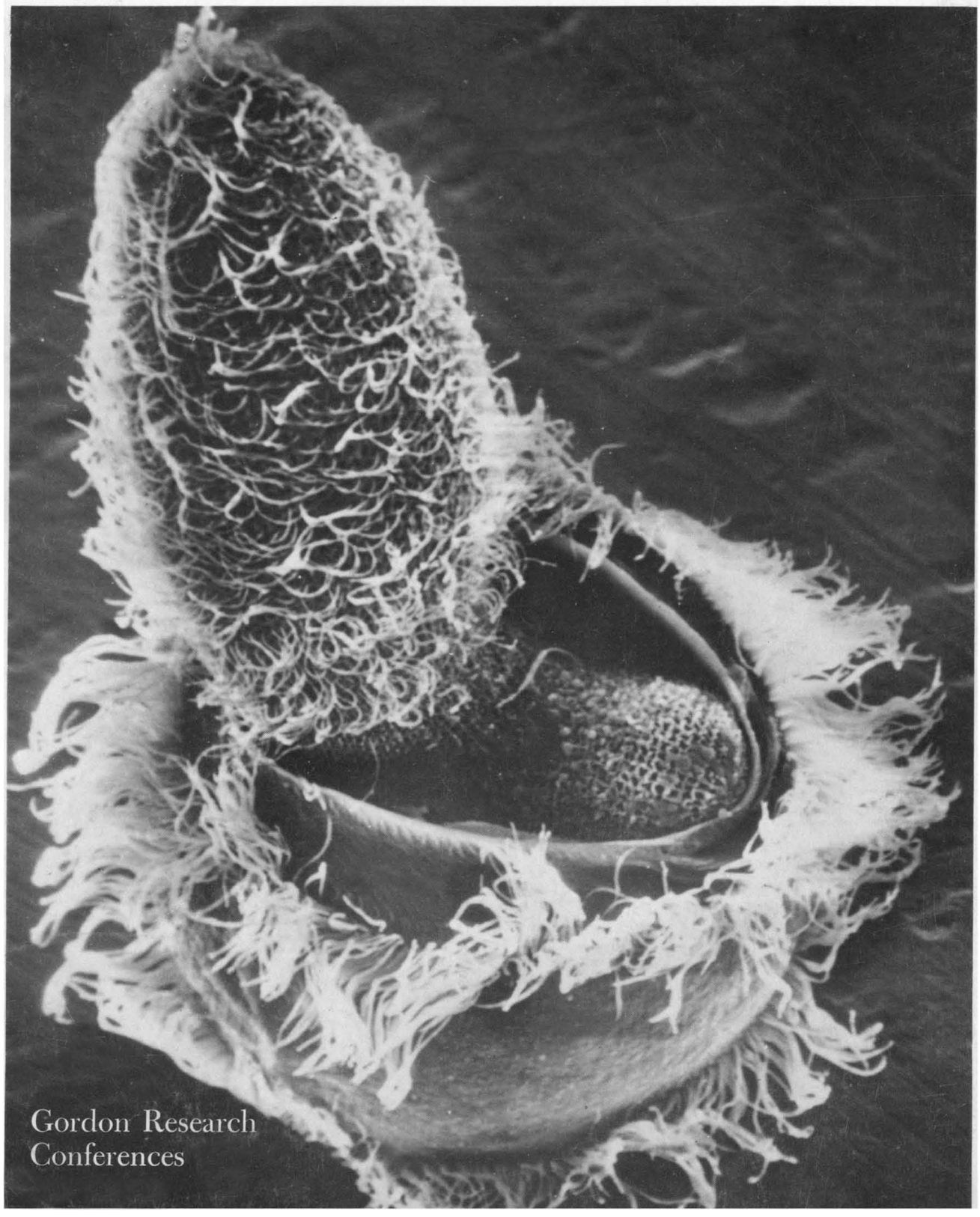
SCIENCE

7 March 1969
Vol. 163, No. 3871

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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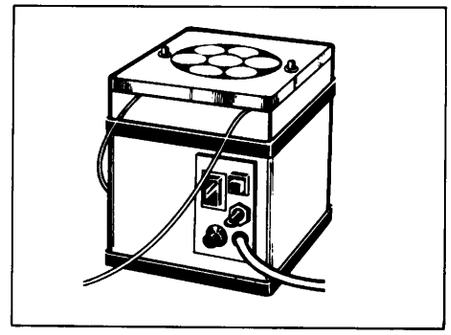

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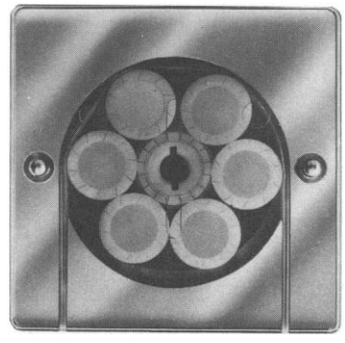

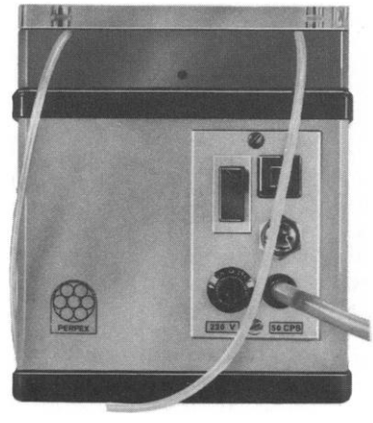

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SCIENCE

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COVER

Ciliate (*Didinium nasutum*) with partially ingested prey ciliate (*Paramecium multimicronucleatum*). Structural details of the specimen were preserved in a sequential series of chemical fixation, quick freeze, freeze dry sublimation, and gold-palladium evaporative coating. (About × 1500). See page 1064. [E. B. Small and D. S. Marszalek, University of Illinois, Urbana]

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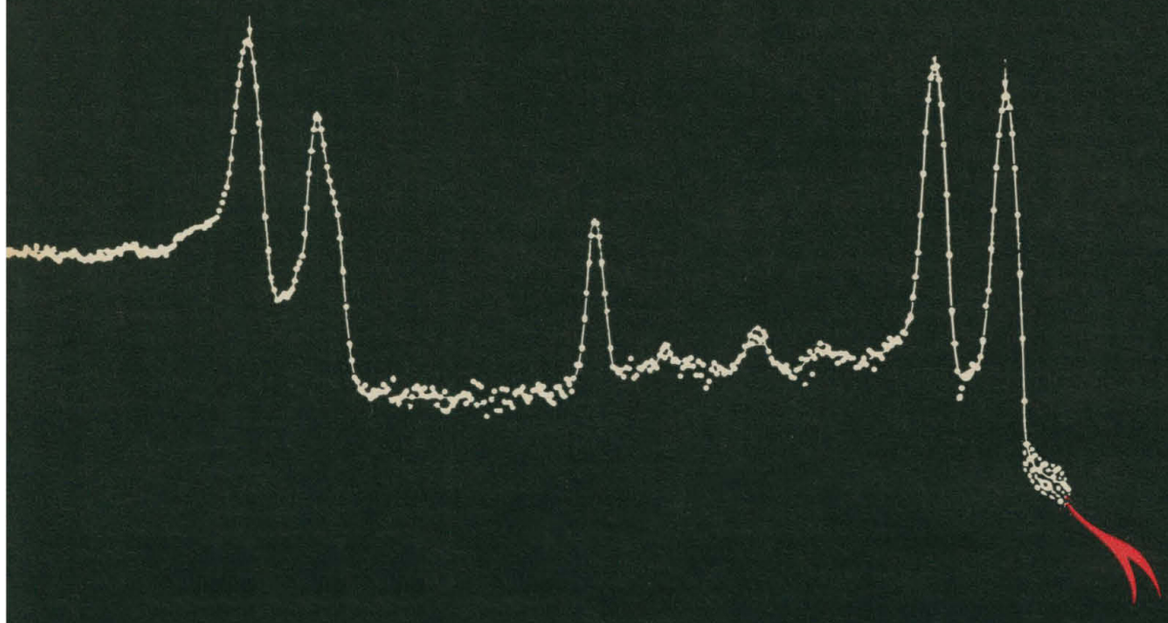

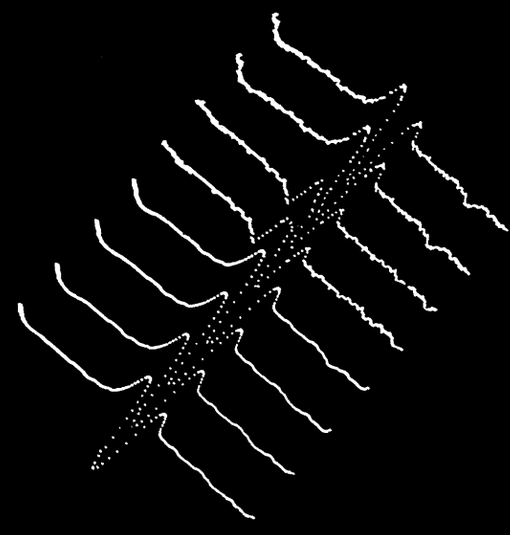

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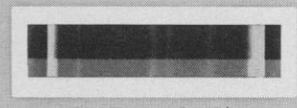

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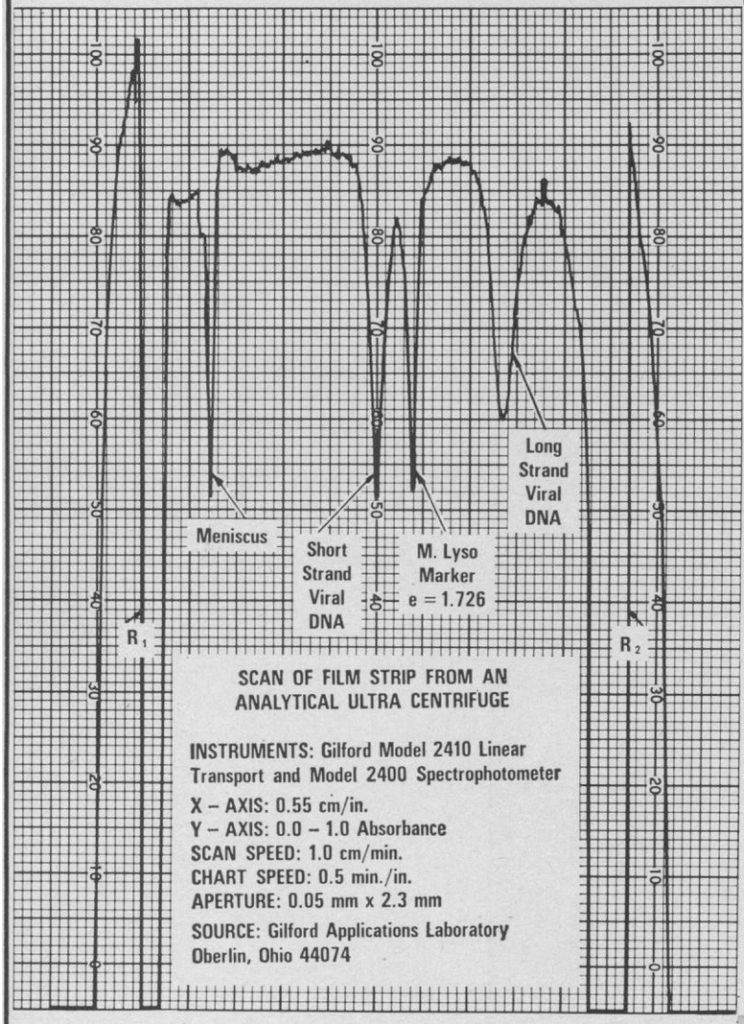

SCAN OF FILM STRIP FROM AN ANALYTICAL ULTRA CENTRIFUGE

INSTRUMENTS: Gilford Model 2410 Linear Transport and Model 2400 Spectrophotometer
X – AXIS: 0.55 cm/in.
Y – AXIS: 0.0 – 1.0 Absorbance
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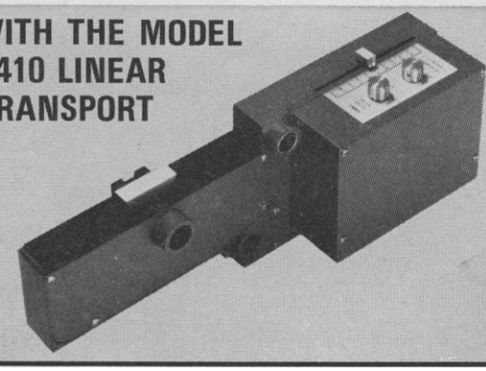

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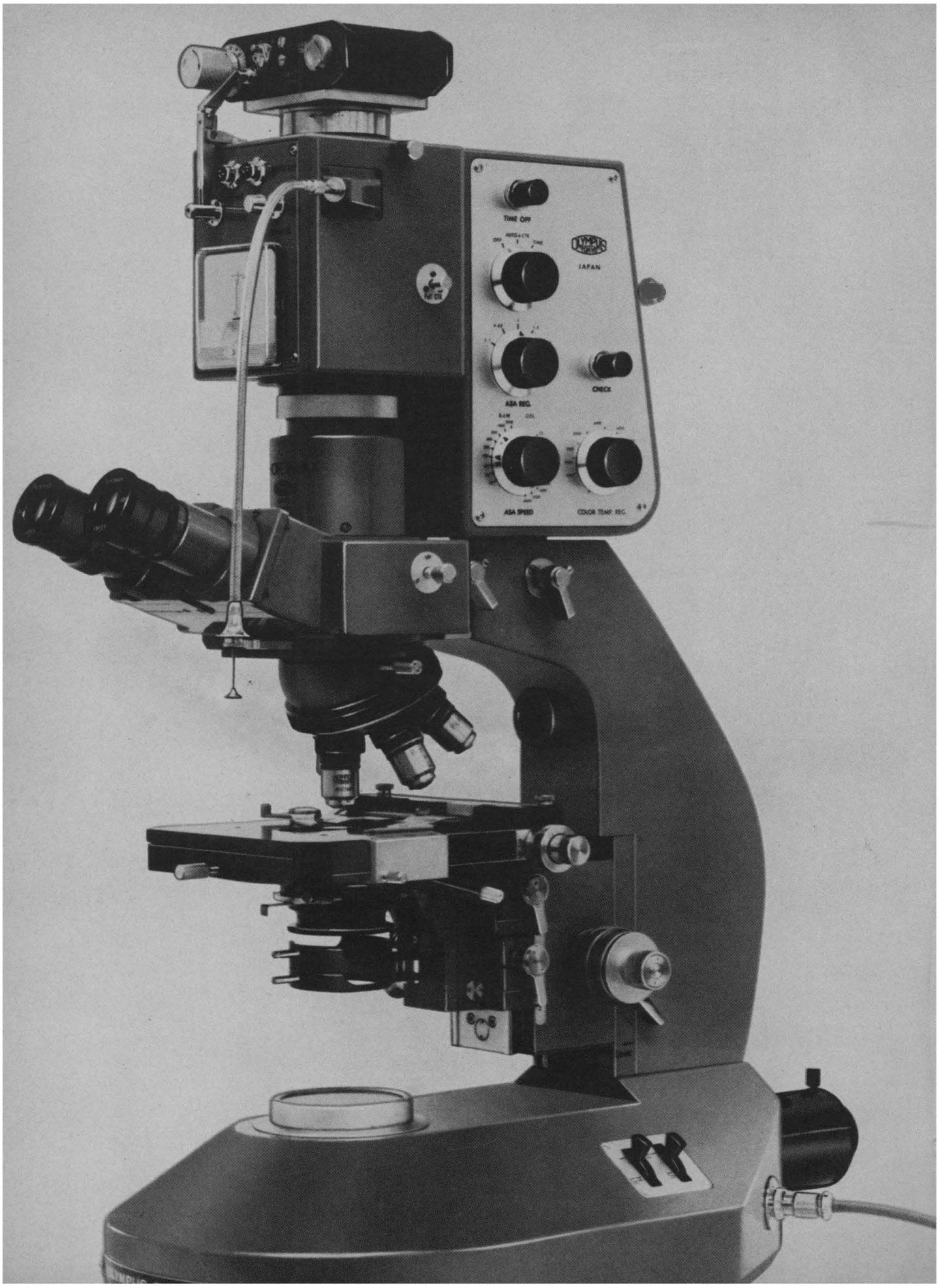
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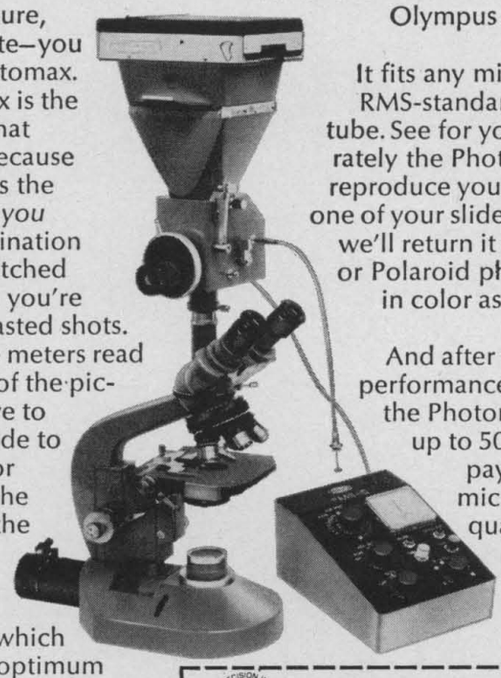

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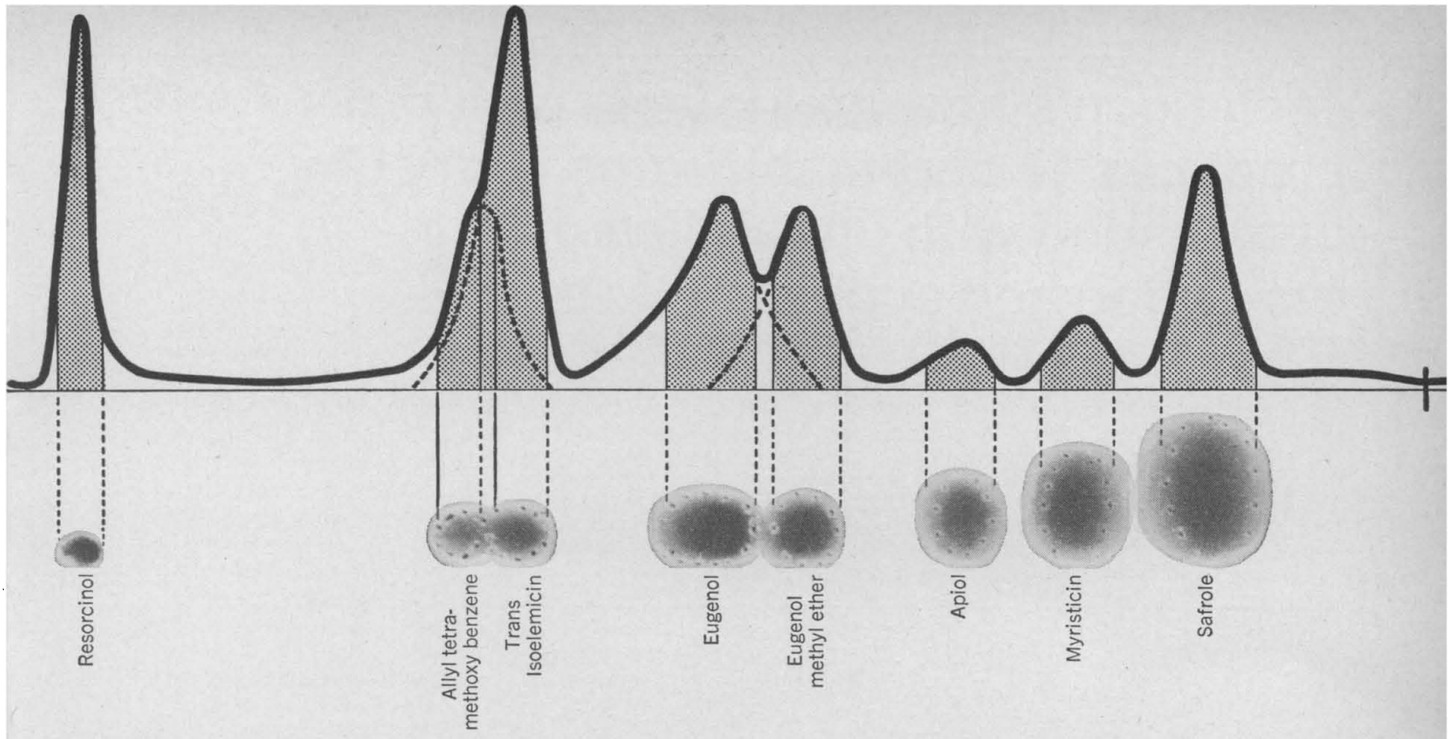

