-filling models with new Koltun connectors; which development came from the Atomic Models Subcommittee of the Biophysics and Biophysical Chemistry Study Section of the National Institutes of Health (or, in more human terms, a working committee consisting of scores of scientists from several dozen institutions); and with subsequent implementation by the American Society of Biological Chemists with the financial support of the National Science Foundation. And now available from Schwarz! Request complete details by writing "CPK" on a postcard. Remember your zip code.



The French, Belgian, and Italian Nuclear Research Agencies make their labeled compounds available to U.S. researchers. (Through Schwarz exclusively.)

Which latter fact begets pride. Le Commissariat a l'Energie Atomique of France, Le Centre d'Etude de l'Energie Nucléaire of Belgium, and La Societa Ricerche Impianti Nucleari of Italy are engaged in ambitious fundamental and applied nuclear research programs. Hardly surprising then that a wide variety of labeled compounds are made for in-house use. But these are *also* available to outside researchers. As a matter of fact, tens of thousands of such deliveries are now made annually. Fantastic. And little wonder we're proud to be the exclusive U.S. distributor. Though there's no room here to do justice to this list, we'd like to mention that it does include: δ-amino levulinic acid-4-C^{14}, orotic acid 6-C^{14}, cholesterol-4-C^{14} and DL-arginine-guanido-C^{14}. For the complete listing of these compounds (as well as the rest of our line), write "Isotopes" on a postcard.

Now let us tell you about the rest of the family.

The neighboring panels serve to highlight some of the things we wish you to note especially. Good and well but terribly limiting. We also make many hundreds of labeled and unlabeled biochemicals—it takes an 80 page catalog to present our story effectively. Examples: labeled and unlabeled ribonucleotides, deoxyribonucleotides, polynucleotides, ribonucleosides, deoxyribonucleosides, purine and pyrimidine bases, enzymes, antimetabolites, sugars and sugar phosphates, amino acids and derivatives. And: labeled steroids and sterols, lipids and fatty acids, alcohols and ethers, aldehydes and ketones, amines and imines. And on and on and on. This panel, then, hopefully redresses the imbalance created by its neighbors and invites your request for our complete catalog. So write "Catalog" on a postcard. With your address, of course.

*A somewhat pretentious way of suggesting that this is the first of a series of miscellany designed to acquaint you with some of our products—often quite unrelated. Such medleys, such potpourris, such salmagundis will come to you whenever we feel that we have something of possible interest.

Schwarz BioResearch, Inc.
Orangeburg, N.Y. 10962

Now: A Fast Signal Averager

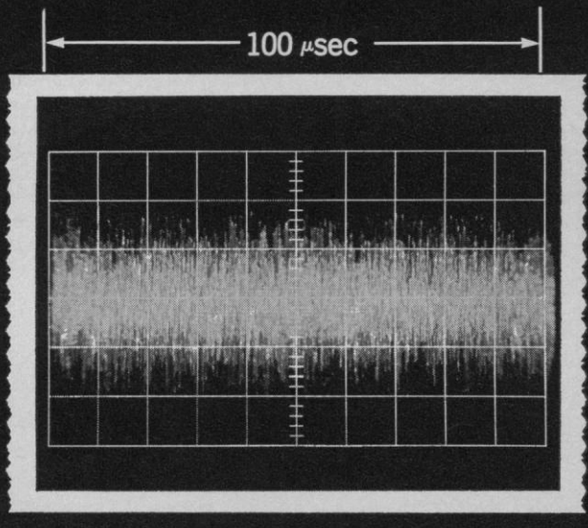


Photo #1—Input to Model TDH-9
SENSITIVITY: 5 V/cm
TIME: 10 μsec/cm
NOISE-TO-SIGNAL RATIO: 10:1

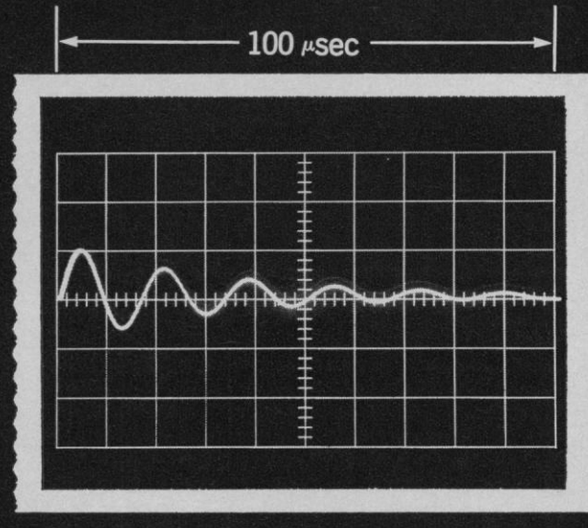
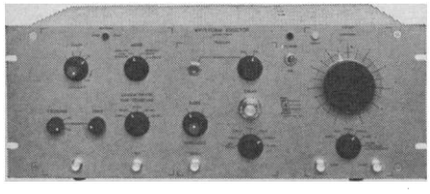


Photo #2—Output of Model TDH-9
SENSITIVITY: 5 V/cm
TIME: 10 μsec/cm



PAR Model TDH-9 Waveform Eductor

Photo #1 is an actual oscillogram of a signal obscured by noise — a situation unfortunately prevalent in many research areas; such as, studies of biomedical evoked potentials, seismology, spectroscopy, fluorescent lifetime studies, and vibration analysis. Photo #2 shows the dramatic improvement in signal-to-noise ratio when the noisy signal was processed by the PAR Model TDH-9 Waveform Eductor.

This new instrument employs a highly efficient waveform-averaging technique, and at the same time offers the fastest sweep rates obtainable in signal processing equipment of the signal-averaging type. Sweep durations as short as 100 microseconds, with dwell times per channel of 1 microsecond, are obtainable. The high resolution capability of the Model TDH-9 allows observation of waveforms or transients which have heretofore been unresolvable by averaging instruments employing a greater number of channels.

Although the Model TDH-9 Waveform Eductor sells for only $4,200, we invite functional comparison with the higher-priced digital averagers. We believe you will be pleasantly surprised. For more information about the PAR Model TDH-9, ask for Bulletin No. T-126.

Have a noise problem?

PAR's technical staff, unusually knowledgeable in signal processing problems and techniques as a result of its experience in the development and application of Lock-In Amplifiers, welcomes your specific inquiries. Please call or write.

PAR
PRINCETON
APPLIED RESEARCH CORP.
Dept. G
Box 565, Princeton, N. J., Tel. (609) 924-6835

(Hungary is not its favorite topic.) Surely congressional investigative vigor could be directed toward more obvious subjects, the contents of the pork barrel, for instance.

Greenberg has presented a largely balanced account of the Smale case, even though his treatment of the professor was a bit too indulgent.

ROBERT M. LUKES
223 Bramton Road,
Louisville, Kentucky 40207

While I abhor HUAC's restrictions on free speech and association, I believe that scientists should be fully alert to oppose repression from *any* source. In this context, I would like to question the choice of sites for international meetings. Rapprochement and lessened tension are wonderful things; but must we hold scientific congresses in countries where political doctrine dictates the scientific approach, where "unorthodox" scientists suffer loss not only of support but of liberty and even of life, and where scientific publications must begin with panegyrics to deified leaders or theories? It is true that the situation in the U.S.S.R. has improved within the past decade, and also that Moscow is an interesting place to visit. Still, we might consider to what extent free scientific inquiry and discussion are possible in a country which is under consideration as a location for a meeting.

PETER SUEDFELD
Department of Psychology,
Rutgers, The State University,
New Brunswick, New Jersey 08903

Visa Barriers

I, too, have had a similar experience to that reported in "Scientific exchange: case of a French visitor" (19 Aug., p. 848). When I applied recently for a visa to attend a congress in the U.S., my application was held up for some time while my political antecedents were intensively investigated on the grounds, according to American Embassy officials in London, that they found my passport contained visas indicating that I had traveled to eastern European countries and that it listed my job as "research biochemist." I was told it was now the policy of the U.S. Embassy, in dealing with visa applications, to regard all biochemists as likely to have left-wing tendencies, and therefore to investigate closely the polit-

What this country needs is a good 10-cent pipet!

Could a 10-cent pipet do the same job as a conventional pipet? This new Kimble *disposable* pipet can...for even less than a dime! Made of fine borosilicate glass, it's clean, cotton-plugged, sterile, ready to use. Features a rugged, uniform tip for consistent delivery. Same accuracy as a regular pipet: ±2%. The right length for handling ease; the right price for disposable convenience, and new packaging for added utility. Compare! Write for your complimentary sample and complete information. Address below, c/o Marketing Services Department.