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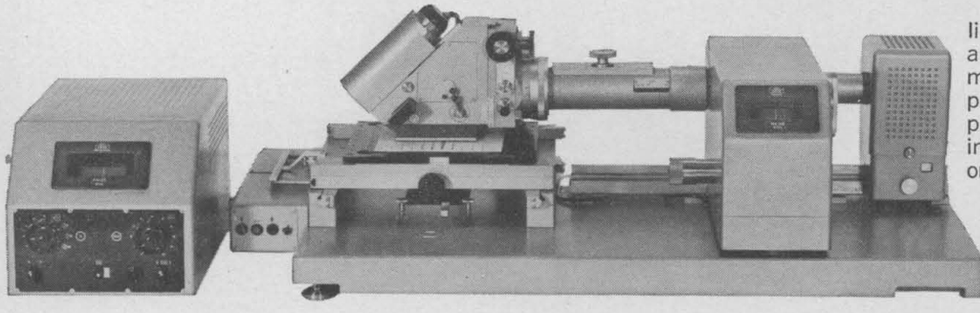

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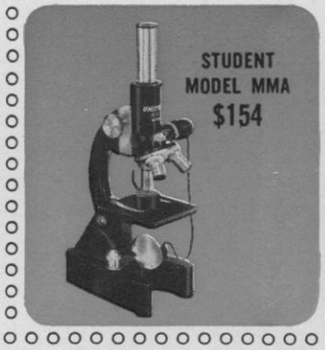

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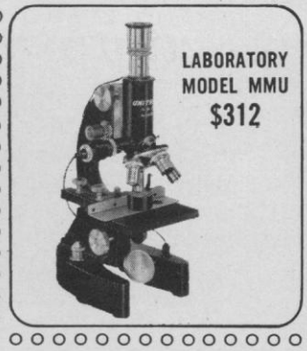

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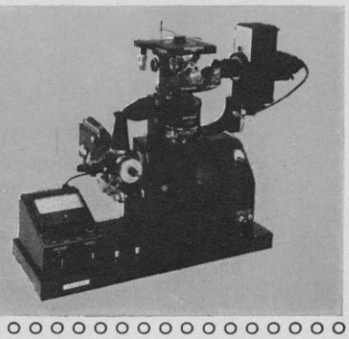

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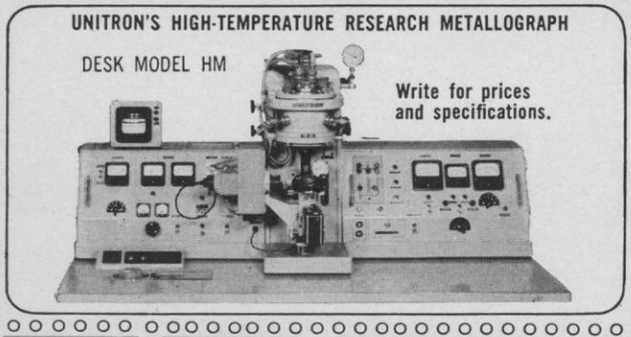

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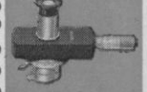

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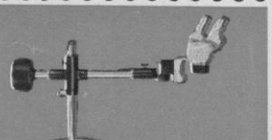

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A salesman's demonstration gives you only about 30 minutes to examine a microscope . . . hardly the best conditions for a critical appraisal. But UNITRON's Free 10 Day Trial allows you to evaluate the microscope in your own lab, and prove its value to you, in your own work, before you decide to purchase.

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The UNITRON catalog is your buying guide to a complete line of microscopes and accessories for every application. Write for your copy and see why UNITRON Microscopes have The Metallurgists' **Stamp of Approval.**

☐ Please send UNITRON's Microscope Catalog No. F-4
☐ I want a FREE, no-obligation, trial of Model . . .

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MASS. 02161

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Are you using photography for recording *quantitative data?* Should you?
The Joyce, Loebl Double-Beam Automatic Recording Microdensitometer Mark IIICS provides a quick, easy, reliable way to get a lot more out of film than just a picture. Whereas your eye tells you one spot is relatively "bright", the Microdensitometer tells you exactly how bright, and how much brighter one spot is than another.
It scans a negative or positive along straight or circular lines, accurately measuring and recording optical density throughout the scan . . . prints out graphs of density vs. position on the specimen. Information about brightness, physical density, thickness, temperature, or *any* phenomena that you can record as a variation of photographic density can now be measured and recorded. The reliable double-beam, null balance design makes the Joyce, Loebl Microdensitometer unusually stable and repetitive. It is clearly established as the leading instrument of its kind, for such diverse applications as measuring mountains on the moon — radiography — cell research — high resolution mass spectrography — X-ray diffraction and U.V. absorption studies — air reconnaissance and meteorology. It's available with many helpful accessories including computer interface equipment. **Better than ever through Tech/Ops national sales and service organization.**
To find out exactly what these remarkable measuring tools can do for you, write to Joyce, Loebl & Co., Inc., an affiliate of Technical Operations, Incorporated, Department K-3, Bldg. 3, South Avenue, Burlington, Mass. 01803.

tech/ops®

The Joyce, Loebl Double-Beam Microdensitometer

...for recording a wide range of increments of optical density in film

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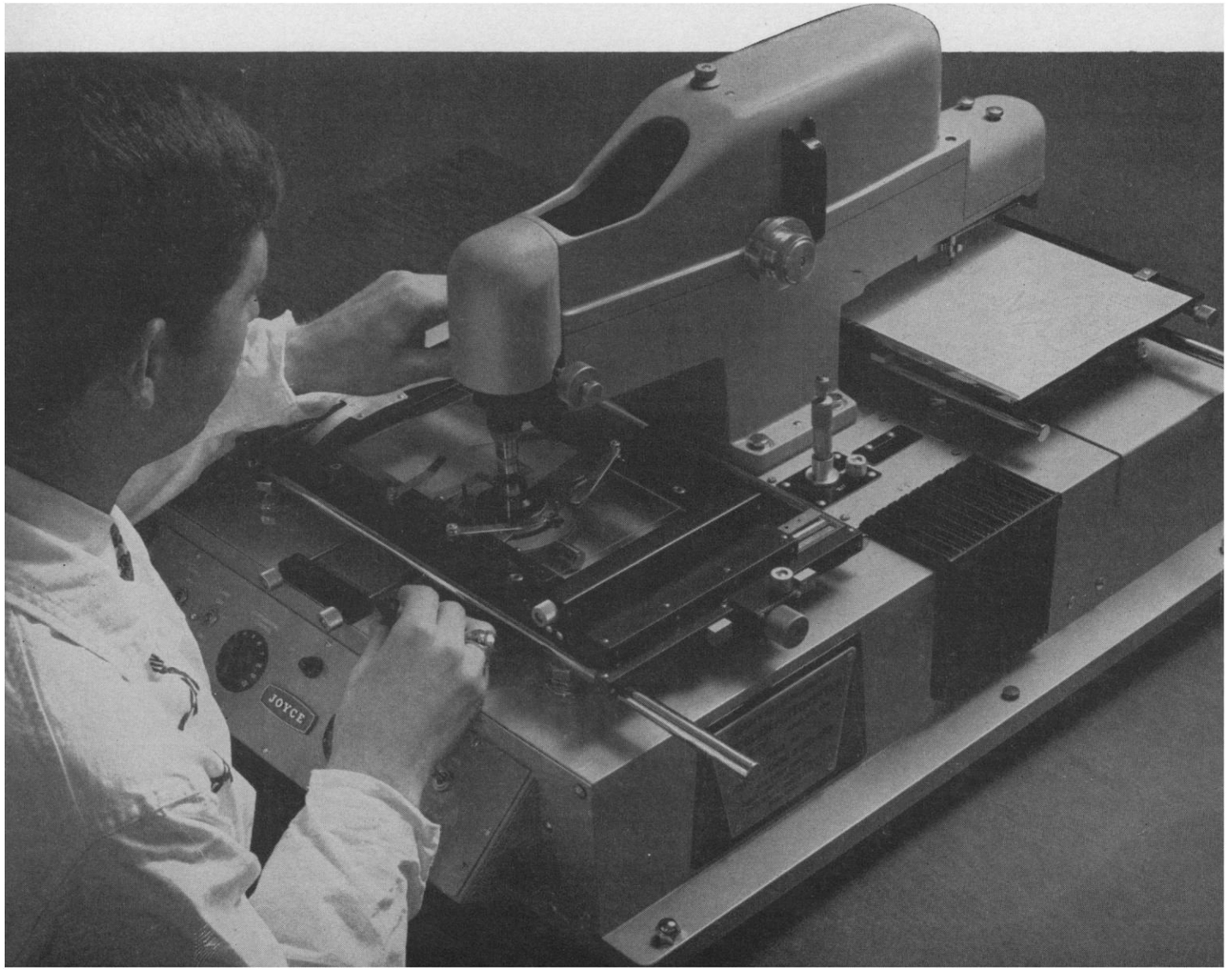

Readers' Service Card 7 March 1969 (Expires 7 June 1969)

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169	170	171	172	173	174	175	176	177	178	179	180

For more information about ads in this issue, circle Key No. and return above card.

new Sepharose®

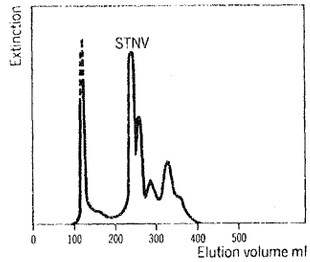
Extends gel filtration separation and fractionation of high molecular weight substances: viruses, nucleic acids, proteins, polysaccharides

The new "bead form" of agarose — Sepharose — now extends the gel filtration method to the separation and fractionation of molecules with molecular weights in the millions. Sepharose is prepared in the "bead form" from agarose, the neutral portion of agar. By altering the concentration of agarose during preparation, Sepharose gels with different fractionation ranges are produced. Sepharose gels complement the present series of Sephadex® gels, and together they extend the limits of the gel filtration method for the fractionation of molecules with molecular weights ranging from essentially zero to approximately 25 million.

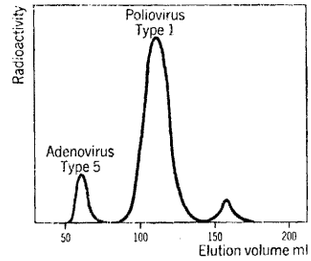
SEPHAROSE

Sepharose Type	Particle Size Microns	Percent Agarose	Fractionation Range
2B	60-250	2	$2x10^6$ to $25x10^6$*
4B	40-190	4	$3x10^5$ to $3x10^6$*

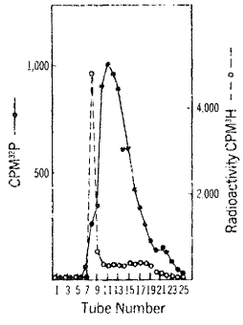
*Determined with polysaccharides.



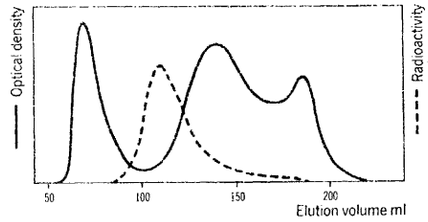
Chromatography of a crude preparation of satellite tobacco necrosis virus on Sepharose 4B.



Separation of ^{32}P-labeled adenovirus and poliovirus on Sepharose 2B.



Separation of the replicative RNA intermediate (first peak) synthesized in RNA phage-infected cells from single stranded cellular RNA (second peak) on Sepharose 4B. Erikson and Gordon, Biochem. Biophys. Res. Commun. 23 (1966) 422-428.



Separation of a mixture of KB-cell nucleic acids and ^{32}P-labeled poliovirus RNA on Sepharose 2B. The first peak contains KB-cell DNA, followed by poliovirus RNA, KB-cell r-RNA and KB-cell s-RNA.

For additional technical information on SEPHAROSE, write to

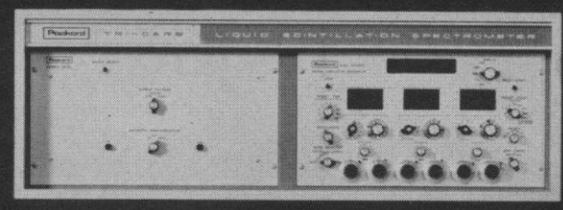
PHARMACIA FINE CHEMICALS INC.
800 Centennial Avenue, Piscataway, N. J. 08854
Pharmacia (Canada) Ltd., 110 Place Crémazie, Suite 412, Montreal 11, P. Q.

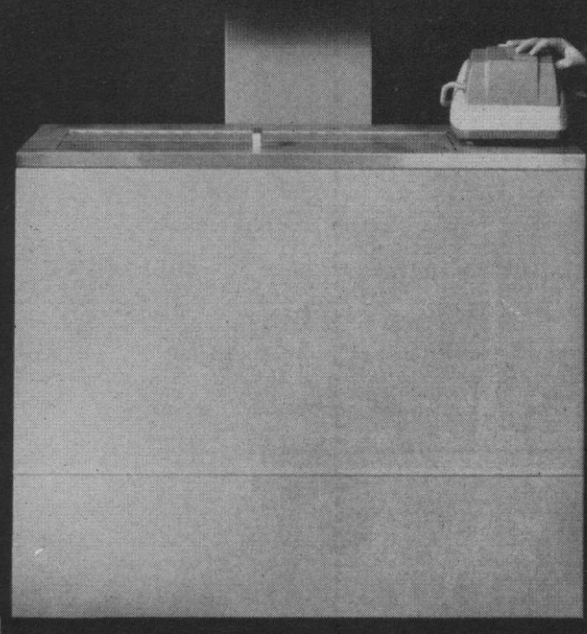
(Inquiries outside U.S.A. and Canada should be directed to PHARMACIA FINE CHEMICALS, Uppsala, Sweden.)

Circle No. 60 on Readers' Service Card

Don't let its features fool you-

this liquid Scintillation Spectrometer is low-priced

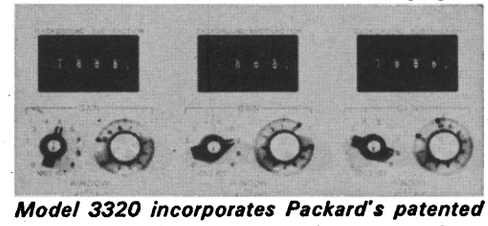




Packard

The Model 3320 Tri-Carb® Spectrometer is loaded with the kind of features you'd expect in the most expensive instruments. Yet it's priced among the lowest. When you examine its capabilities, you'll find features like three simultaneous channels of analysis, controlled and ambient temperature operation (you select the method you want), automatic external standardization that works with *all* degrees of quenching and *all* types of quenching agents, outstanding counting performance and 200-sample capacity. It has built-in capabilities for gamma counting and continuous flow analysis, which together with the optional data processing capability let you upgrade it to meet virtually all your future needs. For more details call your Packard Sales Engineer or write for Bulletin 1057U to Packard Instrument Company, Inc., 2200 Warrenville Road, Downers Grove, Illinois 60515 or Packard Instrument International S.A., Talstrasse 39, 8001 Zurich, Switzerland.

THREE INDEPENDENT CHANNELS OF ANALYSIS



Model 3320 incorporates Packard's patented arrangement of three completely separate channels of pulse-height analysis, each with precisely adjustable linear amplification and continuously variable discrimination levels. You count each sample only once, and collect data in all three channels simultaneously.

Packard offers stimulating career opportunities for scientific and technical personnel. We are an equal opportunity employer.

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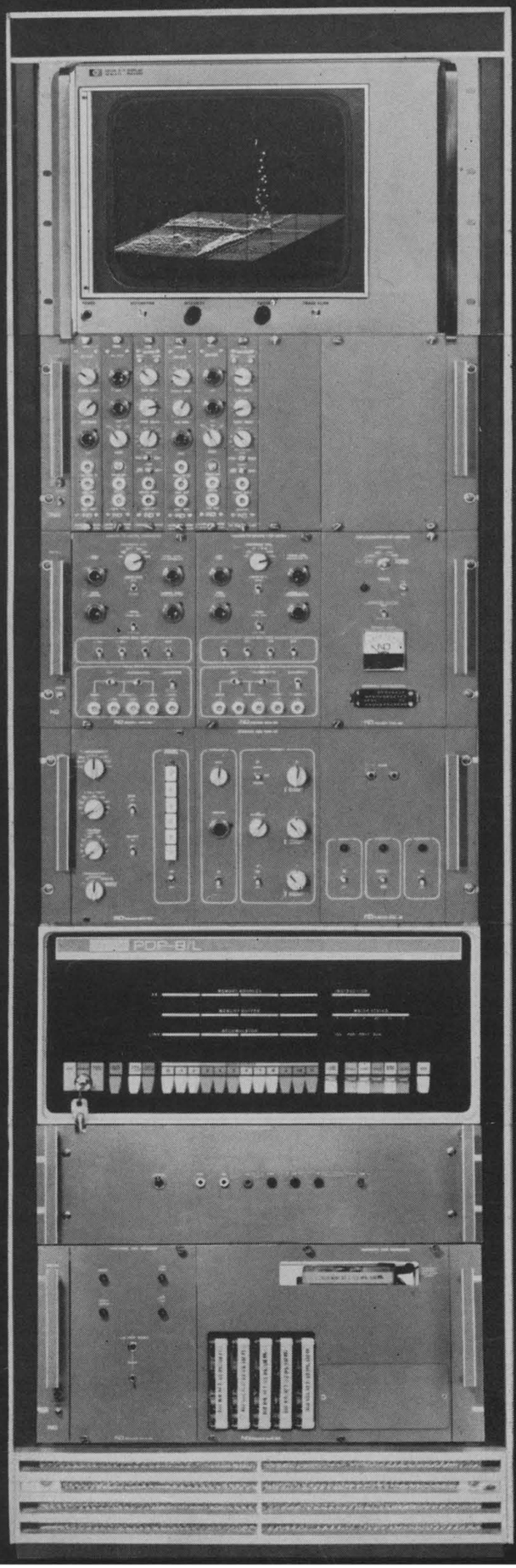

The 50/50 System

The all new integrated 50/50 system uniquely blends software and hardware. Memory includes 12,288 words. Data processing on line or off. Hard wired flickerless display provides heretofore unobtainable display flexibility. A comprehensive software package offers unsurpassed data manipulation and processing capabilities. Call it Fifty-fifty. We do.

NUCLEAR DATA INC

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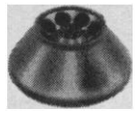
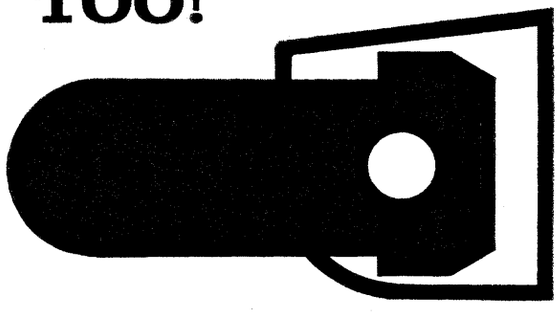
NUCLEAR DATA GMBH, FRANKFURT, GERMANY

SORVALL knows all the centrifuge angles...

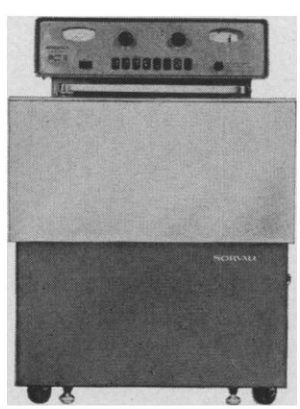


...AND THE HORIZONTALS, TOO!

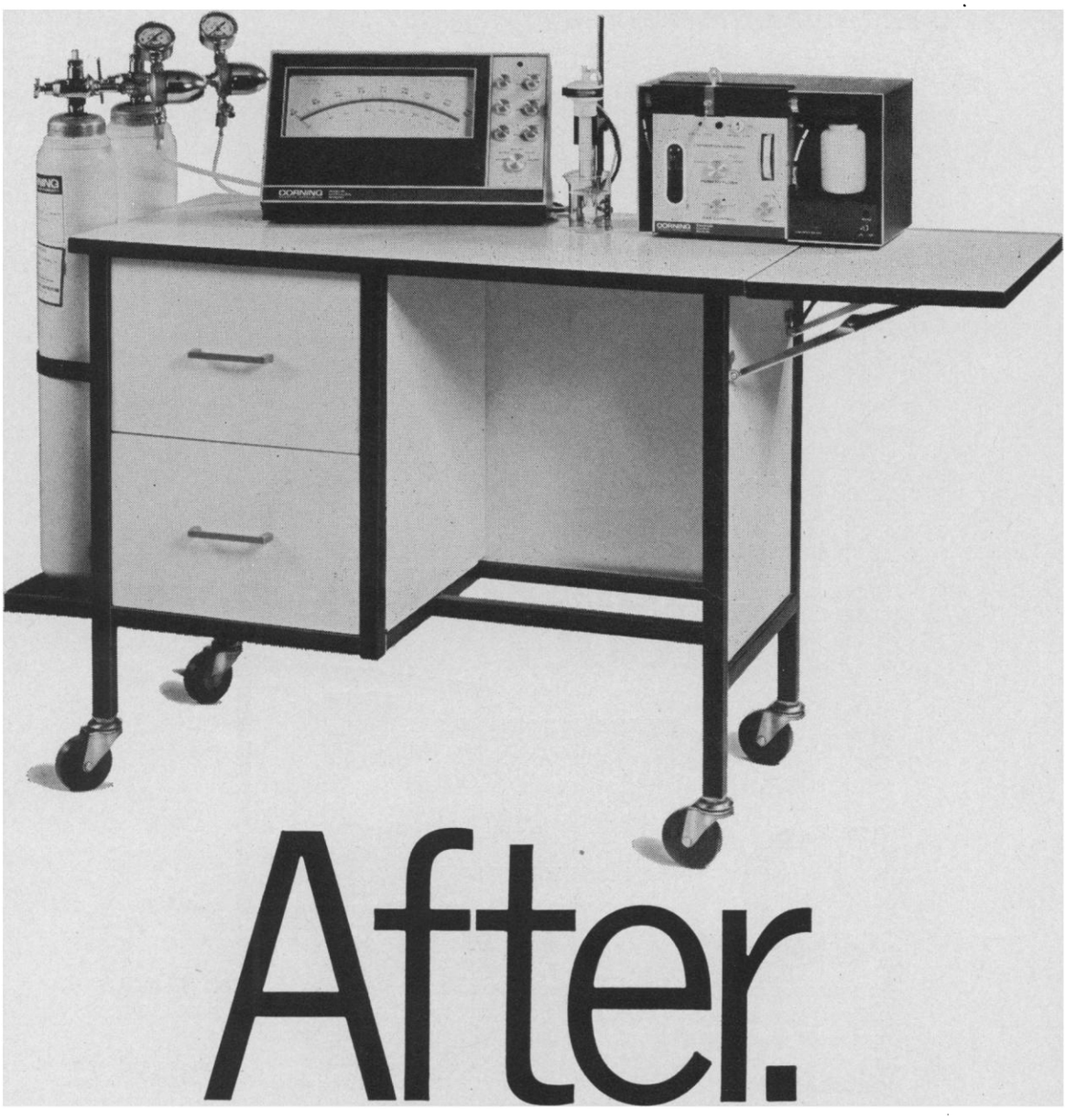


Whether you centrifuge at superspeeds with an Angle Rotor (up to 49,500 x G — 48,200 x G with standard 8 x 50 ml Angle Rotor), or at lower speeds with a Horizontal Rotor, we can meet your requirements. Take our HB-4 Rotor, for instance. Of Titanium alloy and aluminum construction, the HB-4 offers four 50 ml buckets, and accepts most of the tubes and adapters normally used with our standard 8 x 50 ml Angle Rotor. And you can use a lot of other SORVALL Rotors in both refrigerated and non-refrigerated SORVALL Centrifuges. It's a fact — we offer more versatility and reliability where it counts — in performance — than any other manufacturer. You know this if you have a SORVALL Centrifuge. If you don't, you owe it to your lab work to get one. The instrument illustrated is our well-known RC2-B Automatic Superspeed Refrigerated model. Literature? Just write: Ivan Sorvall, Inc., Norwalk, Connecticut, 06852.

SORVALL®



For additional information ask for Bulletin SC-3/ARC-2



The new CORNING® Model 16 pH, Pco_2, Po_2 System does the same things as before. Only better.

Like that small German car, you have to operate it to appreciate all the improvements, to find all the ways we've made it better.

Better calibration time.
A new, single-unit bubble chamber gives you faster equilibration time of your calibrating gases.

Better aspiration.
Now there's a switch that automatically turns on the pump only when it's needed. There's no overheating or loss of vacuum when cleaning the sample chamber.

Better sampling.
For standard samples, a new spill tray keeps the module's face clean. For the small ones, a new micro-capillary adapter simply plugs into the sample chamber entrance for greater speed.

Better membrane check.
A new locking disc prevents accidental polarization of electrodes.

Better protection.
A new relief valve prevents blowout if sample is introduced in start position.

Better electrodes.
There's now a non-stick Teflon* strip in the tubing of the Model R blood pH electrode to make aspiration smooth and sure. The Po_2 membrane is now polypropylene, so no spacer is needed; speeds up setup and calibration time. The Pco_2 electrode is a new design that adds stability, cuts drift.

Better see it for yourself.
There are a lot more advances in the new Model 16. Send the coupon for full details, and see the real thing by asking for a free demonstration. The only thing we can't show you is a "before" unit. They've all been replaced with "afters." On us. That's part of the Corning promise.

*Teflon is a Du Pont trademark

Before these improvements and advances, the CORNING® Model 16 System was already the best way to measure blood pH. And Pco_2. And Po_2. Simply, quickly.

There's no water bath mess or delay. The Model 16 controls temperature electronically.

As little as a 150 lambda sample is enough to measure all three parameters.

Sample is at temperature inside 15 seconds. And held there, automatically. Within 0.01°C. of your setting between 36°C. and 38°C.

An automatic aspiration service draws samples into the pH electrode and the Pco_2 and Po_2 chamber. It also flushes them clean, cutting down the time between tests.

Our special control valve lets you switch instantly from one calibrating gas to another.

The solid-state meter has a full 10" scale. Reads easily to 0.005 pH (pH 6.6 through 8.2) and to 0.5 mmg on the Pco_2 and Po_2 scales.

Before, the CORNING Model 16 was the best blood pH system available. Then, we improved it. Send the coupon for all the data.

Corning Glass Works
Laboratory Products Dept. SC-3
Medfield, Mass. 02052

- ☐ Please send information on the new Corning Model 16 Blood pH System.
- ☐ Please call to arrange a demonstration.

Name

Title

Firm Address

City, State, Zip Telephone

CORNING
SCIENTIFIC INSTRUMENTS

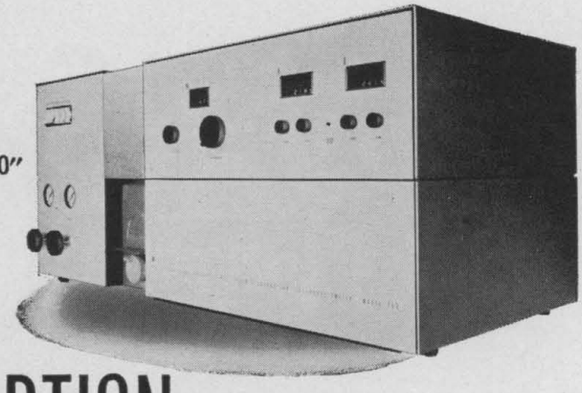
THIS IS A LIST OF OPTIONS YOU WON'T NEED (THEY'RE BUILT-IN)

*Dual channel — double beam
Digital concentration readout (2)
True mathematical integrator
Recorder and computer outputs
*Push-button automatic zero control
*Servo-automatic recalibration
*Reads 2 elements simultaneously, or
Read one element w/internal standard
Push-button fail-safe flame ignition
Gas control system (3 gases)
*Push-button fail-safe N_2O conversion
*Gas and flame safety monitor
*Simplified hollow cathode zone balance (2)
Six tube hollow cathode turret
*Preset independent hollow cathode current
Curved slits on monochromator
Constant head drain system
Flame emission capability
*All solid-state modular electronics
Stabilized voltage regulation
*External electronic test circuit
Single, integrated package — 18″ x 40″ x 20″

*Exclusive features

THIS IS A LIST OF OPTIONS YOU CAN ORDER SEPARATELY

Nitrous oxide burner
Total consumption burner
UV-Vis spectrophotometer attachment
Recorder (if needed)



ATOMIC ABSORPTION WITH THE OPTIONAL EXTRAS LEFT IN!

Add up the "optional extras" that are really necessary for safe, easy, dependable and precise analysis by atomic absorption. Then write for further information about the Model 153.

Instrument Leasing Program details upon request.

INSTRUMENTATION LABORATORY INC. 113 HARTWELL AVE. LEXINGTON, MASS. 02173

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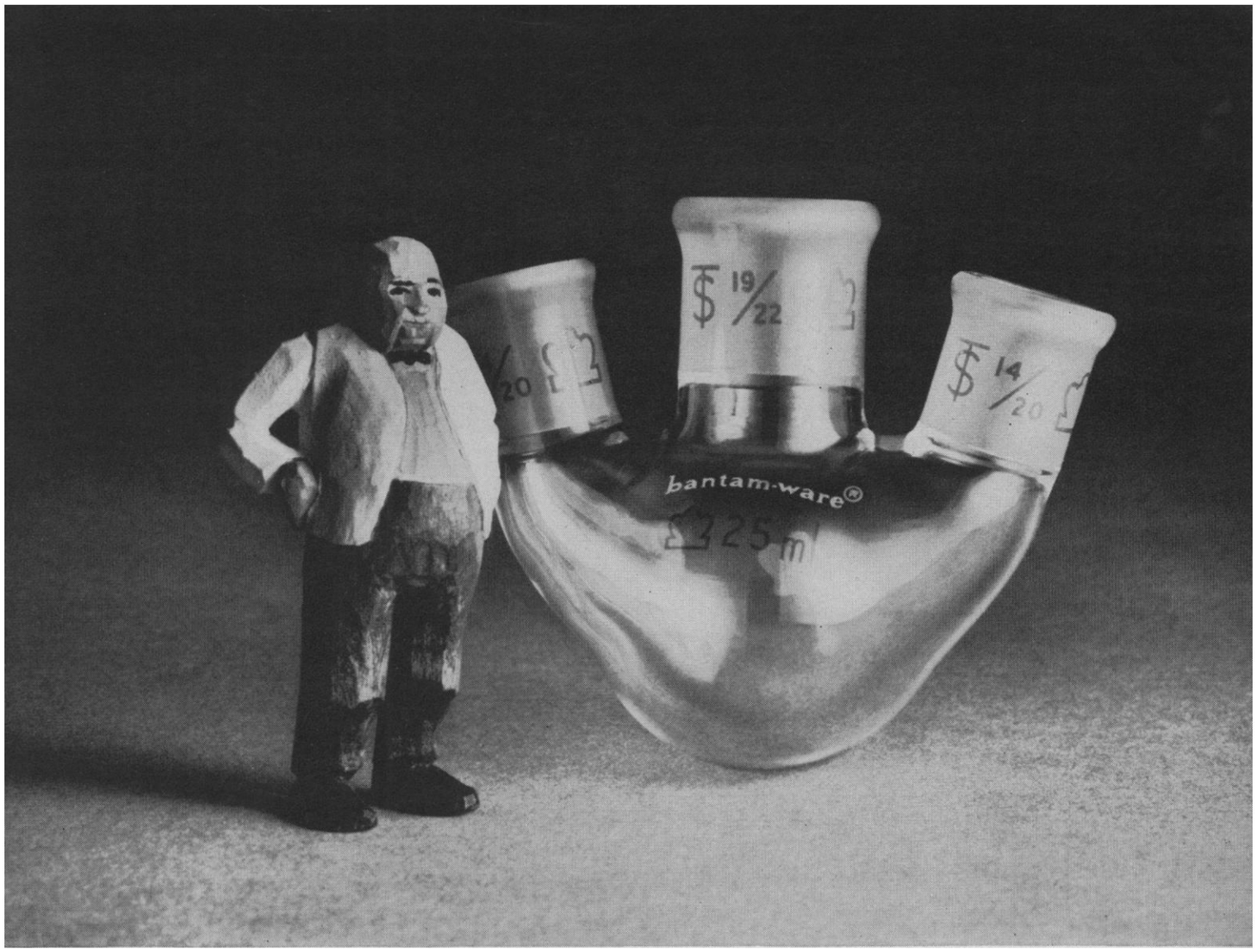

Our man in Lilliput

Once upon a time in Lilliput* there lived a man skilled in organic chemistry. But he had problems with glassware—not all small ones (unfortunately).

Such problems as the waste of large amounts of solutions; ground joints that leaked minutely under vacuum; product hold-up; breakage and awkward design. (The height of chromatographic columns gave him nosebleeds, and he had to bicycle from boiling flask to recovery flask on a large scale distillation set-up).

Then one day, he was looking through a new Kontes Catalog (TG-20) and he spied a listing of an entire group of glassware called . . . Bantam-ware®. It was small enough for him (semi-micro), and very strong (proportionately radiused bends, support rods, and heavy borosilicate throughout), beautifully designed (functionally), and very complete (the **completest**).

Swiftly . . . he ordered a Bantam-ware fractional distillation unit (a unique item with nothing in vertical alignment) and chromatographic column apparatus (with changeable porosity discs).

In use, it **was** small, strong, well-designed, and very, very good.

Bantam-ware pleased the little chemist so much he told all his little friends. And the word must have spread, because there's more Bantam-ware semi-micro glassware in labs throughout this country (and Lilliput) than any other. (We even hear they smuggled a few into Brobdingnag for ultra-micro work).

All stories should have a happy ending. You can help by writing in for our complete 300-page catalog, TG-20 bw.

Or contact our man in **your** area.

®Trademark of Kontes
*Courtesy of Messrs. Gulliver and Swift

KONTES
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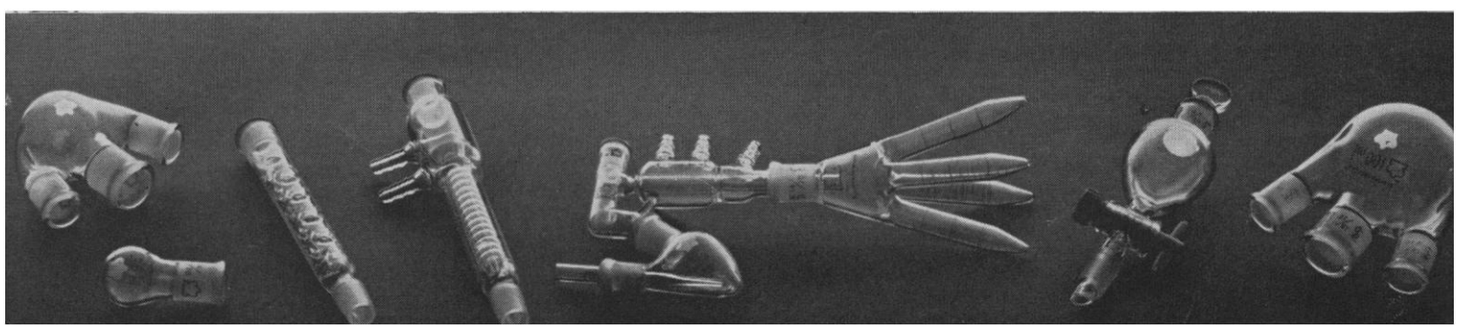
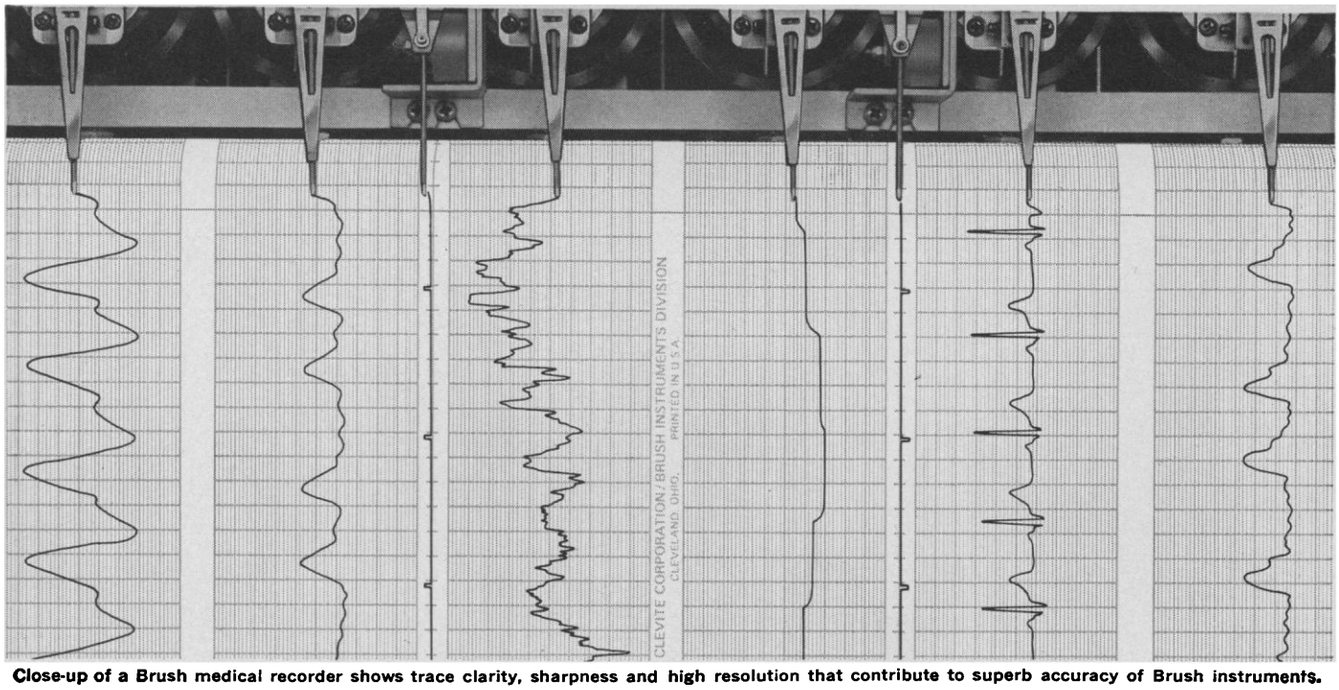




Close-up of a Brush medical recorder shows trace clarity, sharpness and high resolution that contribute to superb accuracy of Brush instruments.