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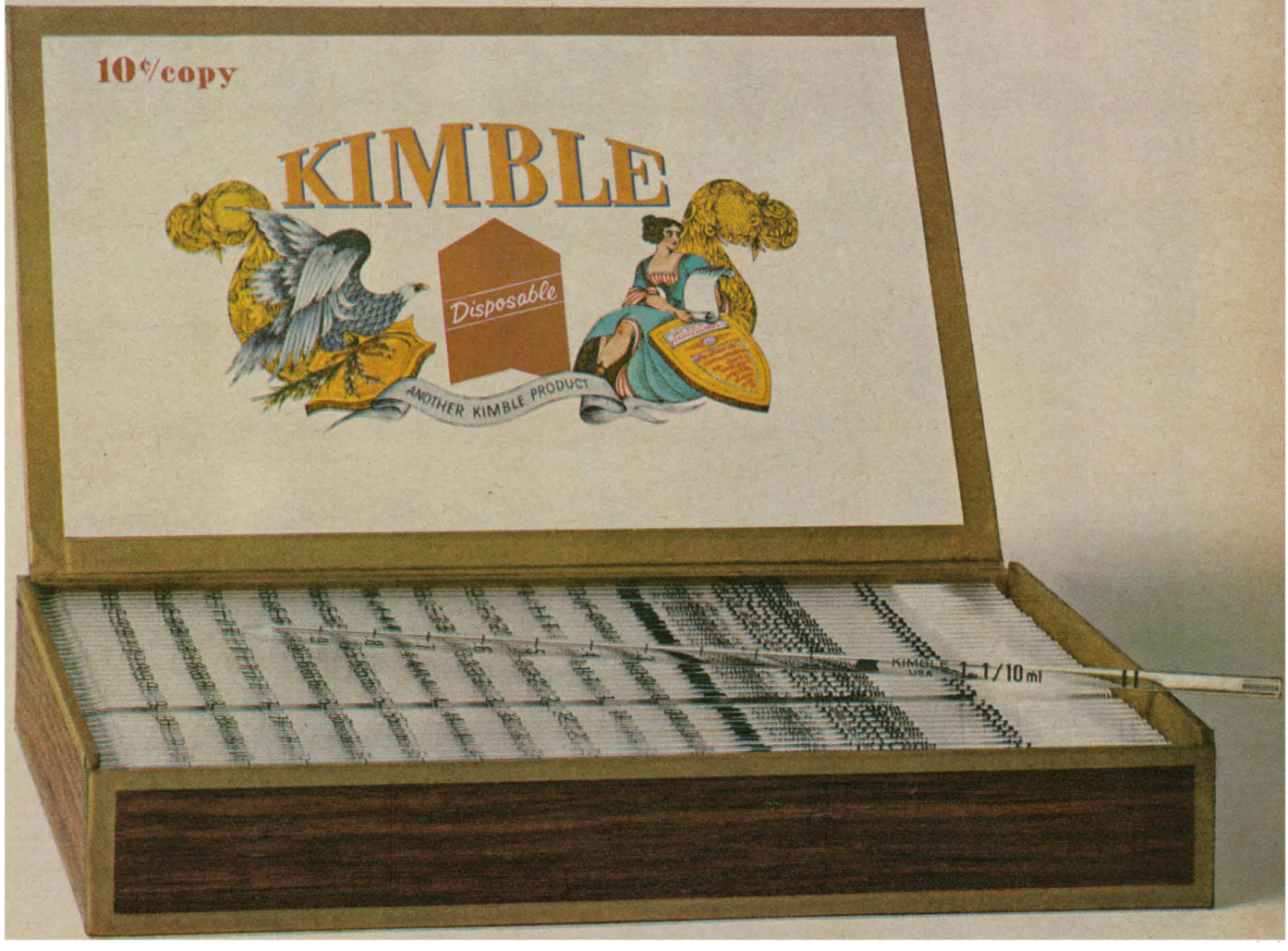

ical background of any biochemist who applied for a temporary visa to visit the States. I did get my visa after some delay and a substantial exchange of correspondence, which included my supplying a list of all organizations, social and political (from the school chess club onwards), to which I had ever belonged. This list did not include the Communist Party, but did include the British Labour Party.

At Montreal I was held up for some time by a suspicious immigration official who objected to my entering; the grounds were that the conference I was planning to attend was being sponsored by M.I.T. but was being held in Boulder, Colorado, not in Massachusetts. It was only after a lengthy exchange that he conceded that it was possible for a conference to be run in this way and, therefore, legitimate for me to enter the U.S.

Such activities by both Embassy officials abroad and immigration officials at points of entry to the U.S. are extremely prejudicial to free scientific exchange, especially as it now appears that whole scientific disciplines are likely to become suspect in such a bizarre manner. It is encouraging that the U.S. scientific community has thought it worthwhile to protest.

S. P. R. ROSE

Department of Biochemistry, Royal College of Science, London S.W.7, England

Praise for a Public Servant

Abelson's editorial (26 Aug., p. 939) is a concise summary of the accomplishments and requirements of the National Bureau of Standards. The scientific community supports, I am sure, his concluding hope that Congress will provide sufficient funds and will regard the quality of the Bureau's effort as highly as we scientists do. Glamorous and high priority issues have continuously detracted attention from the needs and achievements of the Bureau, while some programs of vital interest to large industries, such as our ceramic industry, have been curtailed and talented men sacrificed by budget squeezes. The Bureau represents an unparalleled asset to science, industry, and government that should be supported in its modest frame with the concern it deserves.

NORBERT J. KREIDL

Department of Ceramic Engineering, University of Missouri, Rolla 65401

This is a new automatic pipette.

Among other things, it doesn't touch the liquid it pipettes.

(How's that again?)

When using the BIOPETTE automatic pipette, all of the measured aliquot is held in the disposable plastic tip. The liquid never has to enter the housing of the BIOPETTE itself. Hence, the BIOPETTE stays clean, can't contaminate anything else, and doesn't need washing. And to switch from one liquid to another: just put in a new disposable tip. Period.

Fast? It takes approximately 2 seconds for *both* filling and discharging. Without sacrificing accuracy.

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Easy to use? Yes. With virtually no training. Requires no special "touch" or technique. (Goodbye meniscus.) Weighs less than 2 oz. with tip.

Economical? If time *is* money, yes. Two ways: greatly reduces time for pipetting; totally eliminates time required for the washing ritual. (Special bonuses: no broken or contaminated glass pipettes.)

Useful? Without doubt. Interesting current animal care applications include, for example, forced feeding, artificial insemination, blood dilutions, and so forth.

Guarantee? A real one, lasting ten years. If a problem develops (unlikely), we will immediately send you a replacement BIOPETTE automatic pipette while we fix yours for you. Or we'll throw yours away and let you keep the replacement.

For further information and prices, please write: Lab Cages Inc., 126 John St., Hackensack, New Jersey 07602. (And why not ask for our new, interesting catalog also?)

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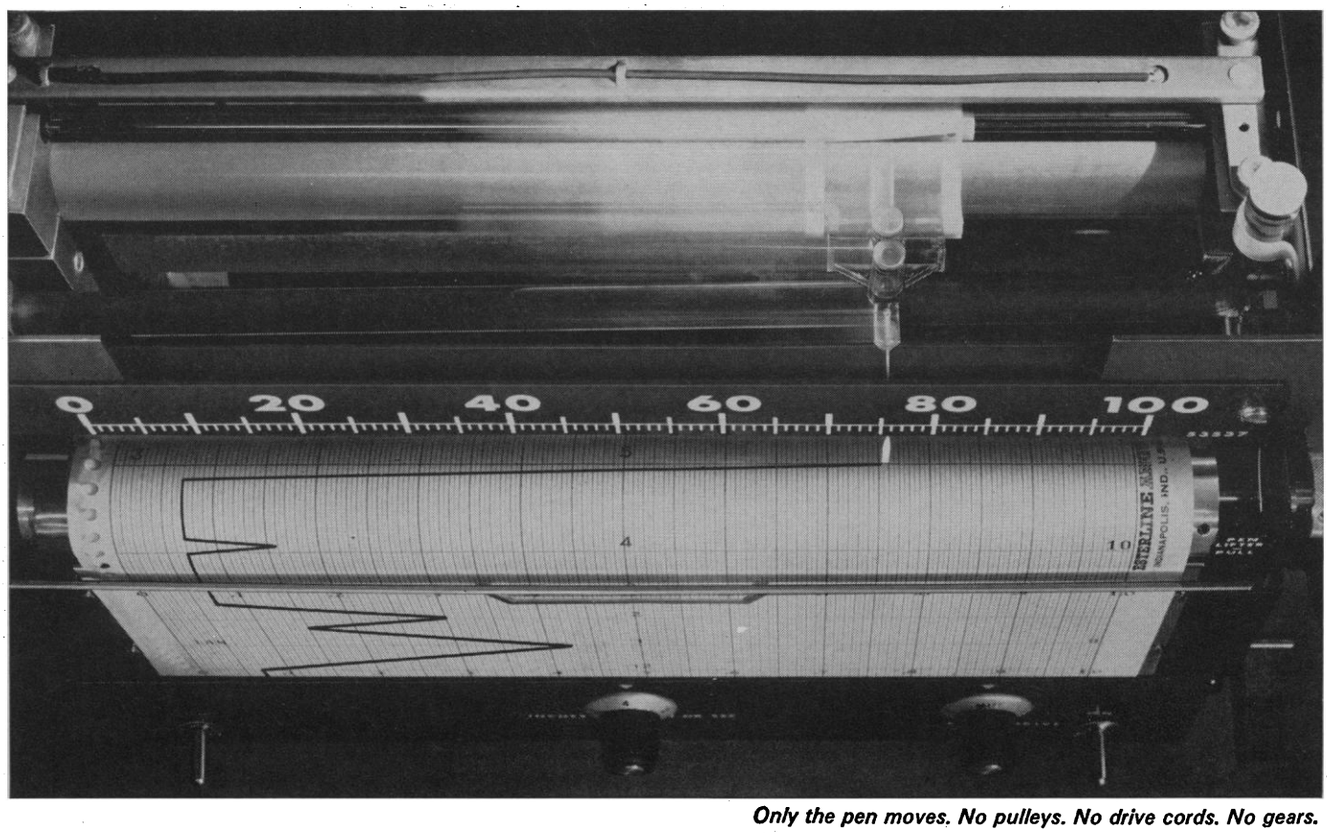
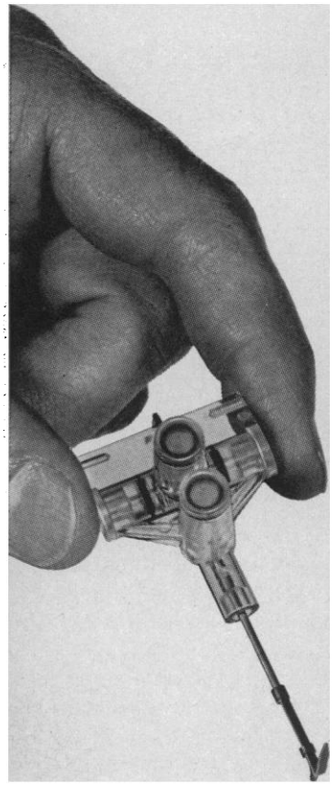