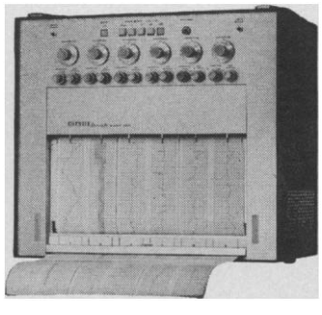
Brush medical recorders deliver more physiology and less fooling than any other make you can buy

We take the fooling out of recording . . . both kinds: the deceptive traces which result from intermingling physiology with artifact, and the need to fool with calibration controls. Unlike ordinary medical recorders, the calibration of Brush recorders remains constant regardless of baseline position, attenuator setting, or gain. Test after test, year after year.

More physiology and less artifact. That's what Brush delivers.

In addition, Brush medical recorders maintain specified system accuracy from one edge of the chart to the other and at *all points* in between.

You can believe the high degree of resolution and system accuracy only when you see some physiological wave forms actually recorded on a Brush instrument. Write for your set of samples. Clevite Corporation, Brush Instruments Division, 37th and Perkins, Cleveland, Ohio 44114.

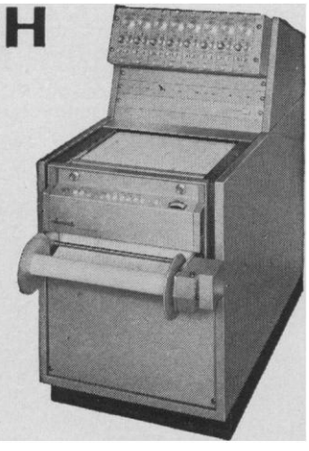


CLEVITE **BRUSH**

There are Brush medical recorders with 1, 2, 3, 4, 5, 6, 7, and 8 channels for physiological data acquisition. Illustrated are the Mark 200 lowboy and the Mark 260.

The Mark 200 lowboy (right) is an eight-channel system that combines solid-state electronics with modular construction to economically meet your specific requirements. Choice of channel widths and biomedical front ends. Range of chart speeds 0.05 to 200 mm/sec. Patented pressure-fluid writing system.

The Mark 260 (left) is a high-performance portable recorder at half the big-system price. Six analog channels and four event channels. Features the Brush patented pressure-fluid system. Frequency response: 70 Hz at 0.5 full scale; 40 Hz at full scale.



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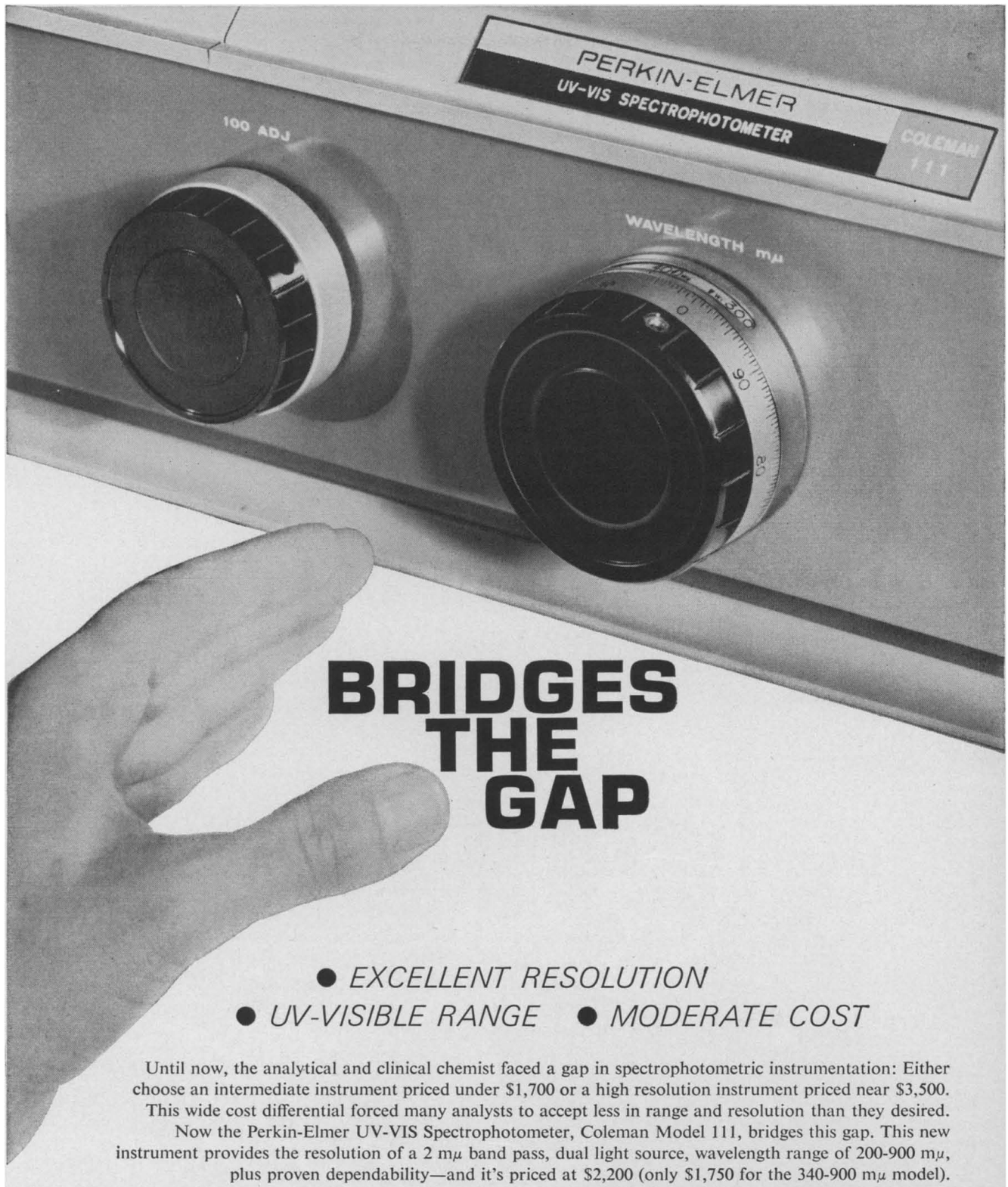


BRIDGES THE GAP

● *EXCELLENT RESOLUTION*
● *UV-VISIBLE RANGE* ● *MODERATE COST*

Until now, the analytical and clinical chemist faced a gap in spectrophotometric instrumentation: Either choose an intermediate instrument priced under $1,700 or a high resolution instrument priced near $3,500. This wide cost differential forced many analysts to accept less in range and resolution than they desired.

Now the Perkin-Elmer UV-VIS Spectrophotometer, Coleman Model 111, bridges this gap. This new instrument provides the resolution of a 2 mμ band pass, dual light source, wavelength range of 200-900 mμ, plus proven dependability—and it's priced at $2,200 (only $1,750 for the 340-900 mμ model).

• Spectral band pass of 2 mμ is constant throughout the wavelength range—wavelength accuracy is better than 0.5 mμ. • Exclusive, dual-range phototube detector covers the entire 200 to 900 mμ range—eliminates mid-operation switching and prevents positioning errors. • Dual light source, selected by operating a lever, provides a tungsten lamp for visible and a deuterium lamp for ultraviolet work. • Large sample compartment accommodates cells up to 100 mm.

Write to Coleman Instruments Division, The Perkin-Elmer Corporation, 42 Madison Street, Maywood, Ill. 60153.

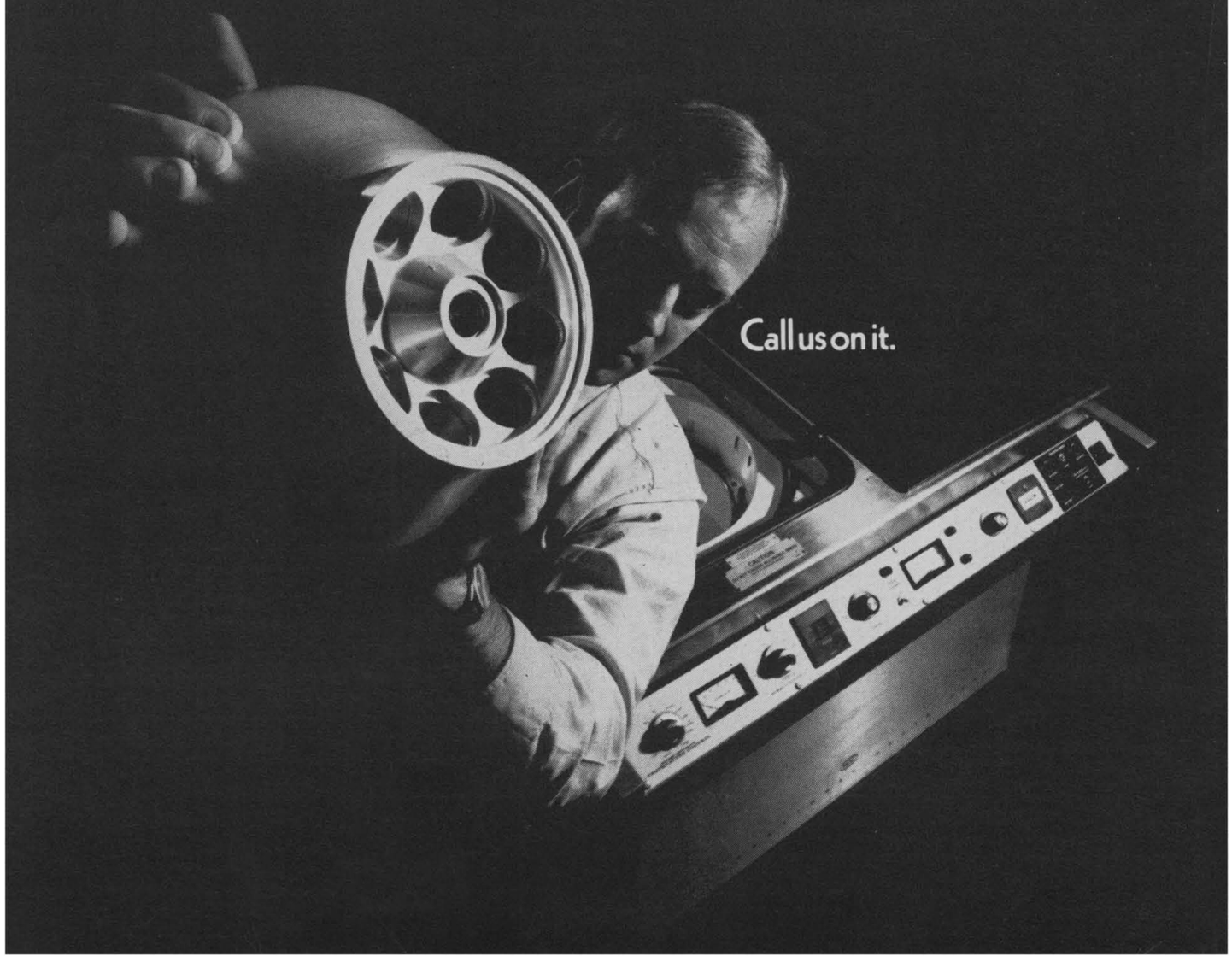
VISIT OUR BOOTH—PITTSBURGH CONFERENCE **Ask for Bulletin S-326.**

PERKIN-ELMER

Stop the threat of ultra destruction.

Protect against rare but expensive errors. Now both our B-50 and B-60 ultras have a new fail-safe rotor device—no rotor, no go. (So you can't spin the drive to destruction.) No rotor overspeed either, thanks to the exclusive new optical sensor protective system. Throw in an all-new drive unit, a temperature control system, a range of accessories no one else can match, and a new and longer warranty. All supported by Ultra Service, IEC's direct sales and service team. It adds up to the most complete ultra-package available. Write for Bulletin B-50 and B-60. Or try the direct approach. Call Tom Mulvihill at (617) 444-6700. Collect.

IEC INTERNATIONAL EQUIPMENT CO.
300 SECOND AVENUE • NEEDHAM HEIGHTS, MASSACHUSETTS 02194



Now, a 200 MHz clock rate and expandable memory in a Multichannel Analyzer

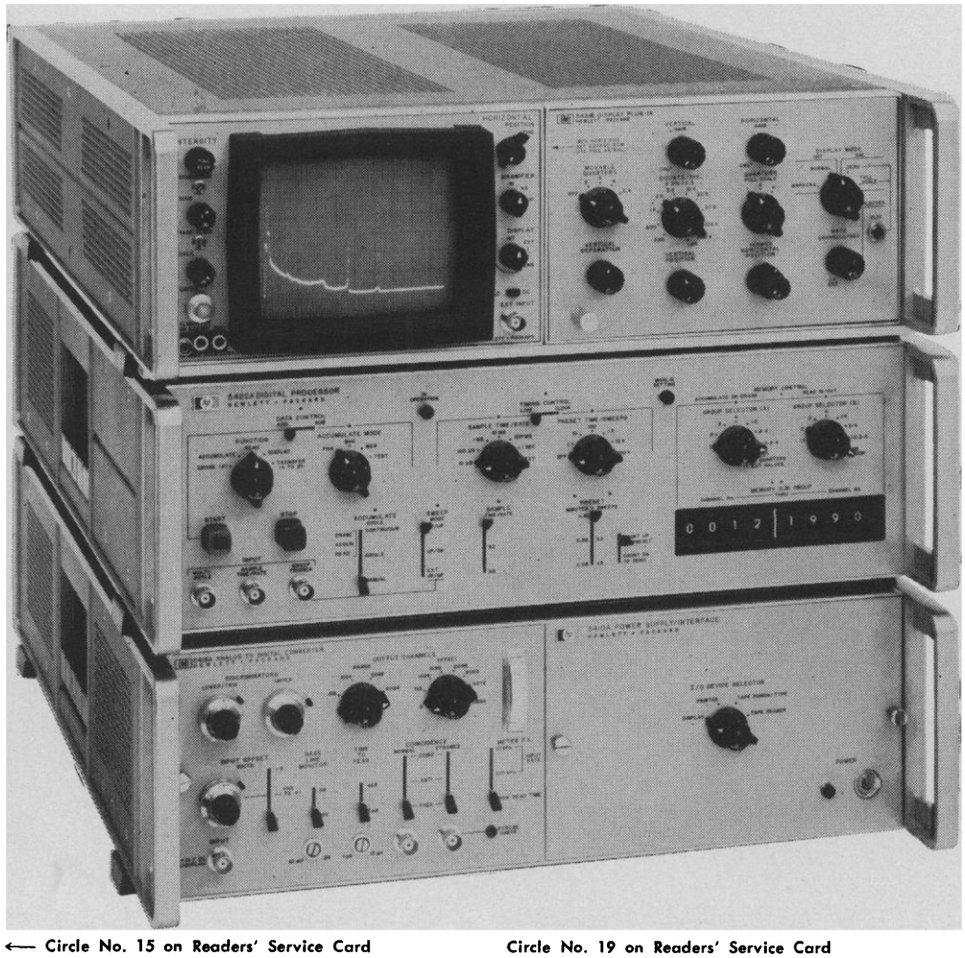
The never-before-achieved 200 MHz clock rate ADC for the new Hewlett-Packard 5401A Multichannel Analyzer will add speed and flexibility to your spectrum analysis work. This precision instrument offers you a 12-bit ADC (4K resolution) and memory expandable from 1024 to 4096 or 8192 channels. Now get extremely high digitizing rate... on top of the outstanding linearity and stability specs, I/O flexibility, and multimode operation that HP has already contributed to nuclear and statistical analysis work.

Besides the price, under $12,000, not much more need be said.

Call your local HP field engineer for all the details on the new 5401A Multichannel Analyzer. Or write Hewlett-Packard, Palo Alto, California 94304; Europe: 1217 Meyrin-Geneva, Switzerland.

HEWLETT hp PACKARD

NUCLEAR INSTRUMENTS



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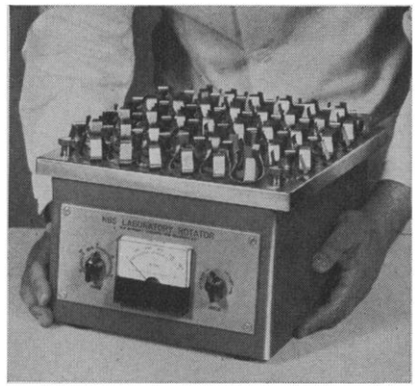
NBS PRODUCT NEWS

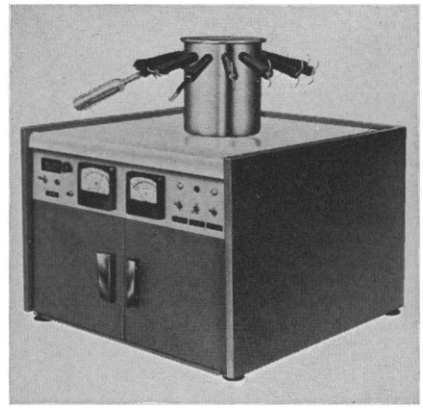


New Portable Rotator Has Many Lab Uses

A low-cost portable shaker has been developed that plugs in right where you want it; in a small incubator, a refrigerator or any corner of your lab. It meets a variety of research needs in shake flask studies of aeration, temperature and media. This rugged rotator imparts smooth reproducible motion to all flasks on the shaker platform. It is precision built with a powerful triple-eccentric drive mechanism designed for continuous-duty shaking and long life. Speed is controlled electronically over a wide range. Choose from a selection of platforms for flasks, test-tubes and beakers. *Write for Catalog GZS-100.*

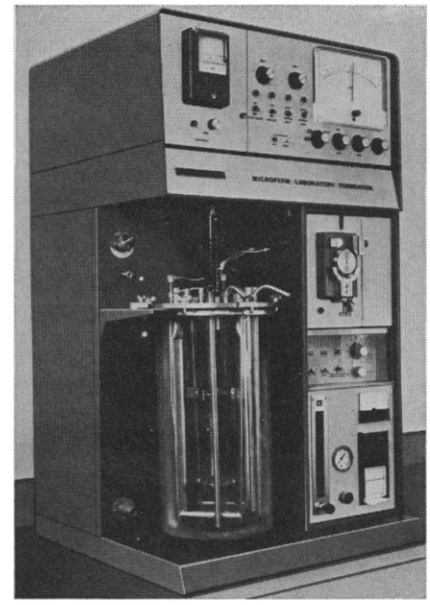
Sampling-Inoculator Aids in Viscous Fermentations

A low cost device for sampling and inoculation in mold, fungal and bacterial fermentations is now available as an accessory for bench scale fermentors. It replaces the hypodermic syringe which is difficult to use with mycelial cultures. The device attaches easily to the fermentor headplate and may be autoclaved with the fermentor intact. The device incorporates a plastic syringe pump, collecting tube, air filter, tubing and pinch clamps, and can be completely disassembled for cleaning. *Write for Catalog GZS-101.*



Bench-Scale Freeze Dryer Has 5-Liter Capacity

The Cryolizer, Model B65 is a versatile freeze dryer used for manifold or batch lyophilization. It is available with a variety of interchangeable vacuum drums and manifolds that may be rotated a full 360° while under vacuum, permitting easy access to all ports. It has its own refrigeration and automatic defrost systems which are all interlocked electrically to prevent operating errors. Other new features include a vacuum shut-off valve between the pump and the trap, and a thermostatic expansion valve in the refrigeration line for optimum Btu efficiency. Automatic degassing feature minimizes pump contamination. Dependable, electronic gauge provides a continuous reading of vacuum. *Write for Catalog GZS-102.*



Bench Scale Fermentor Adapts to New Research Needs

The Modular MicroFerm Fermentor has a new exhaust air condenser that minimizes evaporation loss of liquid. New plug-in filters for inlet air and exhaust gas are heated to prevent condensation. Built-in rubber diaphragm facilitates syringe inoculation and sampling. The MicroFerm accommodates a variety of plug-in accessories and control modules for regulation of pH, foam, continuous culture and illumination in photosynthetic studies. Agitation is electronically controlled over a wide range. Heating and tap-water cooling is achieved automatically on control demand for regulation of temperature within ± 0.25°C. Optional features include a piggy-back module for automatic pH control, and a solid state foam controller arranged in a swivel compartment. Built-in miniature strip-chart recorder provides a continuous record of temperature. Four interchangeable vessels are available for 2,5,7.5,and 14-liter capacities. *Write for Catalog GZS-103.*

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RNase-free DNase, DNase-free RNase...

the cleanest, sharpest tools for molecular biology come to you direct from Worthington

Unlike other biochemical supply houses, mere re-sellers, we make all our own enzymes. We have adapted such specialized analytical techniques as column chromatography, free-flow electrophoresis, and disc gel electrophoresis to routine enzyme production. From our efforts come enzymes with the purity and high activity required for demanding research work.

- For example, our chromatographically-prepared pancreatic ribonucleases, RAF and RASE, are free of that last 1% impurity found in other preparations. Even though we sacrifice half our yield in final purification, our RNA materials are priced competitively.
- Another ribonuclease for nucleic acid chemists, our RT_1 has twice the activity of any other commercially-available product.
- Our standard once-crystallized DNase and our chromatographically-prepared alkaline phosphatase both are upgraded electrophoretically to eliminate trace RNase.

The preparation of each of our 200-plus enzymes is carried through by the one person who best understands the process. His records provide the complete history of each batch of every enzyme. If necessary, we can trace any material back to its source.

Re-sellers can't do this. They merely slap a new label on the bottle and stick it on the shelf.

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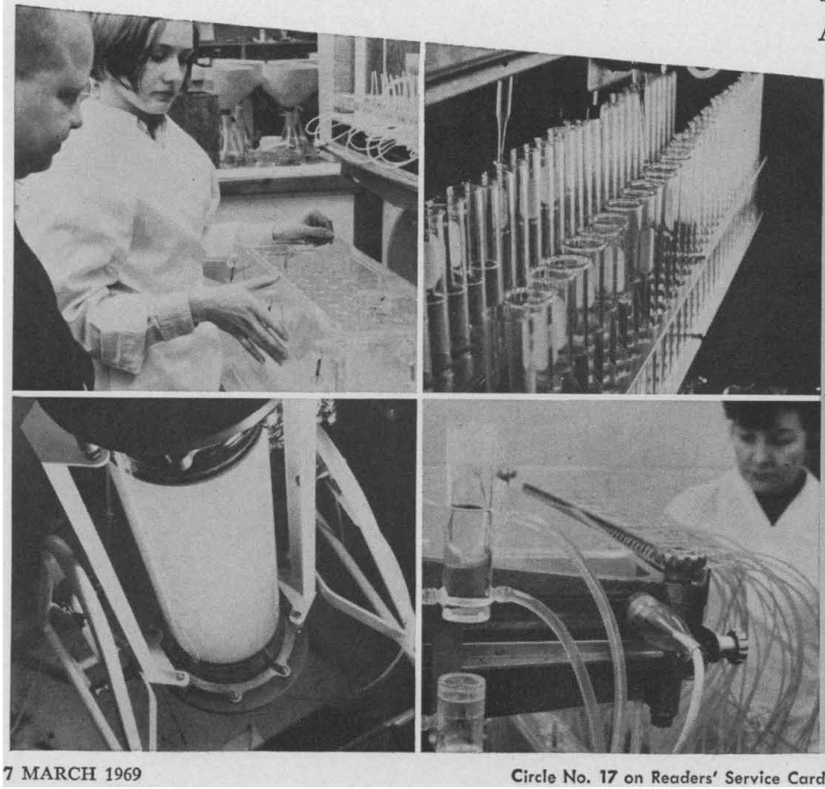

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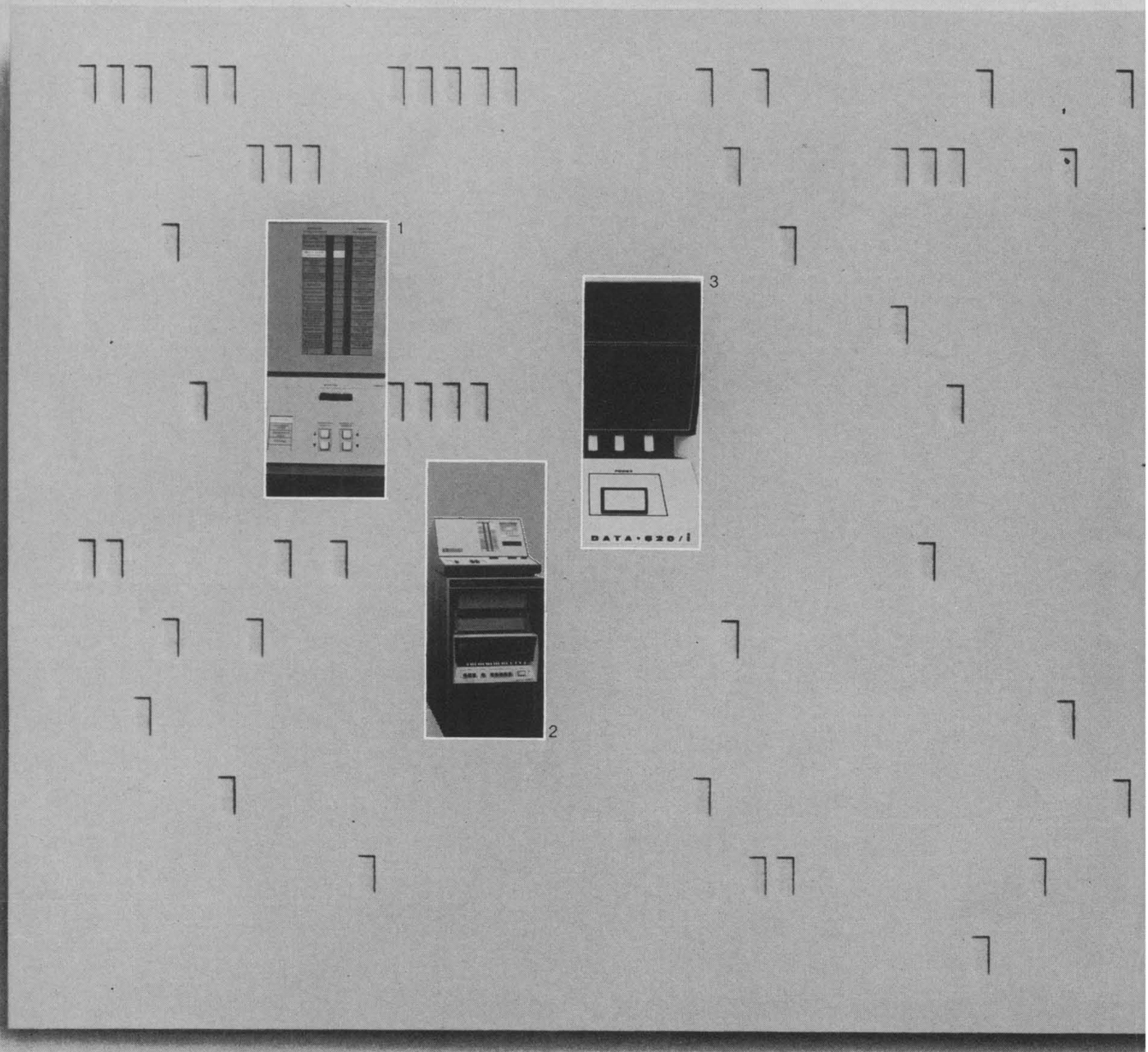
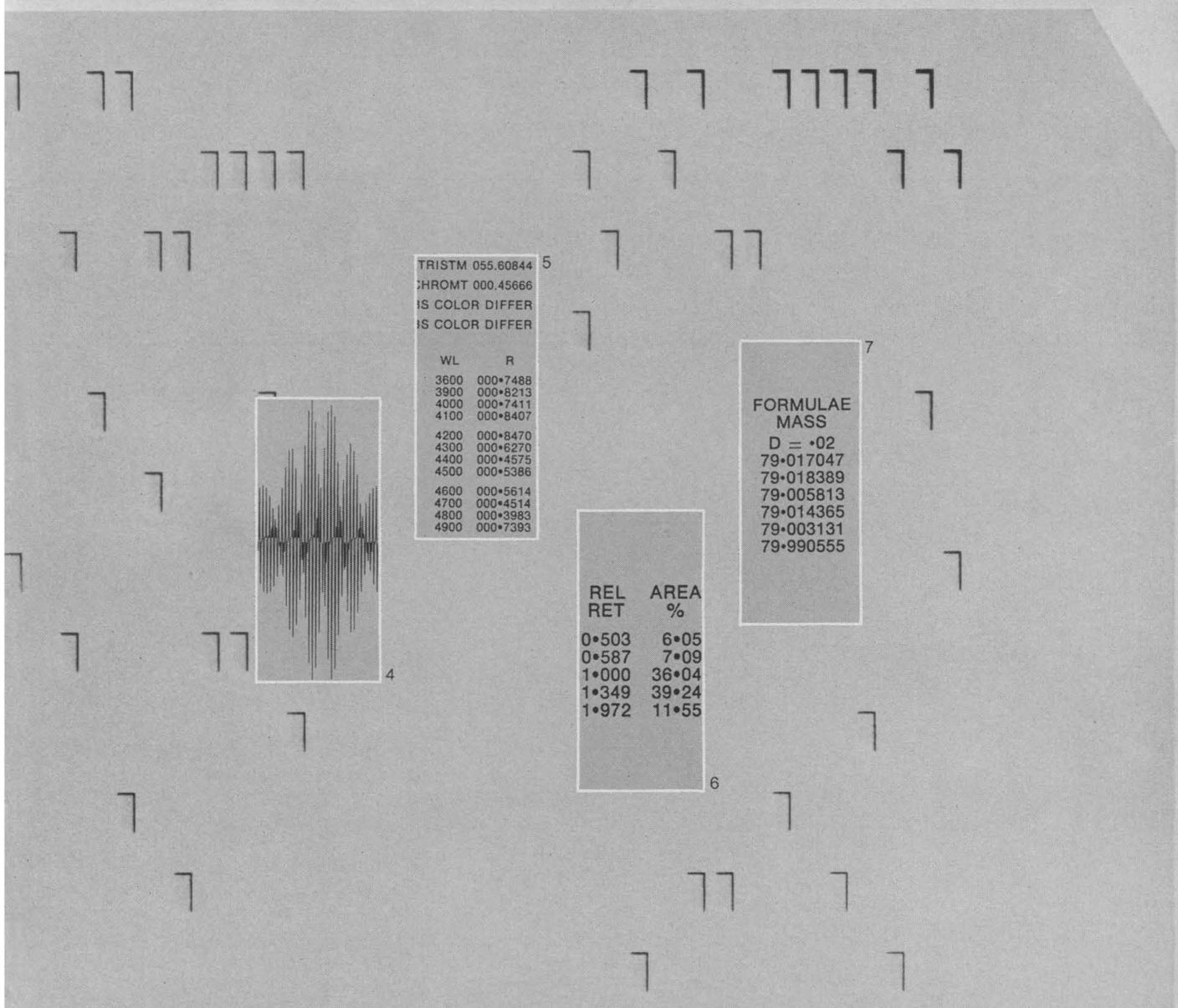


SpectroSystem by Varian: a total analytical system for in-lab use that delivers on-line data processing and optional on-line computer control of your present GC, spectrophotometry, mass spectrometry, NMR or EPR instruments. The typical SpectroSystem comprises: a complete package of software for your analytical instrumentation, (1) Operating Console labeled in chemical—not computer—terminology, (2) Special Instrument/Computer Interface, (3) Varian 620/i Computer with 1.8 microsecond cycle time, 16-bit word length, and a Teleprinter.

Designed with the scientist in mind, SpectroSystem frees you to do more and better chemical analysis. Typical results: an EPR spectrum simulation (4) that demonstrates confirmation of a proposed molecular structure, printout (5) of a spectrophotometer tristi-

your analytical laboratory.



mulus colorimetry analysis, printout (6) of a gas chromatography analysis, printout (7) of formula calculation from mass spectroscopy measurements.

SpectroSystem is the versatile product of a special task force of Varian scientists, programmers and engineers — specialists in designing data systems exclusively for analytical instruments. It's a single-source-responsibility system — Varian makes it a turnkey project including custom installation, software, service, on-site training. It's a working, field-proven system. And it's deliverable to your lab now. For brochure, write Varian Instrument Group, Data Systems, 611 Hansen Way, Palo Alto, California 94303. Please state your field of analytical interest.

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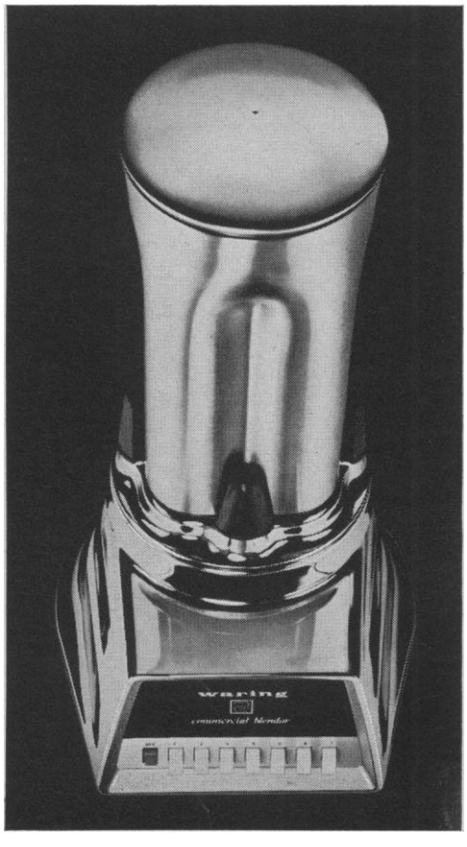
Using your wife's blender is like shaving with her razor.



You wouldn't think of using a kitchen gadget in your laboratory.

And Waring wouldn't think of taking the kind of blender your wife makes Hollandaise with, changing its nameplate, and claiming it's a piece of lab equipment.

Waring Commercial Blendors® were specifically designed for laboratory use. And if people like you don't buy them, nobody else will.

Take our new 5000 Series Blendors, for example. They're designed for homogenizing, emulsifying, macerating, disintegrating, grinding, shredding.

The containers are an exclusive Waring "Cloverleaf" design. The blades are 304 stainless steel. Both are hydrodynamically engineered for outstanding blending action. The motor is powerful and virtually maintenance-free. Illustrated: 5012S – 7-speeds; 8-button switch; chromed base; 120 volts AC; 3-conductor cord with adapter. UL listed. Available in Canada. Stainless container $74.95. Glass container $59.95.

Our laboratory line includes an Aseptic Dispersall® container, an explosion resistant motor model as well as many accessories. For example, there are numerous interchangeable blades and blade configurations. Waring will also design specific pieces of equipment for special applications.

To learn how helpful a Waring Blendor could be in your work, write us today. Helping you is our job.

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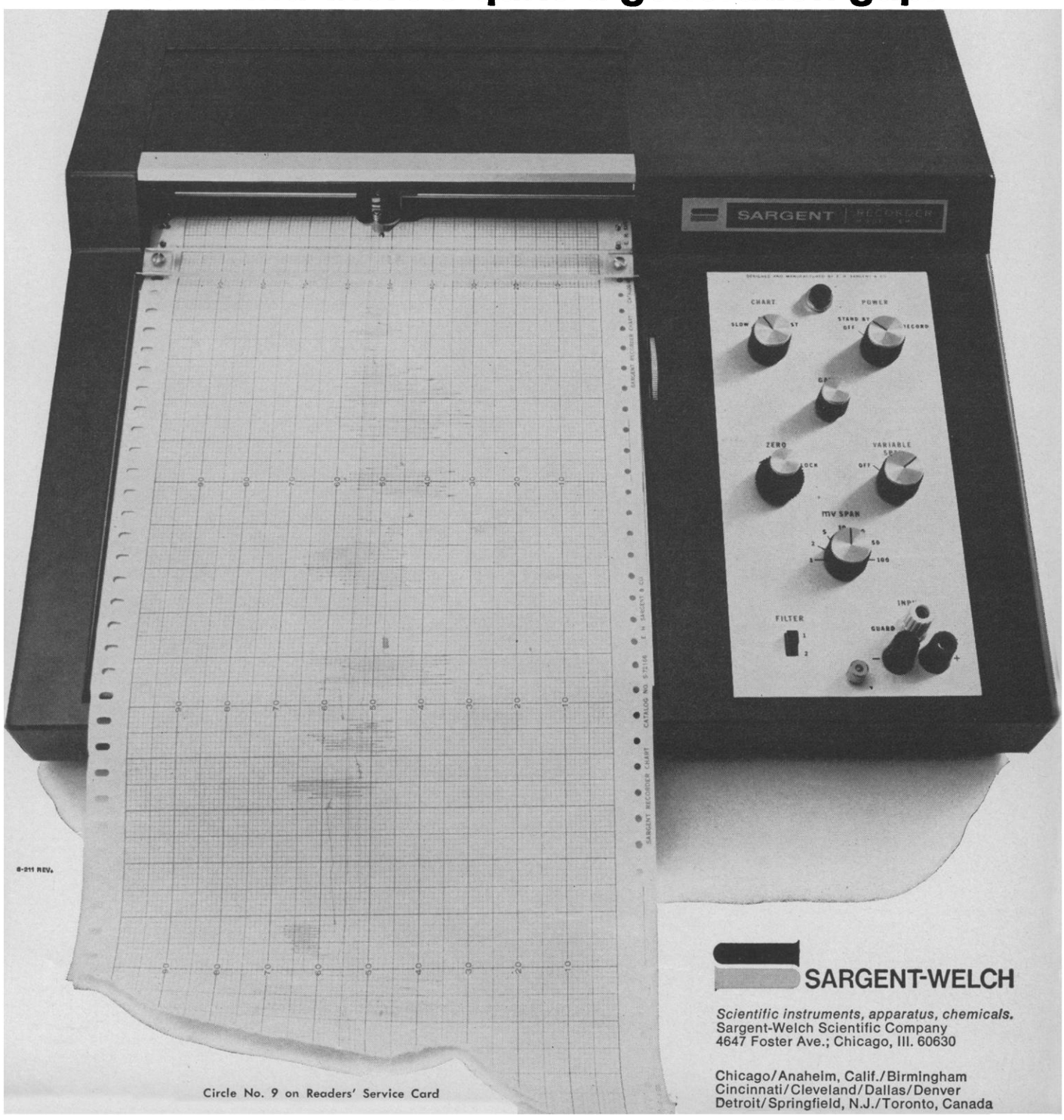
New Hartford, Conn. 06057

Circle No. 47 on Readers' Service Card

This is the general-purpose member of our new family of SRG potentiometric recorders.There's also one for use with gas chromatographs (the SRG-GC) and one for linear-log recording (the SRLG). All three are new, third-generation designs. For details, ask our representative or write to us for our 12-page illustrated brochure on the SRG recorder series. You'll find there's quite a generation gap.