Only the pen moves. No pulleys. No drive cords. No gears.



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16 December 1966, Volume 154, Number 3755 **SCIENCE**

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Toward Cleaner Streams

Until recently, many of our rivers were deteriorating. Some had already become open sewers for municipal and industrial wastes. The long process of restoring the cleanliness of streams has now begun. In spite of the increasing urban population, the amount of organic matter discharged by municipalities into streams is actually diminishing. Moreover, new legislation skillfully sponsored by Senator Muskie of Maine unanimously passed both houses of Congress and has been signed into law. One of its terms is that matching funds be provided to help municipalities improve their sewage treatment. Thus, an accelerating program of waste management is in prospect.

Two types of sewage treatment are now used. The primary treatment removes sludge, skimmings, and the larger suspended solids. Secondary treatment involves such processes as the use of oxidation ponds, trickling filters, and activated sludge to destroy organic matter. Efficiently operated primary-secondary plants remove about 90 percent of the organic matter, giving rise to a biochemical oxygen demand. They simultaneously remove about 90 percent of the bacteria and 50 percent of the fixed nitrogen. Weinberger, Stephan, and Middleton* have discussed new methods of treating wastes and have provided data on the average composition of the better municipal secondary effluents. In parts per million, some values are as follows: gross organics, 55; biodegradable organics, 25; Na^+, 135; NH_4^+, 20; NO_3^-, 15; PO_4^{3-}, 25; Cl^-, 130; HCO_3^-, 300; SO_4^{--}, 100; and total dissolved solids, 730. About half the amount of solids is present in the water supply; the other half is added during use.

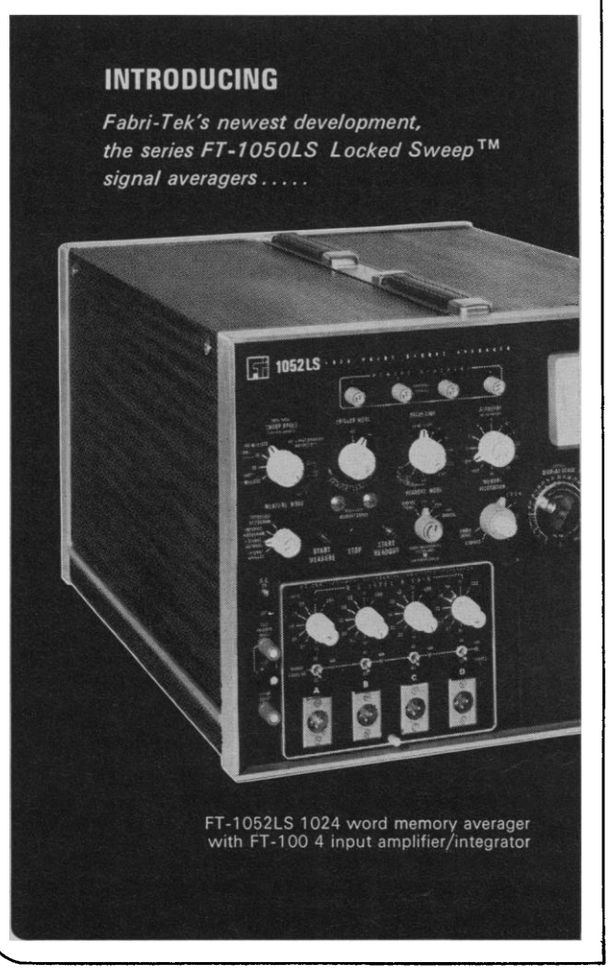
The Federal Water Pollution Control Administration is seeking better means to renovate water. This agency has been sponsoring research and pilot-plant operation to explore methods and to determine feasibility and costs. Most suspended and colloidal solids and phosphates can be removed from a good-quality secondary effluent by use of a coagulant such as alum. This treatment reduces the biological oxygen demand about tenfold and reduces phosphate to 1 to 2 parts per million. The cost, for a large installation, is estimated at $0.05 per 1000 gallons, exclusive of the cost of sludge disposal. After the colloidal and suspended solids have been removed, further purification can be effected with activated carbon. Such carbon, when used in counter-current-flow, fixed-bed contractors, will absorb 20 to 30 percent of its own weight in mixed organics. In a series of tests it was found that more than 98 percent of total organic matter was removed. Costs for treatment on the 100-million-gallons-per-day scale were estimated at $0.06 per 1000 gallons. Except for dissolved salts, these two treatments would restore effluent water to a chemical quality comparable to its quality before use.

By means of electrodialysis it would be feasible to cut the salt concentration in half. However, NH_4^+ presents a special difficulty. Only a few parts of NH_4^+ per million can be tolerated in a municipal water supply. Weinberger, Stephan, and Middleton suggest that this problem can be circumvented by operating secondary biological treatment plants under nitrifying conditions, so that NH_4^+ is converted to NO_3^-.

Progress is being made by municipalities in cleaning up their effluents, and further progress is likely. However, industry discards as much organic material into U.S. streams as the cities do. A recent Harris survey reports that public opinion has become aroused against pollution and that the public believes industry is the principal offender. Thus, industry will experience increasing pressure to reduce its contribution to pollution. Many years will pass before some streams are clean, but at last trends are in the right direction.—PHILIP H. ABELSON

* Leon W. Weinberger, David G. Stephan, and Francis M. Middleton, "Solving our water problems—water renovation and re-use," *Ann. N.Y. Acad. Sci.* **136**, 131 (1966).

Can a signal averager with *linear* sweep accurately measure a signal controlled by a *non-linear* variable?



Yes, it can... if it's one of the *new* Fabri-Tek Series FT-1050LS signal averagers featuring Locked Sweep.™

In addition to all the capabilities of the Series FT-1050 instruments, this new feature provides for externally controlled address advance. The "sweep" operation begins normally, with the input signal voltage measured and averaged over a selected interval from 50 microseconds to 200 milliseconds. However, instead of proceeding immediately to the next memory address, the Locked Sweep averager remains quiescent and waits until an external address advance signal is received before advancing to the next address and resuming the digitizing. The experimenter need only determine when the independent variable has reached the next desired value, and then direct the averager to proceed to the next address.

Averaging of the signal during many recurrences of the changes in the independent variable is accomplished just as in fixed sweep speed signal averagers. Because of this external address advance control the Series FT-1050LS signal averagers can be locked to the rate of change of the controlling independent variable.

The broad class of measurements now possible includes all of those in which the independent variable is a non-linear or even a changing function of time. One example is the measurement of temperature as a function of pressure, where pressure is an independent variable which cannot be controlled in a time linear or even a repeatable time-dependent fashion. Another example is the measurement of a spectrometer signal where the spectrometer scan is irregular, or where transient signal voltages occur during scan changes. A third example is a measurement of internal combustion engine performance in which angular velocity may gradually vary during the measurement.

The FT-1050LS models may also be operated as standard Series 1050 averagers to sweep linearly through all memory addresses without requiring external address advance signals.

The Fabri-Tek Locked Sweep signal averagers are available with 512 memory addresses (FT-1051LS) or 1024 memory addresses (FT-1052LS). A choice of single input or four input plug-in, differential amplifier-integrators is available. A plug-in, high speed, quiet photographic printer to record all memory address values is also available.

Standard features of the Locked Sweep averagers include: a wide range of digitally controlled sweep speeds and delay times (in decimal, not binary); all integrated-circuit logic circuitry; and decimal number readout of any switch-selected memory address on the built-in cathode ray tube.

For more information about Fabri-Tek signal averagers, and about signal averaging in general, write or phone Fabri-Tek Incorporated, Instrument Division, P.O. Box 4218, Madison, Wisconsin 53711. Or call collect: (608) 238-8476.