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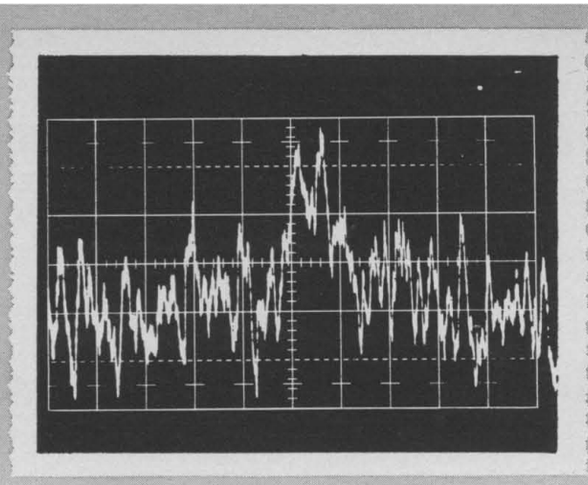
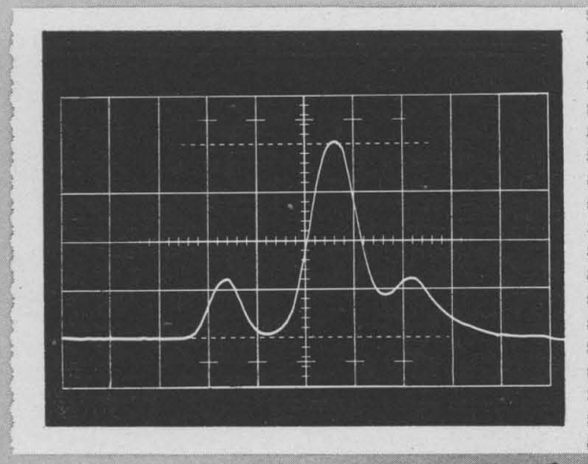
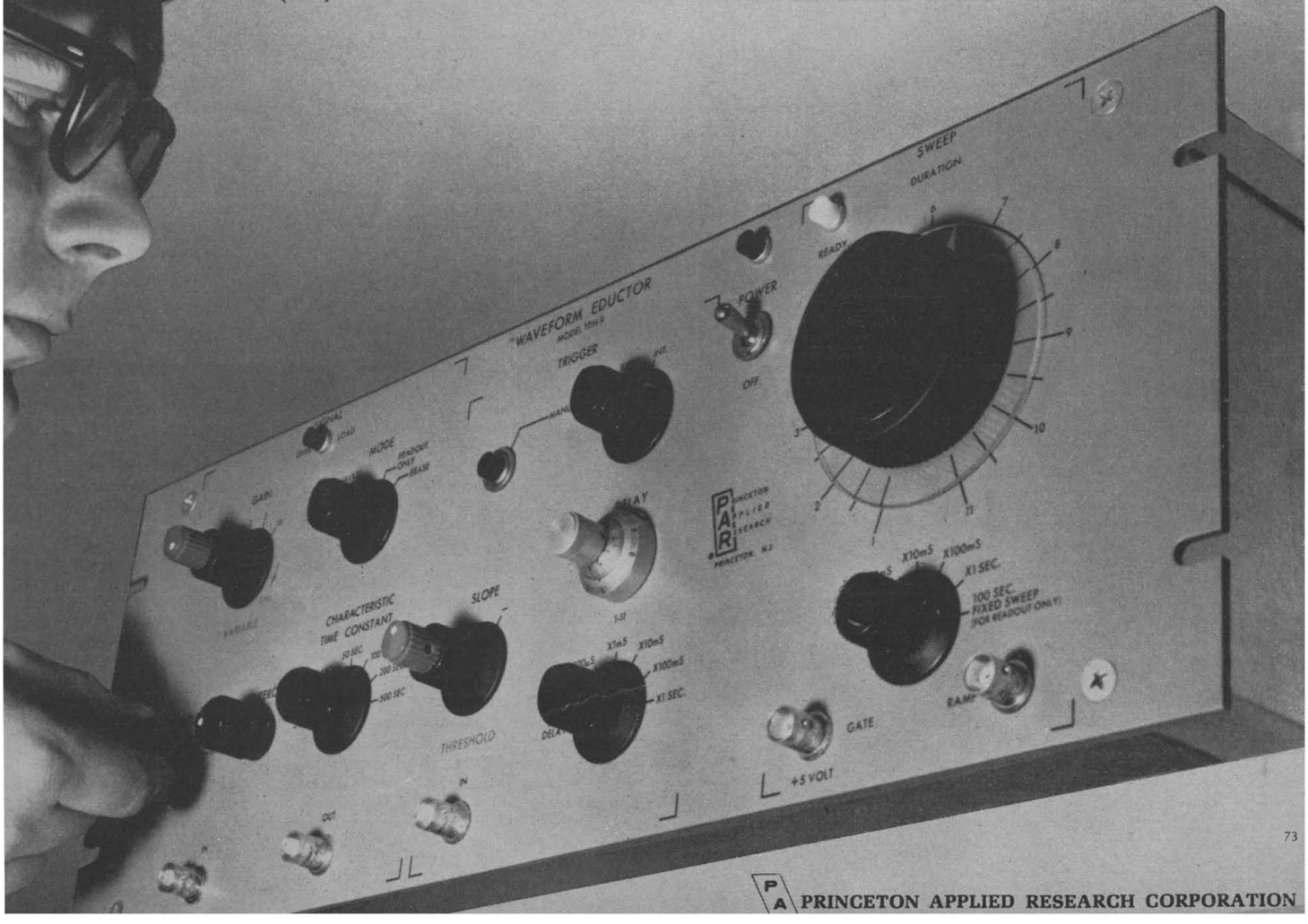
Noisy Signal?





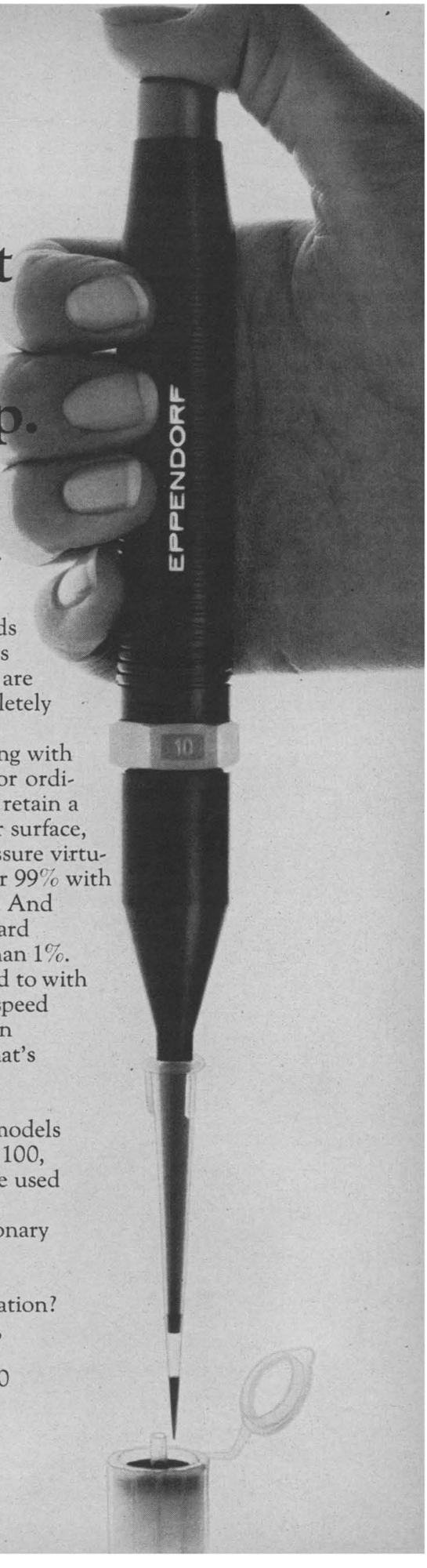
Extract it with a PAR Waveform Eductor™

The PAR Waveform Eductor is a signal averager used to extract repetitive signals from noise. For complete information or to arrange a demonstration of this instrument, which is priced at only $4,200, write Princeton Applied Research Corporation, P.O. Box 565, Princeton, New Jersey 08540, or call (609) 924-6835.



PA PRINCETON APPLIED RESEARCH CORPORATION

This is the revolutionary micropipet with an unbelievably accurate tip and a completely automatic top.



Take the new Eppendorf automatic micropipet in hand and be prepared to have your pipetting habits changed... radically.

For example, you won't have to wash or wipe pipets anymore, or worry about contamination or liquids in your mouth. The Eppendorf holds liquid in disposable plastic tips that are instantly interchangeable and completely separate from the pipet mechanism.

You'll also have to unlearn living with significant pipet error. Unlike glass or ordinary plastic pipet tips which always retain a significant liquid film on their inner surface, the Eppendorf polypropylene tips assure virtually complete sample recovery—over 99% with aqueous solutions, 97% with serum. And look at this precision: at 5 μl, standard deviation is under 0.04 μl, or less than 1%.

But the easiest thing to get used to with the new Eppendorf is the ease and speed of pipetting. Just press the button on top to fill. To empty, press again. That's all. Blowout of the entire sample is automatic and complete.

The Eppendorf is available in models dispensing volumes of 5, 10, 20, 50, 100, 200, 500 and 1,000 μl. It can even be used with acids and organic solvents.

Once you've tried the revolutionary Eppendorf, you'll never want to use conventional micropipets again.

May we send you more information?

Just write: Eppendorf Division, Brinkmann Instruments, Inc., Cantiague Rd., Westbury, N.Y. 11590

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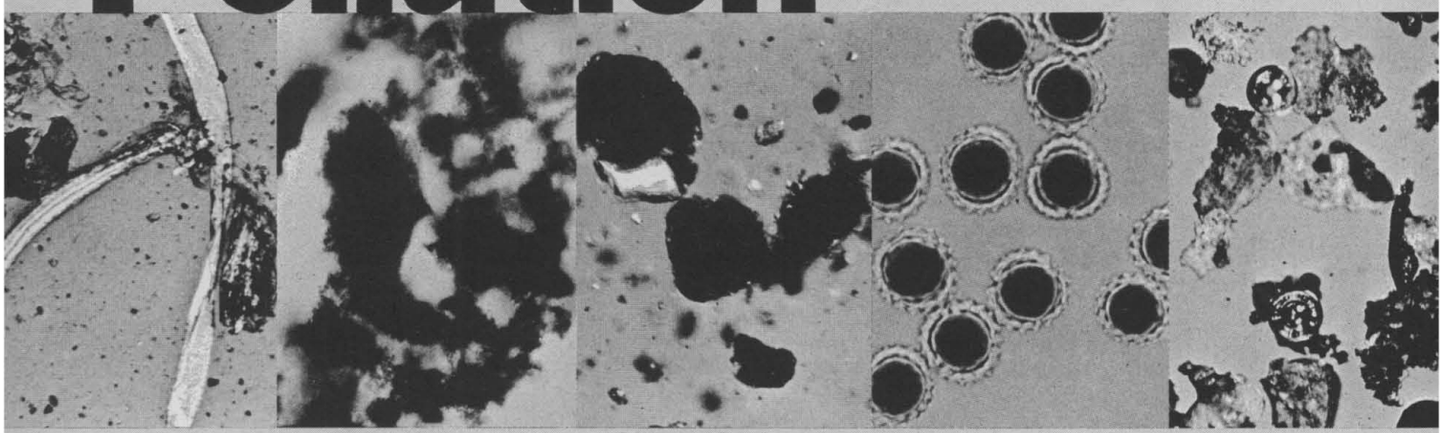
MICROPIPETS

Pollution



How to identify villains that dirty water, spot film, make you cough, pit marble, spoil antibiotics, ruin recording tape.

Pollutant particles can be more precisely identified with a polarizing microscope fitted with a photomicrographic camera. And Leitz is the leading name in this specialized equipment.

Leitz Polarizing Microscopes are used by municipal agencies to identify air and water pollutants—and by industrial hygienists to track down particle contamination of products like miniaturized electronic components, pharmaceuticals, films, and recording tapes. One reason Leitz microscopes are the choice in pollution detection: investigators *know* Leitz quality.

By comparison of a particle in polarized light with reference photomicrographs, which are available for almost every common particulate substance, prompt analysis can be made of pollutant particles. Photomicrographs made with the Leitz Microscope-Camera permit more leisurely comparison, serve as a permanent record, and simplify future analyses of particles native to a region, industry or individual company.

Write to Leitz for information on particle analysis and for facts on the Leitz line of polarizing microscopes and microscope-cameras, and how they can help you identify particle pollutants.

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68468

7 March 1969, Volume 163, Number 3871 **SCIENCE**

The University and Student Dissent

There are a number of ways of viewing the present crisis on the campus. For a relatively senior teacher, one of the more painful ways is to regard it as evidence of an almost complete failure of communication between teacher and student. For the more one listens to the student activists, the more it becomes clear that they have developed a picture of the modern university completely different from the one held by the senior faculty. The students tend to identify the university with everything they dislike about modern society—its elaborate and "suppressive" regulations, its indifference to moral and esthetic values, its preoccupation with bits and pieces of life to the exclusion of overall purpose or meaning. Worst of all is the apparent role of the university as a supporter of the military industrial complex through its engagement with weapons research and its "complicity" with such military enterprises as the ROTC and the draft.

The senior faculty, on the other hand, loves the university as the inheritor and transmitter of the great tradition of individual freedom and of the liberating belief that disinterested investigation of problems will ultimately lead to their solution. Far from seeing the university as collaborating with the nefarious purposes of society at large, they see it as society's most significant critic.

In spite of all the talk, however, there is really not much of a generation gap about such fundamentals as freedom, love, war, and race prejudice. The gap involves the methods to be used in achieving the desirable and avoiding the undesired ends. At one extreme are those who believe that the large problems must be attacked all at once and as a whole. To many of them, moral fervor about the ends and purposes replaces a pedestrian concern with objective methodology. At the other extreme are those who disclaim any concern for the ends to which their discoveries are put and who view any prior commitment as a dangerous impediment to detached investigation.

About both of these attitudes there hovers a kind of self-righteousness that does not lead to the best classroom teaching. If the radicals are too self-satisfied about their moral commitments, conventional scholars may be dangerously smug about the magnificence of their detachment from human concerns. As scientists we might in fact be more effective teachers if we began by admitting that we too are against war, poverty, and hate and that we really went into science, at least in part, because it offered the best available means of overcoming these evils. Our seeming failure to grapple with the big problems all at once is not a sign of indifference or lack of commitment. Rather it stems from the perhaps deplorable but still undeniable fact that the scientific method has achieved almost all its successes by breaking big unmanageable problems down into little, controllable ones.

These views are sure to be unwelcome to those who feel that reforms which fall short of immediate total revolution are nothing more than "little finky changes" unworthy of men of virtue and vision. It may be, however, that the survival of universities that include the right of student dissent depends on the transmission of our belief that the only revolutions worth having come as the slowly accumulating sum of those same "little finky changes."—ROBERT S. MORISON, *Director, Division of Biological Sciences, Cornell University, Ithaca, New York*

The Lauda all-stainless steel constant-temperature circulators. Any resemblance to a water bath is purely coincidental.

The only thing Lauda Circulators have in common with a water bath is the water they use. Beyond that, any resemblance ends. A Lauda not only heats, it can also cool, circulating water or other liquids at constant, electronically-controlled temperatures as high as 330°C. or as low as —120°C. In addition, every Lauda Circulator features stainless steel construction of all components that come into contact with the bath liquid, solid-state electronic relays, automatic excess load protection for the pump, and manual drainage and flow control valves.

There are numerous Lauda Circulator models to choose from, depending on your specific temperature requirements. For example, the K-2 series heats to 150°C. and can cool to — 20°C., while the WB series is best for immersion heating up to 250°C. The N-HT has been engineered for superior high-temperature performance. It will heat from 50°C. to 330°C. and incorporates many unique features, including special high-temperature glass thermo-regulators, fully-sealed housing, water-cooled cover plate and special insulation.

If you do low-temperature work, you may be interested in the Lauda Ultra-Kryostat series that cools from ambient to —120°C. There is also a refrigerated version of the WB-20 that is specially recommended for controlled spectrophotometric temperature measurements.

Now that we've begun to convince you it's a mistake to call a Lauda Circulator a water bath, let our free catalog drive the point home. For your copy, just write: Lauda Circulators, Division of Brinkmann Instruments, Cantiague Rd., Westbury, New York 11590.

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LAUDA Circulators

The only recording spectrophotometer that can

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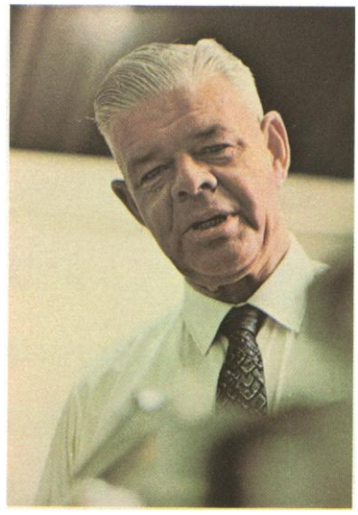


Howard Cary—
President of Cary Instruments,
a Varian subsidiary.

We have two of the best recording spectrophotometers in the business. We also have a slight problem because some people still don't know which instrument does what better. So I thought this may be the appropriate time to clear up the confusion once and for all.

THE MAIN DIFFERENCE

For work in the ultraviolet through visible and near infrared wavelength range, the Cary 14 has no peer. For studies in the ultraviolet and visible only, the Cary 15 cannot be equalled. It's that simple.

There are other differences, of course. For instance, the 14 is more versatile than the narrower-ranged (1850-8000Å) 15. But because it was designed to perform specific tasks, the 15 is easier to operate. Then there's price. The Cary 14 sells for about $18,000, while the Cary 15 costs a little over $12,000. The additional $6,000 becomes a worthwhile investment when you consider the variety and quality of the studies routinely available with this instrument whose range extends from 1860Å to 2.65 microns. Studies like hydrogen bonding investigations in the near infrared. Or quantitative protein analyses in the ultraviolet.

CONSERVATIVE DESIGN: WHAT & WHY

One similarity between the two instruments is the fact that both are conservatively designed. By conservative design we mean (1) that at no point in the instrument system are the electrical or mechanical components operated near their tolerance limits, and (2) that performance specifications are greater than required under normal sample conditions. This design philosophy produces acceptable performance even under the most rigorous sampling conditions. Just as important, it insures longer instrument life and complete confidence in

outperform the Cary 14 is the Cary 15. And, vice-versa.

the quality of the recorded information.