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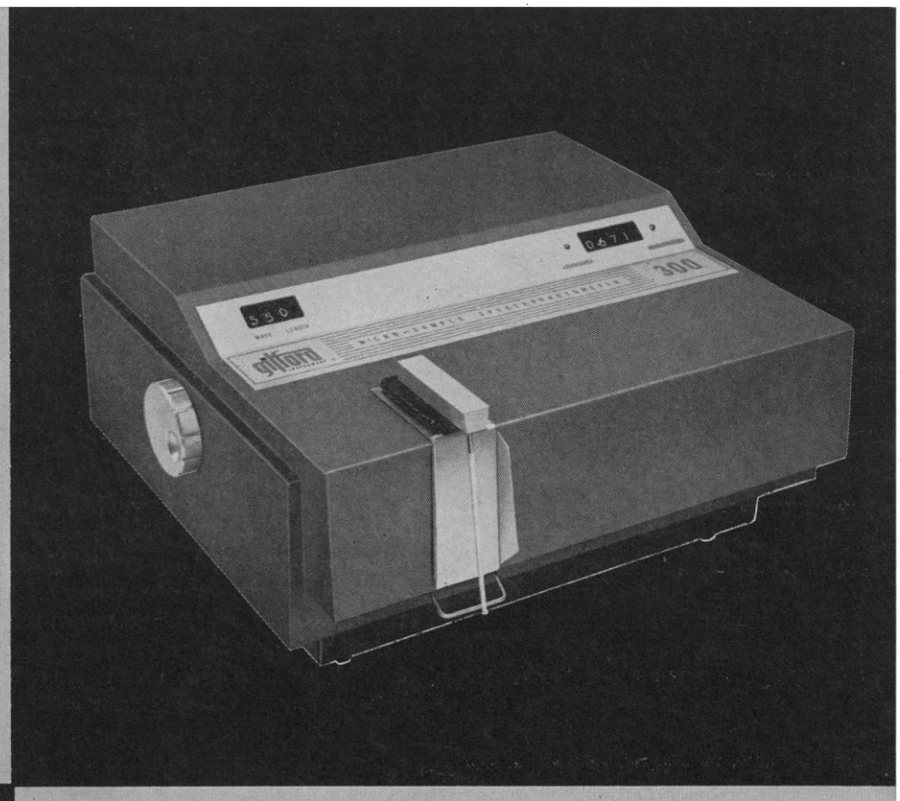
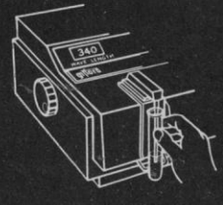


WAVELENGTH RANGE 340 to 700 mu



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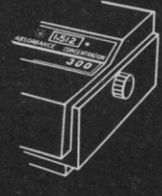

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This instrument maintains a usable resolution of 0.001 absorbance unit over its entire measurement span of 0.000 to 2.000 A units. Its long term stability is better than 0.005 A per hour, requiring only occasional zero setting on a reference. And it combines this uncommon performance with explicitly simple operation.

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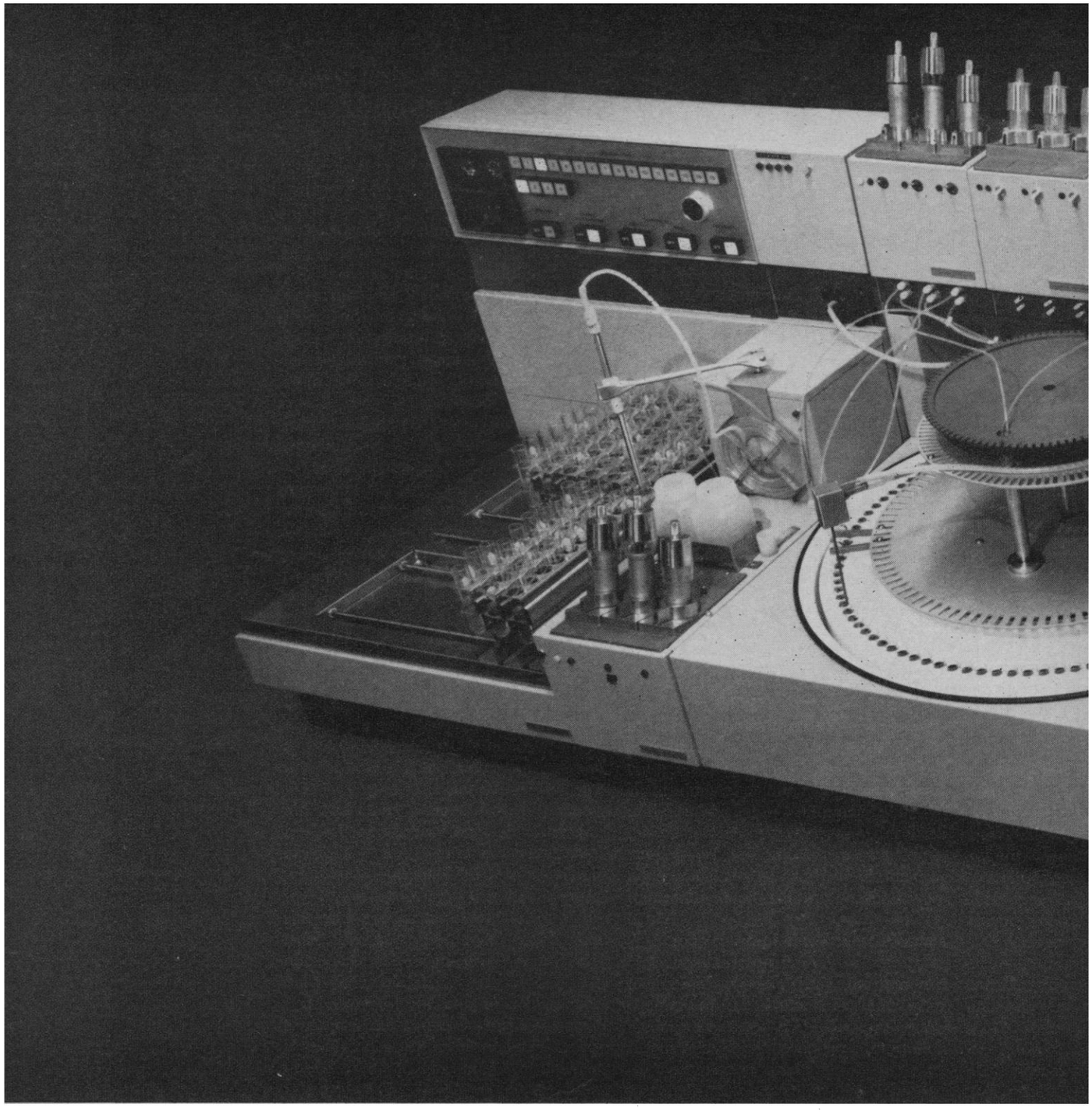

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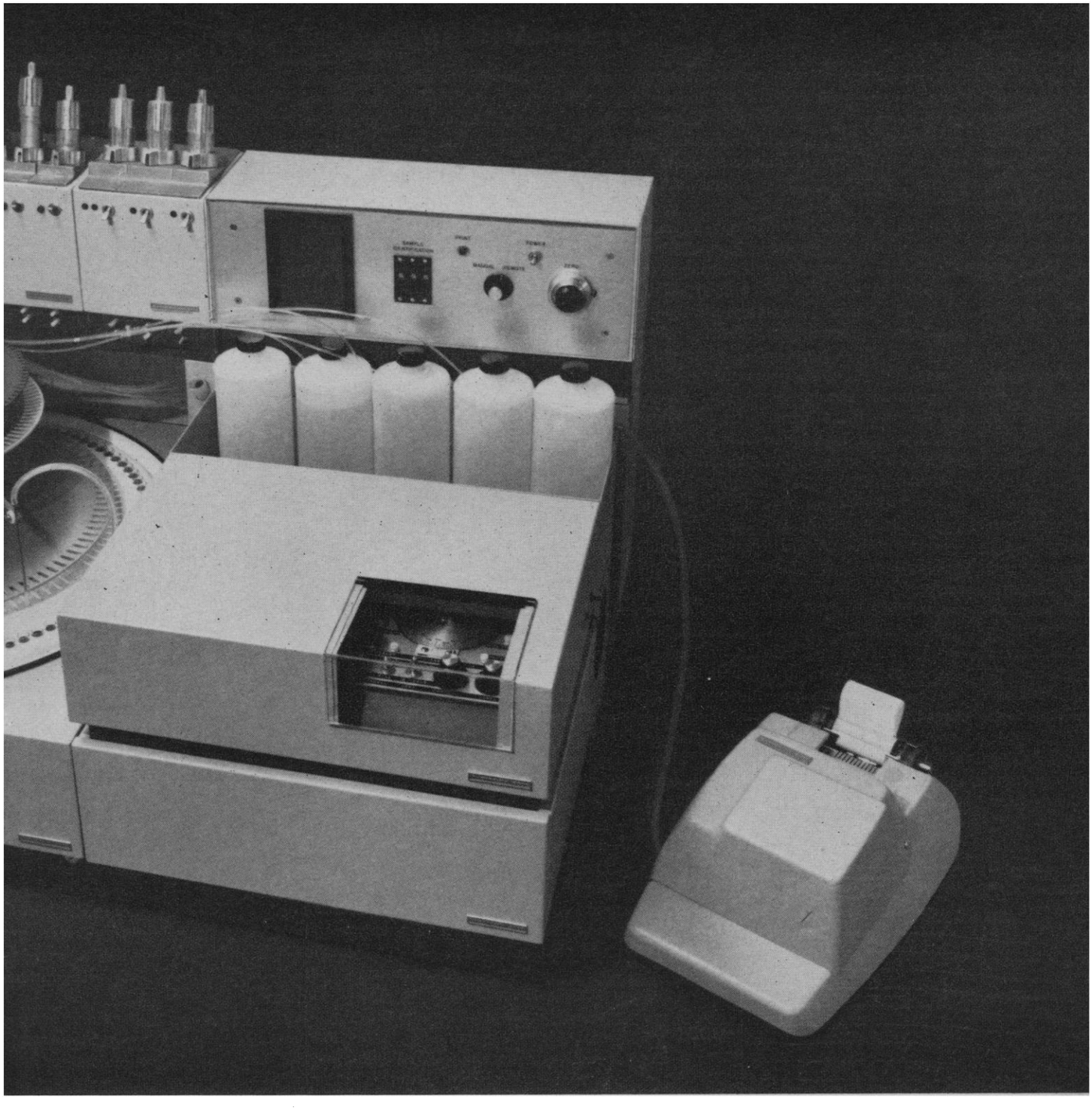