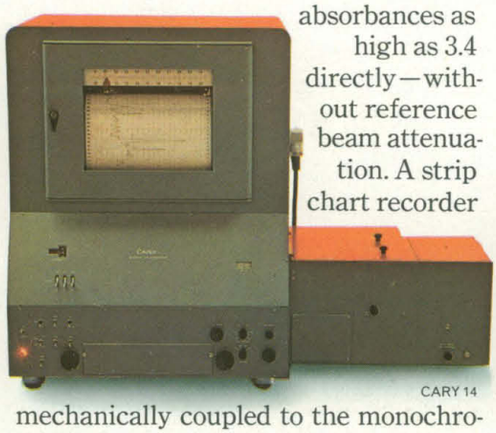
PHOTOMETRIC ACCURACY

While the electronics of the Cary 14 and 15 differ, the photometric accuracy of each is competitively unsurpassed.

The Cary 14 uses a prism-grating double monochromator, plus a dual beam sampling system and a single detector. Reference and sample beams are separated by time then compared and the ratio recorded on a chart which is effectively 20 inches wide. Measurements are accurate within 0.002 abs between zero and 1 abs; 0.005 near 2 abs. At high absorbance levels of 4, or even 5, valid measurements can be obtained using reference beam attenuation.

The Cary 15 employs a two-prism double monochromator and two detectors. Sample and reference beams are separated in space and measured simultaneously by the matched detectors.

From zero to 1 abs the accuracy is between 0.002 and 0.005 abs; at 2 it's 0.008. Because of the dual detector photometric system, the 15 measures at absorbances as high as 3.4 directly—without reference beam attenuation. A strip chart recorder



CARY 14

mechanically coupled to the monochromator records the information.

STRAY LIGHT

The double monochromator and optical design of the 14 and 15 hold stray light to a negligible amount—less than 0.0001% (14) and 0.001% (15) over most of the range; 0.1% at range limits for both instruments.

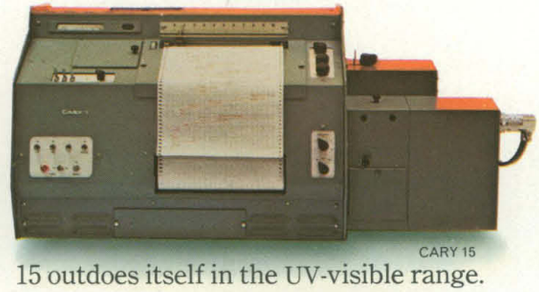
Because of this low stray light, both the 14 and 15 can work at high absorbances without sacrificing photometric accuracy—an extremely useful asset in most spectrophotometric work.

RESOLUTION

Another notable contribution of the double monochromator is the ability to achieve resolution as good as or better than any other recording spectrophotometer (at the same signal-to-noise ratio) in one-half to one-fourth the scanning time.

Some people, no doubt, may feel that they'll never need the high resolution offered by the Cary 14 and 15. What they fail to realize is that much of the "unneeded" resolving power can be exchanged for additional energy (resulting in better accuracy) when working with very dense or micro samples.

There's a lot more to tell about the Cary 14 and 15. Like the wide variety of accessories available for each. Or the fact that we've made instrument drift just about obsolete. For now, just remember that the 14 is unexcelled in the UV-visible-to-near infrared, while the



CARY 15

15 outdoes itself in the UV-visible range.

We have a catalog which describes the spectrophotometers. If you'd like a copy, write Cary Instruments, 2724 So. Peck Road, Monrovia, California 91016. Ask for data file E805-78.

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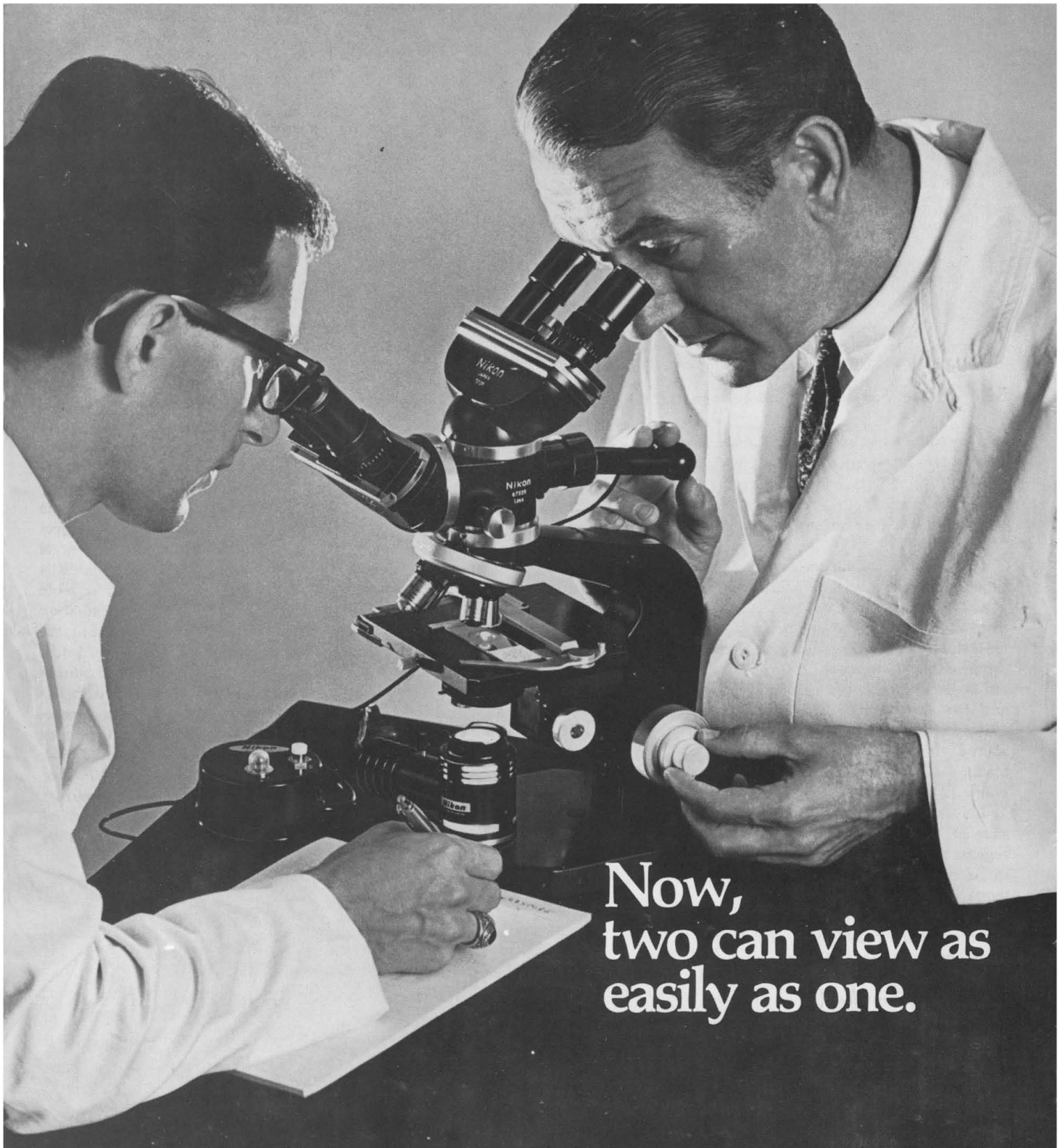

Now, two can view as easily as one.

Any Nikon microscope can now be adapted to provide simultaneous observation by two people: teacher and student, instructor and trainee, or lab co-workers.

Both view the same specimen, at the same time, at the same focus and magnification and with the same visual clarity and image resolution. The Nikon Teaching Head attachment performs this transformation in a matter of moments. And it can be equipped with two monocular or binocular tubes, or one of each. Whichever the case, each viewer can set interpupillary separation and make diopter adjustments to suit his own comfort.

The Teaching Head attachment also embodies a movable arrow pointer whose image, projected onto the same plane as the specimen, can be manipulated by the teacher to single out any detail for the student's attention. For increased contrast and perception, the arrow image may be tinted red or green, or left clear. A turret filter arrangement is provided for this purpose.

The Teaching Head attachment can be easily removed to make the microscope available for conventional use.

For complete details, write: Nikon Inc., Instrument Division/ Ehrenreich Photo-Optical Industries, Inc. Garden City, N.Y. 11530. (In Canada: Anglophoto, Ltd., Ontario)

Nikon
Teaching Head Attachment

W. Giertz, "The matrix model structure of paper."

24 July. (J. Kenneth Craver, discussion leader): Philip Luner, "Organization of wood polymers at interfaces"; Hans Schott, "Clay-cellulose interaction"; Egon Matijević, "Particle-ion interaction."

25 July. (Howard S. Gardner, discussion leader): John W. Vanderhoff and E. B. Bradford, "The simulation of binder migration in latex-base coatings using a model system"; James V. Robinson, "Particle size and scattering coefficient of pigments."

Biomathematics

Julia T. Apter, chairman; Derek Fender, vice chairman.

28 July. (Fred Grodins, discussion leader): Stephen Kahne, "Optimization techniques"; C. K. Gordon, "Topological methods in biologic and behavioral sciences." (D. Fender, discussion leader): Hans Bremermann, "Evolution, optimization and the problem of numerical effort"; Robert Taylor, "Strategic problems in parameter estimation"; Julia T. Apter, "Some biological examples using parameter estimation."

29 July. (Hans Bremermann, discussion leader): F. Charette, "Optimization in endocrine systems"; R. Kalaba, "Fitting non-linear models of drug metabolism to experimental data." (Otto Schmitt, discussion leader): John Outerbridge, "Optimal saccade generation in the vestibulo-ocular system"; D. Fender, "How does the oculomotor control system decide on the optimum strategy for a particular tracking task."

30 July. (R. Kalaba, discussion leader): G. C. Cheng, "Neuronal topology"; Fred Grodins, "Respiratory system control." (Julia T. Apter, discussion leader): Otto Schmitt, keynote speaker, "A new mathematics for biologists—the next five years of biomathematics." Participants selected from audience, "Current problems in biomathematics."

31 July. (E. C. DeLand, discussion leader): P. Green, "Problems of sensorimotor structure"; Gerhard Werner, "Topology of body representation in primate cerebral cortex." (Robert Taylor, discussion leader): L. Slobodkin, "How animals minimize the probability of extinction"; Lee B. Lusted, "Receiver operating characteristic curves in decision making"; E. R. S. W. Crossman, "Optimization in socio-technical systems."

1 August. (Gerhard Werner, discussion leader): D. McRuer, "Optimization of human behavior among control systems"; G. Bekey, "Optimization in manual control systems"; R. Ledley, "Optimization and homeostasis."

Holderness School

Photosynthetic Organelles

Donald L. Keister, chairman; Anthony San Pietro, vice chairman.

Structure, Function, and Control Mechanisms

29 June. Martin D. Kamen, Introductory lecture.

30 June. Chloroplast structure and composition (L. P. Vernon, chairman): R. B. Park, L. P. Vernon. Membrane structure and development (L. Bogorad, chairman): P. Siekevitz, J. Schiff, P. Levine, A. Kahn, J. Lascelles.

1 July. Bacterial photosynthesis (R. K. Clayton, chairman): C. Sybesma, D. Fleischman, D. Mauzerall, D. Keister, J. Thornber. Control mechanisms in photosynthesis (H. Gest, chairman): D. Shemin, S. Kaplan, M Gibbs, J Preiss, J. Gibson.

2 July. Chloroplast photosystem II (B. Kok, chairman): H. T. Witt, G. Cheniae. Chloroplast photosystem I (G. Hoch, chairman): (speakers to be announced).

3 July. Membrane function and energy transduction (A. Jagendorf, chairman): B. Rumberg, R. McCarty, N. Good, J. Kahn, R. Dilley, A. Crofts. Special lectures: "The concept of the photosynthetic unit"; W. A. Arnold, "The physical approach"; H. Gaffron, "The biological approach."

4 July. Special topics.

Chemistry and Physics of Isotopes

William Spindel, chairman; V. J. Shiner, vice chairman.

21 July. Atom-molecule reactions—($H + H_2$) (Jacob Bigeleisen, chairman): D. J. LeRoy, "Experiments"; K. Morokuma, "Theory." Anharmonic isotope effects (Jacob Bigeleisen, chairman): John Overend, "Anharmonicities of the vibrations of polyatomic molecules"; V. W. Laurie, "Isotope effects on dipole moments.

22 July. Isotope effects on energy transfer (Max Wolfsberg, chairman): Clyde Hutchison, "Isotope effects on energy transfer in organic crystals"; E.

K. C. Lee, "Deuterium isotope effects observed in photochemical systems"; W. Siebrand, "Isotope effects on radiationless transitions." Isotope effects in geochemical processes (Sam Epstein chairman).

23 July. Cosmochemistry of isotopes (Dieter Heymann, chairman): R. O. Pepin, "Isotopic abundances of rare gases in the solar system"; T. P. Kohman, "Isotopic abundance variations in the solar system due to nuclear processes." P. A. Seegar, "Stellar nucleosynthesis and solar abundances." Isotope separation (Walter J. Haubach, chairman): E. von Halle, "A new German process for isotope separation"; Georghe Vasaru, "Isotope separation in Romania"; Walter J. Haubach, "Thermal diffusion research at Mound Laboratory."

24 July. Isotope effects in bio-organic systems (Stanley Seltzer, chairman). Y. Pocker, "Deuteron transfer in enzyme catalysis"; H. Bright, "Kinetic isotope effects in flavoprotein reactions." Contributed reports on research in progress (W. Spindel, chairman). Contributions should be sent to the Chairman at Belfer Graduate School of Science, Yeshiva University, 186th Street and Amsterdam Avenue, New York, New York 10033.

25 July. Present status of tunnelling effects (R. E. Weston, chairman): R. E. Weston, "Brief summary of evidence for tunnelling in gas-phase reactions"; E. F. Caldin, "Experimental work on tunnelling in proton transfer reactions in solution"; R. E. Davis, "A quest for quantum tunnelling."

Chemistry and Physics of Liquids

Cornelius J. Pings, chairman; Benjamin Widom, vice chairman.

11 August. (B. Widom, discussion leader): F. P. Buff, "Statistical mechanical theory of fluid interfaces"; J. Straub, "Measurements of surface tension of pure fluids in the critical region." (D. McIntyre, discussion leader): W. W. Webb, "Diffuse interface in critical liquid mixtures"; U. Ingard, "Light scattering from thermal fluctuations of liquid surfaces."

12 August. (G. M. Pound, discussion leader): H. Riess, "A critique of current nucleation theory"; P. P. Wegener, "Homogeneous nucleation of water and ethanol in supersonic flow." (P. A. Egelstaff, discussion leader): S. A. Rice, "Electronic states of van der Waals liquids"; J. E. Enderby, "Electronic states of liquid metal."

13 August. (W. H. Stockmayer, discussion leader): D. S. Eisenberg, "Structure and properties of water"; J. A. Barker, "Structure of liquid water by Monte Carlo calculations." (H. L. Friedman, discussion leader): F. H. Stillinger, Jr., "Statistical mechanical theories of water"; P. G. de Gennes, "Liquid crystals."

14 August. (C. J. Pings, discussion leader): Status reports—A. Levelt Sengers, "Scaling laws and critical exponents"; A. Rahman, "Molecular dynamics"; J. C. Thompson, "Metal-ammonia systems"; J. S. Rowlinson, "Mixtures"; B. Chu, "Scattering in the critical region"; R. Zwanzig, "Transport." (G. S. Rushbrooke, discussion leader): Open session for brief reports of current important work; speakers will be announced after the opening of the conference.

15 August. (F. H. Stillinger, Jr., discussion leader): M. E. Fisher, "Survey of theories of exponent renormalization at plait points"; R. B. Griffiths, "Boundedness of heat capacities and compressibilities at plait point curves"; W. I. Goldburg, "The effect of impurities on light scattering near the critical point."

Operations Research and Management Science

Sidney W. Hess, chairman; Richard E. Colgate, vice chairman.

18 August. Probabilistic forecasting (Milton L. Godfrey, chairman): George J. Feeney. Decision analysis (Sigurd L. Andersen, chairman): Ronald A. Howard.

19 August. Decision theory (George T. Foradori, chairman): Peter C. Fishburn. Long range planning (Keith Coad, chairman): Franz Edelman.

20 August. Non-linear programming (Donald S. McArthur, chairman): Kenneth Kortanek. O. R. at the local government level (George M. Parks, chairman): Louis C. Santone.

21 August. Are we solving the right problems? (Gifford H. Symonds, chairman): C. West Churchman. The profession and our societies (John F. Magee, chairman): Thomas E. Caywood and Robert M. Thrall.

22 August. Application of search theory to large scale operations including Mediterranean H-bomb search (Fred Schneider, chairman): Henry H. Richardson.

Geochemistry

Brian J. Skinner, co-chairman; Heinrich D. Holland, co-chairman.

Ore Deposits

25 August. Sulfide melts and sulfides in melts: B. J. Skinner, "Solubility controls of sulfides in hydrous and anhydrous magmas"; A. J. Naldrett, "Sulfide-oxide melts"; W. H. MacLean, L. A. Clark, and H. Shimazaki, "Liquidus phase relations in the system FeS-FeO-Fe_3O_4-Na_2O-SiO_2 and their geologic applications."

26 August. Water in silicate intrusions: H. P. Taylor, Jr., "Isotopic evidence for the origin of water in igneous rocks"; S. M. F. Sheppard, "Hydrogen and oxygen isotope studies of hydrothermal deposits"; B. B. Hanshaw, "Linear and convective hydrologic flow models near intrusives."

27 August. Experimental evidence for the composition of hydrothermal fluids: H. C. Helgeson, "Mass transfer among silicates, sulfides and hydrothermal solutions"; J. L. Haas, Jr., "The solution geochemistry of iron"; H. D. Holland, "The sulfur content of hydrothermal solutions"; J. J. Hemley, "The stability relations of alunite and compositional limits on hydrothermal solutions producing strong proton metasomatism."

28 August. Observational evidence for the origin and composition of hydrothermal fluids: E. Roedder, "Validity of T, P, and X data on ore fluids from fluid inclusion studies"; R. O. Rye and F. J. Sawkins, "Fluid inclusion and isotopic studies of the ores at Providencia, Mexico"; H. Ohmoto, "Fluid inclusion and isotopic studies of the ores at the Bluebell Mine, British Columbia."

29 August. Metallogenic provinces: R. E. Zartman, "The use of lead isotopes to distinguish between 'Laramide' and Precambrian mineralization in northwestern Montana and northern Idaho"; U. Petersen, "South American metallogenic provinces."

Providence Heights College

Plasma Physics

Burton D. Fried, co-chairman; Richard F. Post, co-chairman.

Nonlinear Phenomena in Collisionless Plasmas

23 June. Thomas Dupree, "Trapped particles and particle-wave interac-

tions"; Thomas M. O'Neil, "Large amplitude waves."

24 June. Marshall N. Rosenbluth and Ravinandra Sudan, "Mode coupling"; John Dawson, "Particle simulation and computer experiments."

25 June. Alec Galeev and Richard E. Aamodt, "Saturation effects on instabilities"; Paul H. Rutherford, "Fluctuations and anomalous diffusion."

26 June. Lonya Rudakov and Igor Alexeff, "Turbulent heating"; Roy Bickerton and Charles Kennel, "Collisionless shocks."

27 June. Roy Gould, "Plasma echoes."

Environmental Sciences: Air

August T. Rossano, Jr., chairman; James J. Morgan, vice chairman.

Atmospheric Aerosols

30 June–4 July. Introduction. Sources of atmospheric aerosols. Physical and chemical properties of atmospheric aerosols. Behavior and fate of atmospheric aerosols: dispersion; sinks; weather modification; atmospheric reactions; visibility reduction. Sampling and analysis of atmospheric aerosols. Effects of aerosols on biological systems; vegetation; animals; human. Social and economic effects of atmospheric aerosols. Air quality goals and criteria for atmospheric aerosols. Control of aerosol sources. Research needs.