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The Robot Chemist is an instrument that behaves like a chemist. It samples, dilutes, adds and mixes reagents, incubates, reads, and prints out a test result. Then, it rinses, washes, dries itself, and gets ready for the next sample. **All at your command.**

You can pick up samples from 20 μl to 5 ml with 1% accuracy; add up to 7 reagents with 0.5% accuracy; incubate for precise periods of time with a thermal stability of $\pm 0.1°C$ at 37°C or $\pm 0.5°C$ up to 95°C; and, measure through a spectrophotometer range of 340 to 1000 nanometers. It's ideal for enzyme and other analyses that require precise control of variables!

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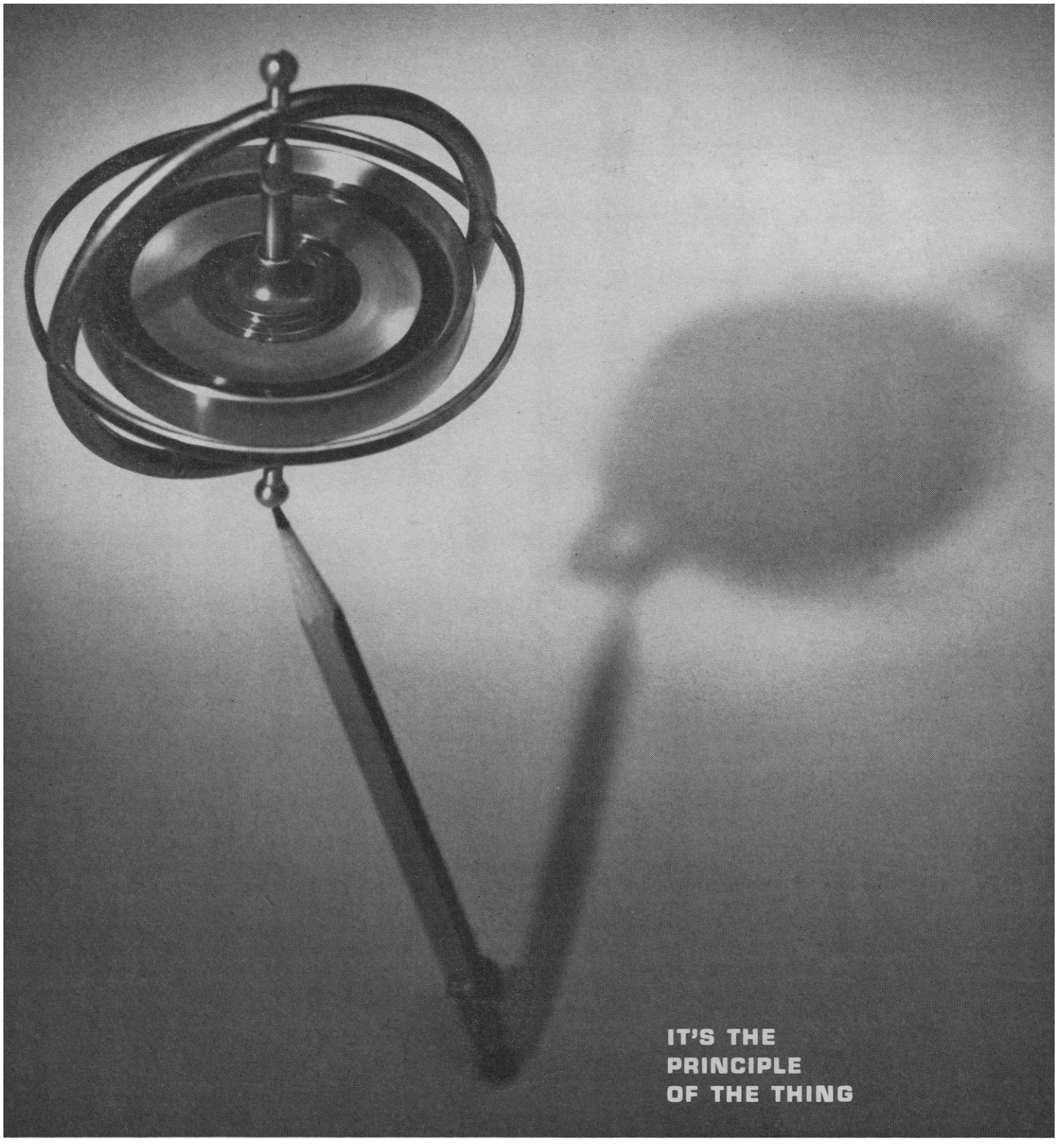

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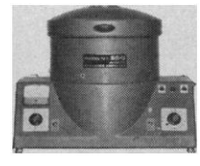
* Other SORVALL Centrifuges with Gyro-Action Drive advantage: RC2-B, RC-3, and the new GLC-1.

SS-4 Manual Superspeed Centrifuge

SS-3 Automatic Superspeed Centrifuge



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This was not, however, the only reason for their action on the immune response. R. S. Schwartz (Boston) thought it was more likely that these drugs inhibit the antigen-induced differentiation of immunologically competent cells into antibody-forming cells. This fitted with the finding of J. Sterzl (Prague) that inhibitors of DNA synthesis fail to inhibit the immune response despite their inhibition of cell division.

Sterzl reported on the action of the immunosuppressive drug 6-mercaptopurine (6-MP) in detail. The primary immune response is inhibited by 6-MP; so is the secondary response, but only if administration of 6-MP is continued. Schwartz showed that if the injection of 6-MP is carefully timed in relation to injection of the antigen, then specific deletion of reactivity to this (but not to unrelated) antigens is possible. One unexpected new finding was that administration of 6-MP is occasionally followed by marked hyperplasia of lymphoid cells and increased, rather than decreased, immunological reactivity.

Discussion of subjects bearing on the host immune reaction against cellular cancer antigens was begun by W. Boyle (Durham), who reported work on concentration of the antigenic activity of cell surface membranes by density gradient centrifugation. R. T. Prehn (Philadelphia) examined the evidence for a host reaction against chemically induced sarcomas, and posed thought-provoking questions as to the basic mechanism of the neoplastic change. He concluded that there was no direct relation between the nature of chemical or physical carcinogens and the antigenicity of the resulting tumor. He thought that all tumors may possess tumor-specific antigens, and had found that most carcinogens depress the immune response. He concluded that immunity does play a role in the natural history of tumors. M. Schlesinger (Jerusalem) reviewed experimental evidence that the physiological development and differentiation of an organ is paralleled by the development of isoantigens.

Following discussion of the action of complement by H. J. Müller-Eberhard (La Jolla), and of the antigenicity of synthetic polymers of amino acids in a paper read for P. H. Maurer (Philadelphia), the final paper, on organ transplantation, was given by T. Starzl (Denver). In common with Medawar and Russell, Starzl found het-

erologous anti-lymphoid serum to be a powerful immunosuppressive agent. By adding injections of such antiserum to use of a chemical immunosuppressive agent (azathioprine), the dosage of a potent third medicant, the steroid prednisolone, could be reduced to one-eighth the previously required amount. The clinical results obtained made Starzl quite optimistic as to the future of organ transplantation in man.

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Argonne National Laboratory: Educational Workshops

During the academic year 1965–66 faculty members representing 120 colleges and universities from 16 midwestern states participated in 70 two-day workshops or brought students to perform experiments at the instructional facilities of Argonne National Laboratory (ANL). Summer institutes and audio aids for on-campus use supplement these programs.

In 1955 as part of President Eisenhower's "Atoms for Peace" program, the Atomic Energy Commission established the School for Nuclear Science and Engineering at Argonne, Illinois. By 1963 this program had served its purpose of training nuclear engineering students from abroad. Some of the colleges in the Chicago area then requested the use of its facilities for supplementing their science and mathematics programs. The Office of College and University Cooperation set up shortly afterwards at Argonne directs the use of the instructional laboratories. Nineteen liberal arts colleges within commuting distance formed the Associated Colleges of the Chicago Area (ACCA) and for the past 3 years have worked with this office in planning faculty workshops and student experiments to meet the needs of their various departments. Students from these colleges accompanied by their professors spend half-days weekly or biweekly performing experiments in the ANL instructional laboratories.

Since these programs are open to all colleges and universities in the Midwest, over 70 institutions participated in the faculty workshops. Forty-five colleges from greater distances brought students for two or more days of experimental work. Last spring a Nuclear

Chemistry Users Committee (NCUC) representing schools outside the ACCA group was organized to evaluate their educational experiences at ANL and to explore further use of its facilities to implement their programs. User groups are also developing in biology, mathematics, and physics.

The workshops cover nuclear science and recent developments in related areas. They are designed to update the theoretical background of faculty members and acquaint them with the use of newer instruments and their applications to the various fields of instruction. The equipment, much of which is of research caliber, includes nuclear reactors, a 21-foot grating emmission spectrograph, an A-60 NMR, an x-ray diffractometer, a mass spectrometer, both infrared and ultraviolet spectrophotometers, gas chromatographs, and a CDC 8090 computer. There is also a radiobiological laboratory for studying the effects of radiation on living matter. Workshops are presented each semester in the areas of radioisotopes, radiation biology, spectroscopy, modern and neutron physics, computers, and electronics. Topics are treated on introductory and advanced levels.

The number of participants in any given workshop is generally limited to eight with reservations made on a first-come, first-served basis. Small groups promote close contact with the Argonne staff member and ready access to the instruments. During the past year some 300 faculty members availed themselves of the opportunities afforded by these workshops. The program is supported by the Atomic Energy Commission's Division of Nuclear Education and Training; the National Science Foundation has provided some support to help defray travel and lodging expenses for those coming from a distance.

Faculty members are invited to bring their students of junior and senior standing to ANL to perform experiments as part of their regular course work or to supplement it. An Argonne staff member and a technician are on hand for consultation and help as desired by the college instructor. Again small groups are more practical.

There is a wide selection of experiments from which to choose in each of the following areas: neutron and modern physics, physical chemistry, general techniques and applications of radioisotopes, radiobiology, molecular spectroscopy, gas chromatography, and

computers. If desired, a tour of the research divisions can be arranged during the students' visit to acquaint them with applications of the basic knowledge and skills they are acquiring.

This past summer there were two AEC-NSF institutes for college faculty in radiobiology and nuclear-physical chemistry. A similar institute in radiobiology has been submitted for next summer.

At the spring meeting of NCUC it was suggested that several 1-week short courses held early in June and in August to permit teaching of summer classes would be more practical for participants coming from considerable distances than several weekend trips during the year. Some of the topics suggested for consideration were nuclear magnetic resonance, symmetry and group theory, and computer applications to chemistry problems.

At the request of the Biology Committee of ACCA, radiobiological seminars have been prepared on tapes by members of Argonne's Division of Biological and Medical Research. Accompanying the tapes are student brochures with illustrations from the lecturers' slides, background information, and reference material. These tapes may be kept in the college library. To date 60 colleges and universities located throughout the country have used the radiobiological seminars.

Also available are eight tapes with brochures entitled, "Introduction to Fortran Programming of Digital Computers." Thirty colleges have used these tapes to assist them in computing courses. "Introduction to Analog Computing" is presented in 3 films each running 45 minutes. These are loaned gratis to colleges.

It is hoped that this summary of educational opportunities at Argonne National Laboratory has conveyed the scope and flexibility of the programs and will interest more educators to look into them as cocurricular training for their students as well as a means of keeping abreast with new developments in their particular fields. If the best advertisement is a satisfied customer, Argonne's instructional laboratories are in business.

For further information write to J. E. Baird, Office of College and University Cooperation, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois 60440.

SISTER MARY MAYNARD
Mount Mary College,
Milwaukee, Wisconsin 53222

Forthcoming Events

January

9–10. **Industrial Research**, 2nd natl. conf., Purdue Univ., West Lafayette, Ind. (W. E. Spaulding, Krannert Graduate School of Industrial Administration, Purdue Univ., West Lafayette)

9–11. Electrical and Electronic **Measurement and Test Instruments**, conf., Ottawa, Ontario, Canada. ("EEMTIC '67," Box 6015, Postal Station J, Ottawa 13)

9–14. American **Library** Assoc., mtg., New Orleans, La. (D. H. Clift, The Association, 50 E. Huron St., Chicago, Ill. 66011)

9–18. **Spectroscopy**, intern. conf., Bombay, India. (Organizing Committee, Spectroscopy Div., Atomic Energy Establishment, 414 A Cadell Rd., Bombay 28)

10–12. **Reliability**, annual symp., Inst. of Electrical and Electronics Engineers, Washington, D.C. (IEEE, 345 E. 47 St., New York 10017)

10–13. Physics of **Quiescent Plasmas**, conf., Rome, Italy. (Quiescent Plasmas, Laboratorio Gas Ionizzati, EURATOM-C.N.E.N., C. P. 65, Frascati, Rome, Italy)

11–13. **Surface Chemistry**, 3rd Scandinavian symp., Fredensborg, Denmark. (Nordforsk, Ørnevej 30, Copenhagen NV)

12–14. Evaluation of Agents Used in Prevention of **Oral Diseases**, conf., New York Acad. of Sciences, New York. (J. Hein, Forsythe Dental Center, 140 Fenway, Boston, Mass. 02215)

13–14. **Orthopaedic Research** Soc., mtg., San Francisco, Calif. (R. A. Calandruccio, 869 Madison Ave., Memphis, Tenn.)

13–14. American Soc. for **Surgery of the Hand**, San Francisco, Calif. (R. M. Curtis, 2947 St. Paul St., Baltimore, Md.)

14–19. American Acad. of **Orthopedic Surgeons**, San Francisco, Calif. (J. K. Hart, 29 E. Madison St., Chicago, Ill.)

16–18. **Compressed Gas** Assoc., annual mtg., New York, N.Y. (The Association, 500 Fifth Ave., New York 10036)

16–20. **Australian and New Zealand** Assoc. for the Advancement of Science, 39th congr., Melbourne, Australia. (W. W. Fee, The Association, Dept. of Chemistry, Univ. of Melbourne, Parkville, N.2, Australia)

16–20. **Highway Research** Board, NAS–NRC, 46th annual mtg., Washington, D.C. (E. W. Harris, 2101 Constitution Ave., NW, Washington, D.C. 20418)

16–21. Atomic, Molecular, and Solid State **Physics**, symp., Gainesville, Fla. (P.-O. Löwdin, Quantum Theory Project, Nuclear Sciences Bldg., Univ. of Florida, Gainesville 32601)

16–21. Recent Advances in **Tropical Ecology**, symp., Varanasi, India. (R. Misra, Intern. Soc. for Tropical Ecology, Dept. of Botany, Banaras Hindu Univ., Varanasi 5)

16–27. Low Energy **Nuclear Physics**, intern. seminar, Dacca, Pakistan. (A. M. Harunar Rashid, Atomic Energy Center, P.O.B. 164 RAMNA, Dacca)

16–31. **Ocean Science**, 5th Pan Indian congr., Bangkok, Thailand. (P. Cheosakul, Natl. Research Council, Bangkhen, Bangkok)

17–18. **Engineering** Socs. and Their **Literature Programs**, symp., Engineers Joint Council, New York. (EJC, 345 E. 47 St., New York 10017)

17–18. **Simulation** in Medicine and Biology, symp., Central and Midwestern States Simulation Council, Mayo Clinic, Rochester, Minn. (J. B. Bassingthwaighte, Dept. of Physiology, Mayo Clinic, Rochester 55902)

18–20. **Oil and Water**, symp., Brighton, England. (Inst. of Petroleum, 61 New Cavendish St., London W.1)

18–21. **Conformation of Biopolymers**, intern. symp., Madras, India. (C. Ramakrishnan, Centre of Advanced Study in Biophysics, Univ. of Madras, A.C. College Bldgs., Madras 25)

18–22. **Parasitology**, 1st Latin American congr., Santiago, Chile. (R. Doncкaster, Dept. of Parasitology, Univ. of Chile, Santiago)

20–21. **Blood**, 15th symp., Wayne State Univ., Detroit, Mich. (W. H. Seegers, Dept. of Physiology, Wayne State Univ. School of Medicine, Detroit 48207)

20–2. International College of **Surgeons**, 3rd Caribbean surgical congr. and cruise. (S. E. Henwood, 1516 Lake Shore Dr., Chicago, Ill. 60610)

22–3. **Electron Microscopy**, workshop, Northeastern Univ., Boston, Mass. (M. D. Maser, Millard Fillmore Hospital, 3 Gates Circle, Buffalo, N.Y. 14209)

23–24. **Avionics**, symp., Montreal, Canada. (Secretary, Canadian Aeronautics and Space Inst., 77 Metcalfe St., Ottawa, Ont.)

23–24. **Coupled Reactor Kinetics**, natl. mtg., Texas A&M Univ., College Station. (C. G. Chezem, Dept. of Nuclear Engineering, Texas A&M Univ., College Station 77843)

23–25. **Aerospace Science**, 5th mtg., American Inst. of Aeronautics and Astronautics, New York, N.Y. (Manager of Public Information, AIAA, 1290 Sixth Ave., New York 10019)

23–25. Society of **Thoracic Surgeons**, mtg., Kansas City, Mo. (F. X. Byron, The Society, City of Hope Medical Center, 1500 E. Duarte Rd., Duarte, Calif. 91010)

23–27. **Relativistic Astrophysics**, symp., New York, N.Y. (A. G. W. Cameron, Belfer Graduate School of Science, Yeshiva Univ., New York 10033)

24–27. **Comparative Pharmacology**, intern. symp., Natl. Inst. of Health, Bethesda, Md. (G. J. Cosmides, Room 5B29, Bldg. 31, NIH, Bethesda 20014)

25–27. American **Crystallographic** Assoc., mtg., Georgia Inst. of Technology, Atlanta. (W. L. Kehl, Gulf Research and Development Co., P.O. Drawer 2038, Pittsburgh, Pa. 15230)

25–27. American **Mathematical** Soc., 73rd annual mtg., Houston, Tex. (The Society, P.O. Box 6248, Providence, R.I. 02904)

25–28. American **Group Psychotherapy** Assoc., New York, N.Y. (Mrs. M. Schiff, 1790 Broadway, New York 10019)

26–28. **Mathematical** Assoc. of America, 50th annual mtg., Houston, Tex. (H. L. Alder, Univ. of California, Davis)

28–30. **Radiology**, southern conf., Point Clear, Ala. (M. Eskridge, P.O. Box 4097, Mobile, Ala.)

28–1. American Acad. of **Allergy**, Phoenix, Ariz. (J. O. Kelley, 756 North Milwaukee St., Milwaukee, Wis. 53202)

29. **Mössbauer Effect Methodology**, 3rd annual symp., New York, N.Y. (P. A. McNulty, New England Nuclear Corp., 575 Albany St., Boston, Mass. 02118)

29–3. **Power**, mtg., Power Group, Inst. of Electrical and Electronics Engineers, New York, N.Y. (E. C. Day, IEEE, 345 E. 47 St., New York 10017)

30. American Soc. of **Heating, Refrigerating, and Air Conditioning Engineers**, semi-annual mtg., Detroit, Mich. (Miss J. I. Szabo, 345 E. 47 St., New York 10017)

30–1. **Personnel Radiation Dosimetry**, symp., Chicago, Ill. (J. H. Pingel, Argonne Natl. Laboratory, Bldg. 301, 9700 S. Cass Ave., Argonne, Ill. 60439)

30–2. American **Physical** Soc., annual mtg., New York, N.Y. (The Society, Executive Secretary, Columbia Univ., New York 10027)

30–2. American Assoc. of **Physics Teachers**, New York, N.Y. (A. B. Arons, Physics Dept., Amherst College, Amherst, Mass.)

30–3. **Zodiacal Light and the Interplanetary Medium**, intern. symp., Honolulu, Hawaii. (F. E. Roach, Aeronomy Lab., Inst. for Telecommunication Sciences and Aeronomy, Environmental Science Services Administration, Boulder, Colo. 80302)

31–2. Ciba Foundation symp. on **Cell Differentiation**, London, England. (Ciba, 41 Portland Pl., London W.1)

31–3. **Reinforced Plastics**, 22nd conf., Soc. of the Plastics Industry, Washington, D.C. (The Society, 250 Park Ave., New York 10017)

31–4. American College of **Radiology**, mtg., Los Angeles, Calif. (American College of Radiology, 20 N. Wacker Dr., Chicago, Ill.)

February

1–3. Southwestern Federation of **Geological** Soc., Hobbs, N.M. (American Assoc. of Petroleum Geologists, P.O. Box 979, Tulsa, Okla. 74101)

1–3. **Neural Regulation of Food and Water Intake**, conf., New York, N.Y. (P. J. Morgane, Communication Research Inst., 3430 Main Highway, Miami, Fla. 33133)

4–11. Pan American **Medical Women's Alliance**, 10th congr., Lima, Peru. (R. Quiroz B., Los Castanos 395, San Isidro, Lima)

5–6. American Soc. for **Testing and Materials**, natl. symp., Toronto, Ont., Canada. (ASTM, 1916 Race St., Philadelphia, Pa.)

5–10. American Soc. for **Testing and Materials**, winter mtg., Detroit, Mich. (ASTM, 1916 Race St., Philadelphia, Pa.)

6–7. **American Chemical Soc.**, 2nd Mid-Atlantic mtg., New York, N.Y. (S. M. Gerber, Ciba Co., Fairlawn, N.J. 07410)

6–8. **Flight Test, Simulation, and Support**, conf., Cocoa Beach, Fla. (Meetings Manager, American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

6–8. Society of **Rheology**, winter mtg., Santa Barbara, Calif. (M. C. Shen, North American Aviation Science Center, 1049

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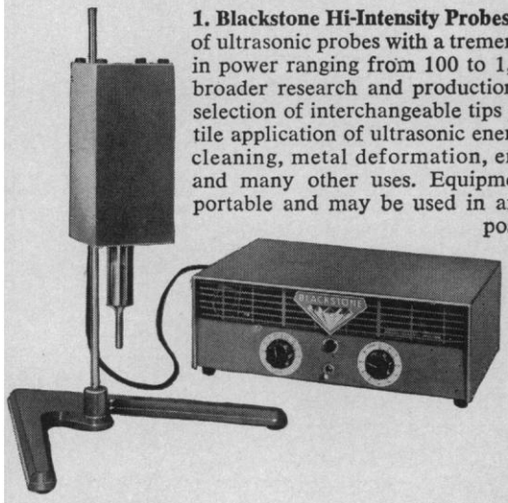

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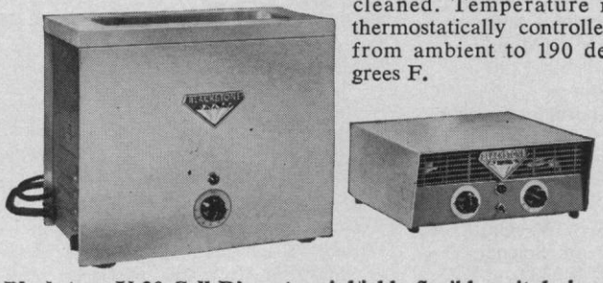

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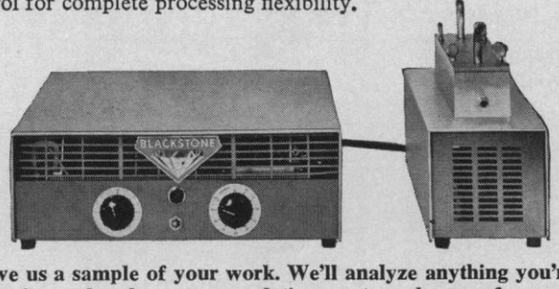

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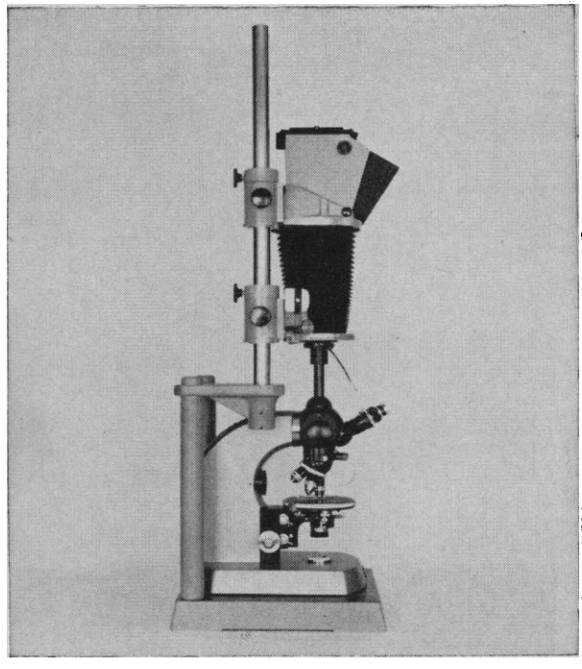

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7–8. **Sanitary Engineering,** 9th conf., Urbana, Ill. (J. H. Austin, 203 Engineering Hall, Univ. of Illinois, Urbana 61801)

7–9. Institute of **Electrical and Electronic Engineers,** winter conv., Los Angeles, Calif. (Office of Technical Activities Board, 345 E. 47 St., New York 10017)

8–10. Canadian Inst. of **Surveying,** annual mtg., Ottawa, Ont. (Secretary, 157 McLeod St., Ottawa)

13–17. Australia-New Zealand Conf. **Soil Mechanics and Engineering,** 5th mtg., Auckland, New Zealand. (P. W. Taylor, Conf. Secretary, P.O. Box 6422, Auckland)

14–19. **Triplet State,** symp., American Univ. of Beirut, Beirut, Lebanon. (A. B. Zahlan, American Univ. of Beirut)

15–16. **Electron Probe Microanalysis,** conf., London, England. (Institute of Physic and the Physical Soc., 47 Belgrave Sq., London, S.W.1)

15–17. **Solid-State Circuits,** intern. conf., Philadelphia, Pa. (V. I. Johannes, Room 3E-323, Bell Telephone Labs., Holmdel, N.J. 07733)

15–24. **Scientific and Technical Films,** 4th intern. festival, Brussels, Belgium. (Centre Universitaire du Film Scientifique, 50 Ave. F. D. Roosevelt, Brussels 5)

16–18. **American Educational Research** Assoc., New York, N.Y. (L. Walters, 1201 16 St., NW, Washington, D.C. 20036)

17–18. **Thyroid,** 3rd Midwest conf., Columbia, Mo. (Executive Director, Continuing Medical Education, M-176 Medical Center, Univ. of Missouri, Columbia 65201)

18–22. American Acad. of **Allergy.** 23rd annual mtg., Palm Springs, Calif. (Executive Secretary, 756 N. Milwaukee St., Milwaukee, Wis. 53202)

19–23. American Inst. of **Mining, Metallurgical and Petroleum Engineers,** annual mtg., Los Angeles, Calif. (Executive Secretary, 345 E. 47 St., New York 10017)

19–25. **Biochemistry,** Chemical Inst. of Canada, conf., Ste. Marguerite, P. Q. (General Manager, 48 Rideau St., Ottawa 2, Ont.)

20–25. American Acad. of **Forensic Sciences,** mtg., Honolulu, Hawaii. (S. R. Gerber, 2153 Adelbert Rd., Cleveland, Ohio 44106)

21–24. **Offshore Exploration,** conf., Long Beach, Calif. (M. Richardson, Box 88, 2516 Via Tejon, Palos Verdes Estates, Calif. 90274)

22–24. **Biophysical** Soc., 11th annual mtg., Houston, Tex. (A. Cole, M.D., Anderson Hospital, Univ. of Texas, Houston 77025)

23–25. American **Physical** Soc., mtg., Austin, Tex. (K. K. Darrow, American Physical Soc., Columbia Univ., New York 10027)

26. **Psychoanalysis,** 5th annual conf., New York, N.Y. (D. M. Kaplan, 175 W. 12 St., New York 10011)

26–2. International **Anesthesia Research** Soc., 41st congr., Bal Harbour, Fla. (Executive Secretary, 227 Wade Park Manor, Cleveland, Ohio 44106)

27. **Thermoanalysis,** Chemical Inst. of Canada, symp., Toronto, Ont. (H. G. McAdie, Ontario Research Foundation, Toronto, Ont.)

NEW BOOKS

(Continued from page 1441)

Brain Physiology and Psychology. C. R. Evans and A. D. J. Robertson, Eds. Univ. of California Press, Berkeley, 1966. 288 pp. Illus. Paper, $5. Fifteen papers.

Calculus and Analytic Geometry. Jack R. Britton, R. Ben Kriegh, and Leon W. Rutland. Freeman, San Francisco, 1966. 1083 pp. Illus. $12.50.

The Cause of Behavior II: Readings in Child Development and Educational Psychology. Judy F. Rosenblith and Wesley Allinsmith, Eds. Allyn and Bacon, Boston, ed. 2, 1966. 624 pp. Illus. Paper, $6.50.

Central Asians under Russian Rule: A Study in Culture Change. Elizabeth E. Bacon. Cornell Univ. Press, Ithaca, N.Y., 1966. 291 pp. Illus. $6.50.

Challenge to Science: The UFO Enigma. Jacques Vallee and Janine Vallee. Regnery, Chicago, 1966. 286 pp. Illus. $5.95.

Characteristics and Limitations of Transistors. Richard D. Thornton, David DeWitt, Paul E. Gray, and E. R. Chenette. Wiley, New York, 1966. 194 pp. Illus. Paper, $2.65; cloth, $4.50. Semiconductor Electronics Education Committee, vol. 4.

Chemical Engineering in Medicine. Edward F. Leonard, Ed. American Inst. of Chemical Engineers, New York, 1966. 157 pp. Illus. Paper. There are 13 papers given at symposia held in 1964 and 1965.

Chemistry of the Earth's Crust. vol. 1. Proceedings of the Geochemical Conference commemorating the centenary of V. I. Vernadskii's birth. Translated from the Russian edition (Moscow, 1963) by N. Kaner. R. Amoils, Translation Ed. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1966. 464 pp. Illus. $17.75. Twenty-nine papers.

The Chromosome: Structural and Functional Aspects. A symposium (Miami), June 1965. Clyde J. Dawe, Ed. Tissue Culture Assoc., Durham, N.C., 1966. 123 pp. Illus. $6. Eight papers.

The College Dropout and the Utilization of Talent. Lawrence A. Pervin, Louis E. Reik, and Willard Dalrymple, Eds. Princeton Univ. Press, Princeton, N.J., 1966. 268 pp. Illus. $6.50. Eleven papers.

The Condensed Chemical Dictionary. Arthur Rose and Elizabeth Rose. Reinhold, New York, ed. 7, 1966. 1066 pp. $17.50.

Culture and Ethnology. Robert H. Lowie. Basic Books, New York, 1966. 203 pp. Paper, $2.45; cloth, $5.95. Classics in Anthropology.

Decision and Control: The Meaning of Operational Research and Management Cybernetics. Stafford Beer. Wiley, New York, 1966. 568 pp. Illus. $13.50.

Deep Challenge. Harris B. Stewart, Jr. Van Nostrand, Princeton, N.J., 1966. 218 pp. Illus. $5.95.

Determining Forces in Collective Wage Bargaining. Harold M. Levinson. Wiley, New York, 1966. 295 pp. $8.95.

Development in Flowering Plants. John G. Torrey. Macmillan, New York, 1966. 192 pp. Illus. Paper, $1.95. Current Concepts in Biology Series.

The Development of High-Energy Accelerators. M. Stanley Livingston, Ed. Dover, New York, 1966. 331 pp. Illus.

Paper, $2.50. Classics of Science Series, vol. 3. Twenty-eight papers.

Directory of the International Association for Plant Physiology. International Assoc. for Plant Physiology, New Haven, Conn., 1966 (available from A. W. Galston, Yale Univ., New Haven, Conn.). 151 pp. Paper, $1. Contains a list of all members in the Association's 15 constituent national organizations.

Divisiveness and Social Conflict: An Anthropological Approach. Alan R. Beals and Bernard J. Siegel. Stanford Univ. Press, Stanford, Calif., 1966. 199 pp. $6.

Drug Adulteration: Detection and Control in Nineteenth-Century Britain. Ernst W. Stieb. Univ. of Wisconsin Press, Madison, 1966. 351 pp. Illus. $7.50.

Economic Behavior of the Affluent. Robin Barlow, Harvey E. Brazer, and James N. Morgan. Brookings Institution, Washington, D.C., 1966. 299 pp. Illus. $6.75.

Educated American Women: Self-Portraits. Eli Ginzberg and Alice M. Yohalem. Columbia Univ. Press, New York, 1966. 212 pp. $5.95.

Electrical Machine Theory. Morris Jevons. Elsevier, New York, 1966. 383 pp. Illus. $15.75.

Electron Microscopy. A handbook for biologists. E. H. Mercer and M. S. C. Birbeck. Davis, Philadelphia, ed. 2, 1966. 112 pp. Illus. $2.50.

Elementary Practical Organic Chemistry. pt. 2, *Qualitative Organic Analysis.* Arthur I. Vogel. Wiley, New York, ed. 2, 1966. 447 pp. Illus. $5.75.

Experimental Primary Myopathies and Their Relationship to Human Muscle Diseases (*Ann. N.Y. Acad. Sci.* **138**). Edward M. Weyer, Ed. New York Acad. of Sciences, New York, 1966. 366 pp. Illus. Paper, $10. Twenty-three papers given at a conference in November 1965.

Explorations in Typing Psychotics. Maurice Lorr, Ed. Pergamon, New York, 1966. 249 pp. Illus. $9.25. Nine papers.

Fluidics. Eugene F. Humphrey and Dave H. Tarumoto, Eds. Fluid Amplifier Associates, Boston, Mass., 1965. 284 pp. Illus. $28.

Foundations of Immunochemistry. Eugene D. Day. Williams and Wilkins, Baltimore, 1966. 223 pp. Illus. $8.50.

Foundations of Physical Science. William Ramsey, Clifford R. Phillips, Jr., and Frank M. Watenpaugh. Holt, Rinehart, and Winston, New York, 1966. 410 pp. Illus. $6.08.

Franklin and Newton: An Inquiry into Speculative Newtonian Experimental Science and Franklin's Work in Electricity as an Example Thereof. I. Bernard Cohen. Published for the American Philosophical Society. Harvard Univ. Press, Cambridge, Mass., 1966. 683 pp. $6.

Frontiers in Food Research, Proceedings (Ithaca, N.Y.), April 1966. Cornell Univ. Graduate Field of Food Science and Technology, Ithaca, N.Y., 1966 (available from W. F. Shipe, Stocking Hall, Cornell Univ., Ithaca, N.Y. 14850). 144 pp. Illus. Paper, $4. Fourteen papers.

Gastrin. Proceedings of a conference, September 1964, sponsored by the School of Medicine, Univ. of California, Los Angeles. Morton I. Grossman, Ed. Univ. of California Press, Berkeley, 1966. 363 pp.

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