Physical Metallurgy

J. Weertman, chairman; J. E. Hilliard, vice chairman.

7 July. (John Dorn, discussion leader): O. Sherby, "Creep of metals and metallic alloys above 0.4 T_m"; Henry Eyring, "Significant structures influencing viscous and plastic flow." (James C. M. Li, discussion leader): C. Barrett and W. Nix, "Experimental data on effective stress concept in high temperature creep of metals"; L. J. Cuddy, "Relationship between the internal stresses and structures developed during creep."

8 July. (W. J. McG. Tegart, discussion leader): G. B. Gibbs, "Theory of glide controlled by local obstacles: application to low and high temperature creep"; D. H. Avery, "Unidirectional and alternating strain behavior in a superplastic material." (John Hirth, discussion leader): T. Alden, "Recovery

creep and grain boundary sliding theories of superplasticity"; Wayne Hayden, "Dislocation processes during superplastic deformation of Fe-Ni-Cr alloys."

9 July. (D. T. Griggs, discussion leader): Neville Carter, "Preliminary results on hot creep of olivine"; C. B. Raleigh, "Mechanisms of creep in rocks"; H. C. Heard, "Steady-state flow in NaCl and $CaCO_3$"; (with formal discussion by N. Carter and C. B. Raleigh). (David Fischback, discussion leader): W. Green and E. Zukas, "High temperature creep of graphite"; A. Clauer, M. Seltzer and B. A. Wilcox, "High temperature creep of oxides."

10 July. (John Hockett, discussion leader): R. Arsenault, "The effects of internal stress on low temperature creep of BCC metals"; H. Conrad and G. Sargent, "Stress relaxation and thermally activated deformation in titanium at low temperatures"; Mark Meier, "The flow of glaciers: creep, slip, and gallop."

11 July. (N. J. Grant, discussion leader): George S. Ansell, "Steady-state creep of two phase systems"; B. H. Kear and G. R. Leverant, "Creep mechanisms in γ/γ' nickel base alloys."

Molecular Pathology

Robert M. O'Neal, chairman; Henry C. Pitot, vice chairman.

14 July. R. V. Rice, "Ultrastructure of the smooth muscle cell and its contractile proteins"; J. Marshall, "Physiology of the smooth muscle cell"; J. Kendrick-Jones, "Assembly of paramyosin molecules and the filamentous organization of invertebrate smooth muscle"; B. Panner, "Contractile protein in smooth muscle."

15 July. R. Nachman, "Contractile proteins in platelets"; G. Gasic, "Contractile properties of the cell membrane"; H. Puchtler, "Histochemistry of smooth muscle"; B. Lane, "Structure and function of smooth muscle."

16 July. R. Ross, "Hormonal response of the myometrium"; W. A. Thomas, "Cultured smooth muscle cells"; M. Ross, "Physiologic conversion of undifferentiated cells to smooth muscle"; R. Ellis, "The myoepithelial cell."

17 July. D. Haust, "Alternate potentials of the smooth muscle cell in health and disease"; J. Wiener, "Smooth muscle cells in experimental vascular disease"; R. Wissler, "Role of the

smooth muscle cell in atherosclerosis."

18 July. G. Majno, "Contractility of endothelial cells"; C. Becker, "Demonstration of contractile protein in endothelium, cells of heart valves, endocardium, intima, arteriosclerotic plaques, and in Aschoff bodies of rheumatic heart disease."

Quantum Solids and Fluids

A. S. Barker, co-chairman; Gerald D. Mahan, co-chairman.

Optical Properties of Metals

21 July. Introduction. (Speaker to be announced.) Photoemission (H. D. Hagstrum, chairman): D. E. Eastman, "Photoemission in metals." Alkali metals: N. V. Smith, "Optical studies of alkali metals."

22 July. Optical spectra (H. Philipp, chairman): U. Gerhardt, "Electronic structure of Cu and Ni from piezoreflectivity"; G. F. Dresselhaus, "One electron theory of interband transitions"; H. E. Bennett, "Optical plasmons and anomalous skin effect in silver"; A. J. Sievers, "Far infrared absorption in metals."

23 July. Surface plasmons (P. A. Wolff, chairman): D. Beaglehole, "The optical excitation of surface plasmons"; R. H. Ritchie, "Surface plasmons." Light scattering (E. Burstein, chairman): A. Mooradian, "Light scattering from electrons in solids"; P. M. Platzman, "X-ray scattering from electrons in metals."

24 July. Alloys (F. Abéles, chairman): S. Schnatterly, "Optical reflectivity studies of magnetic alloys"; B. I. Halperin, "Optical studies of antiferromagnetism in chromium and its alloys."

25 July. Electron energy loss: H. Raether, "Electron energy loss in metals."

Animal Cells and Viruses

George K. Hirst, chairman; James Darnell, vice chairman.

28 July–1 August. Boyce W. Burge, "Arboviruses"; R. Walter Schlesinger, "Adenoviruses"; Walter Eckhart, "DNA tumor viruses"; Peter K. Vogt, "RNA tumor viruses"; Donald F. Summers, "Polioviruses"; W. K. Joklik, "Reoviruses"; Purnell Choppin, "Myxoviruses"; Howard Green, "Cell fusion"; Leonard Warren, "Animal cell membranes."

Chemistry and Physiology of Odor and Flavor

Lloyd M. Beidler, chairman; David Moulton, co-vice chairman; Amos Turk, co-vice chairman; Irwin Hornstein, co-vice chairman.

4–8 August. Anatomical correlates of taste and odor. Selection of primary odors. Isolation of receptor proteins. Odor selection and purity. Molecular structure in taste and odors. Volatile analysis. Organoleptic evaluation. Recent advances in taste enhancers and modulators. Odors and animal behavior.

Biochemistry in Agriculture

A. Carl Leopold, chairman; Edward F. Rogers, vice chairman.

11 August. (G. F. Stewart, discussion leader): R. D. O'Brien, "An approach to the isolation of acetylcholine receptors"; R. J. Magee, "Chemical factors relating to organophosphorus insecticides"; Y. P. Sun, "Toxic interactions-insecticides"; G. C. LaBrecque, "Recent developments in insect population control with chemosterilants"; G. P. Georghiou, "Genetic bases of resistance to insecticides."

12 August. (E. F. Rogers, discussion leader): B. G. von Schmeling, "The search for systemic fungicides; their specificity, structure and activity relationships"; D. C. Erwin, "Possibilities and problems in control of verticillium wilt with chemotherapeutants"; J. W. McFarland, "Modern anthelmintic agents in agriculture"; T. A. Hymas, "Coccidiostats—past, present, and future."

13 August. (R. E. Cleland, discussion leader): A. B. Pardee, "Membrane transport proteins"; J. B. Hanson, "Ion transport in plant mitochondria"; E. Epstein, "Ion transport across plant cell membranes"; W. R. Benson, "Some current chemical research on pesticides at F.D.A."

14 August. (A. C. Page, discussion leader): L. Rappaport, "Regulation of dormancy in buds"; P. F. Wareing, "Abscisic acid and its action in plants"; H. N. Cathy, "Synthetic chemicals which limit plant growth"; J. Heslop-Harrison, "Some aspects of reproductive development in plants."

15 August. (A. C. Leopold, discussion leader): W. D. Mitchell, "Regulation of photoperiodic flowering"; C. E. Hess, "Naturally occurring growth substances regulating root initiation."

Postharvest Physiology

P. H. Heinze, chairman; H. K. Pratt, vice chairman.

18 August. Physiological phenomena of maturation and senescence (general) (J. B. Biale, discussion leader): A. C. Hulme. External control of maturation and senescence (R. Ulrich, discussion leader): L. L. Morris.

19 August. Physiological and biochemical problems in the postharvest handling of crops: metabolic disturbances, chilling, etc. (J. M. Lyons, discussion leader): I. Uritani and B. McGlasson.

20 August. The role of ethylene in senescence and other aspects of metabolism (M. Lieberman, discussion leader): H. Pratt and H. Imaseka. Hormonal control of aging (F. Abéles, discussion leader): Daphne Osborne and A. C. Leopold.

21 August. Protein and nucleic acid metabolism during maturation and senescence (J. E. Varner, discussion leader): D. R. Dilley and A. Richmond. Enzyme regulatory mechanisms of maturation and senescence (G. C. Laties, discussion leader): Roy Young and Joseph Sacher.

22 August. Membranes and organelles: structure, composition and changes during maturation and senescence (F. W. Mercer, discussion leader): W. Thomson and P. Mazliak.

Laser Interaction with Matter

Harlow G. Ahlstrom, co-chairman; Petras V. Avizonis, co-chairman.

25 August. Laser glass (Alex Glass, chairman): G. Young, "American Optical glass"; H. Lee, "Owens-Illinois glass"; (speaker to be announced), "C.G.E. glass"; J. Swain, "Survey of laser glasses." Laser devices (R. J. Collins, chairman): J. Swain, "Disk lasers"; E. D. Jones, "Picosecond lasers"; R. Rudder, "Subnanosecond lasers."

26 August. Nanosecond pulse heating (R. Kidder, chairman): D. H. Polk, (speaker to be announced), J. L. Bobin. Picosecond pulse heating (R. Osborne, chairman): R. Kidder, J. Shearer, and M. J. Lubin.

27 August. Injection (A. Bishop, chairman): P. Saunders, E. Fabre, M. J. Lubin, A. Haught, and W. J. Fader. Diagnostics (F. Ribe, chairman): M. A. Duguay and S. T. Shapiro, "Picopulses"; A. G. Englehardt, "Thomson scattering." Business meeting.

28 August. Long wavelength plasma heating (A. Kolb, chairman): John Dawson, R. Kidder, and A. Hertzberg. Colliding plasmas (John Walsh, chairman): G. J. Yevick and (speaker to be announced).

29 August. Lasers and CTR in panel discussion (P. V. Avizonis and H. G. Ahlstrom, moderators): panel: J. Dawson, R. Kidder, A. Hertzberg, J. Tuck, P. Veyrie, A. Bishop, N. Basov, A. Haught.

Calendar of Events

National Meetings

March

20–22. American Acad. of **Facial Plastic and Reconstructive Surgery**, New Orleans, La. (J. R. Anderson, 111 Tulane Ave., New Orleans 70112)

23–29. American **Crystallographic** Assoc., Seattle, Wash. (W. L. Kehl, Gulf Research and Development Co., P.O. Box 2038, Pittsburgh, Pa. 15230)

24–25. **Basis of Decision**, Brooklyn, N.Y. (C. McC. Brooks, Downstate Medical Center, State Univ. of New York, 450 Clarkson Ave., Brooklyn 11203)

24–25. **Laser Safety** Conf. and Workshops, 2nd, Cincinnati, Ohio. (L. Goldman, Laser Lab., Children's Hospital Research Foundation of the Medical Center of the Univ. of Cincinnati, Cincinnati)

24–27. American **Physical** Soc., Philadelphia, Pa. (W. W. Havens, Jr., The Society, 335 E. 45 St., New York 10017)

24–28. **Desalination**: Methods and Applications, Berkeley, Calif. (Continuing Education in Engineering, Univ. Extension, Univ. of California, 2223 Fulton St., Berkeley 94720)

25–27. American **Laryngological, Rhinological and Otological** Soc., Inc., New Orleans, La. (V. R. Alfaro, 917 20th St., NW, Washington, D.C. 20006)

26–28. National **Business Aircraft** Mfg. and Engineering Display, Wichita, Kan. (A. J. Favata, SAE Headquarters, 2 Pennsylvania Plaza, New York 10001)

26–28. Symposium on the **Engineering Aspects of Magnetohydrodynamics**, 10th, Cambridge, Mass. (J. Klepeis, Arrangements Committee, Avco Everett Research Lab., 2385 Revere Beach Parkway, Everett, Mass. 02149)

26–28. **George H. Hudson** Symp., 4th, Plattsburgh, N.Y. (M. H. Tourin, State Univ. College of Arts and Sciences, Plattsburgh 12901)

27. **Biochemistry, Assay and Nutritional Value of Vitamin E**, Rosemont, Ill. (W. Davin, Dawes Labs., Inc., 450 State St., Chicago Heights, Ill. 60411)

27–28. **Technical Writing** Inst., Lubbock, Tex. (M. Miles, Technical Writing Inst., Dept. of English, Texas Technological College, Lubbock 79409)

27–29. **Geological** Soc. of America, South-Central Section, Lawrence, Kans., "Basement Rocks of the Mid-Continent" and "Paleo-Environmental Implications of Palynology." (W. M. Merrill, Dept. of Geology, Univ. of Kansas, Lawrence 66044)

28–29. American **Otological** Soc., Inc., New Orleans, La. (W. H. Bradley, 1100 E. Genesee St., Syracuse, N.Y.)

28–30. American **Psychosomatic** Soc., Inc., 26th, Cincinnati, Ohio. (H. Weiner, 265 Nassau Rd., Roosevelt, N.Y. 11575)

28–2. Seminar of the American **Cancer Soc. for Science Writers**, 11th, New Orleans, La. (J. Clark, American Cancer Soc., 219 E. 42 St., New York 10017)

30–2. American **Orthopsychiatric** Assoc., New York, N.Y. (M. F. Langer, Room 1313, 1790 Broadway, New York 10019)

31. American **Astronomical** Soc., Honolulu, Hawaii. (G. C. McVittie, Univ. of Illinois Observatory, Urbana 61801)

31–2. **Advances in Water Quality Improvement**–Physical and Chemical Processes, Austin, Tex. (Center for Research in Water Resources, Univ. of Texas, Rt. 4, Box 189, Austin 78757)

31–2. **Metals Engineering** Conf., Washington, D.C. (R. J. Cepluch, Hartford Steam Boiler Inspection and Insurance Co., 56 Prospect St., Hartford, Conn. 06102)

31–2. Education for the **Peaceful Uses of Nuclear Explosives**, Tucson, Ariz. (L. E. Weaver, Dept. of Nuclear Engineering, Univ. of Arizona, Tucson 85721)

31–2. American Assoc. of **Thoracic Surgery**, San Francisco, Calif. (T. B. Ferguson, Suite 311, 7730 Carondelet Ave., St. Louis, Mo. 63110)

April

1. Arkansas Acad. of **Science**, Fayetteville, Ark. (G. E. Templeton, Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701)

1–2. **Advanced Techniques in Real-Time Simulation**, Philadelphia, Pa. (University City Science Center, Science Center Bldg. No. 1, 3401 Market St., Philadelphia 19104)

1–3. **Numerical Control** Soc., 6th, Cincinnati, Ohio. (P. Senkiw, Advanced Computer Systems, Inc., 2185 S. Dixie Ave., Dayton, Ohio 45409)

1–4. American Assoc. of **Anatomists**, Boston, Mass. (R. T. Woodburne, Dept. of Anatomy, Univ. of Michigan, East Medical Bldg., Ann Arbor 48104)

2. **Oral Cancer** Symp., 7th, Poughkeepsie, N.Y. (Sister M. A. Elizabeth, Poughkeepsie, N. Y.)

2–4. **Picture Bandwidth Compression**, Cambridge, Mass. (E. E. Witchi, Boston Section, IEEE, 31 Channing St., Newton, Mass. 02158)

3–4. American Soc. for Engineering **Education**, Fayetteville, Ark. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

3–5. Southern Soc. for **Philosophy and Psychology**, Miami, Fla. (D. Browning, Dept. of Philosophy, Univ. of Miami, Coral Gables, Fla.)

3–5. National Conf. on **Schizophrenia**, Topeka, Kan. (Dept. of Education, Menninger Foundation, Box 829, Topeka 66601)

7–9. **Operations Research** Seminar, Cleveland, Ohio. (Office of Public Relations, Case Western Reserve Univ., University Circle, Cleveland 44106)

7–11. **Public Health Aspects of Peaceful Uses of Nuclear Explosives**, Las Vegas, Nev. (Symp. Committee, Southwestern

Radiological Health Lab., P.O. Box 15027, Las Vegas 89114)

8–9. **High Performance Composites**, 4th symp., St. Louis, Mo. (G. L. Esterson, Box 1048, Washington Univ., St. Louis 63130)

8–11. **Acoustical** Soc. of America, 71st, Philadelphia, Pa. (B. Goodfriend, 335 E. 45 St., New York 10017)

9–10. American Assoc. of **Planned Parenthood Physicians**, 7th, San Francisco, Calif. (G. C. Denniston, The Association, 515 Madison Ave., New York 10022)

9–11. **Textile Research** Inst., 39th, New York, N.Y. (P.O. Box 625, Princeton, N.J.)

9–12. **Geological** Soc. of America, southeastern section, Columbia, S.C. (D. J. Colquhoun, Dept. of Geology, Univ. of South Carolina, Columbia 29208)

10. Health Conf. on **Diet, Exercise, and Cardiovascular Disease**, Philadelphia, Pa. (R. L. Kunes, Heart Assoc. of Southeastern Pennsylvania, 318 S. 19 St., Philadelphia)

10–12. **Population** Assoc. of America, Atlantic City, N.J. (A. L. Ferriss, Russell Sage Foundation, 1755 Massachusetts Ave., NW, Washington, D.C. 20036)

10–16. American **Leprosy Missions**, 10th PHS seminar, Carville, La. (American Leprosy Missions, 297 Park Ave. South, New York 10010)

11–12. American Soc. for **Engineering Education** (North Central Section mtg.), Windsor, Ont., Canada. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

12. New Jersey Acad. of **Science**, East Orange. (F. F. Katz, Seton Hall Univ., South Orange, N.J. 07079)

12–16. American Soc. of **Abdominal Surgeons**, Las Vegas, Nev. (B. F. Alfano, 675 Main St., Melrose, Mass. 02176)

12–13. National Guild of **Catholic Psychiatrists**, Washington, D.C. (P. A. Santucci, 4962 Hampden Lane, Bethesda, Md. 20014)

12–13. **Histochemical** Soc., 20th, Atlantic City, N.J. (G. M. Lehrer, Div. of Neurochemistry, Mount Sinai Medical School, 11 E. 100 St., New York 10029)

13–16. **Plant Engineering and Maintenance**, 12th conf., Pittsburgh, Pa. (B. J. Cross, Lederle Labs., Pearl River, N.Y. 10965)

13–17. American Assoc. of **Cereal Chemists**, 54th, Chicago, Ill. (R. Tarleton, 1955 University Ave., St. Paul, Minn. 55104)

13–17. Pacific Coast **Oto-Ophthalmological** Soc., San Francisco, Calif. (F. A. Sooy, Dept. of Otolaryngology, Univ. of California Medical Center, San Francisco 94122)

13–18. American Socs. for **Experimental Biology**, Atlantic City, N.J. (J. F. A. McManus, FASEB, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (R. E. Knotti, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. American Inst. of **Nutrition**, Atlantic City, N.J. (J. Waddell, 9650 Rockville Pike, Bethesda, Md. 20014)

13–18. American Soc. for **Pharmacology and Experimental Therapeutics**, Inc., Atlantic City, N.J. (E. B. Cook, Executive Officer, The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

Falls, Iowa. (R. Hanson, Dept. of Science, Univ. of Northern Iowa, Cedar Falls 50613)

18–20. American Soc. of **Internal Medicine**, Chicago, Ill. (A. V. Whitehall, 3410 Geary Blvd., San Francisco, Calif. 94118)

20–23. Institute of **Environmental Sciences**, 15th, Anaheim, Calif. (Technical Program Committee, The Institute, 940 E. Northwest Highway, Mount Prospect, Ill. 60056)

20–23. West Virginia Acad. of **Ophthalmology and Otolaryngology**, Greenbrier. (J. E. Blaydes, Jr., 107 Federal St., Bluefield, W.Va.)

20–23. Assoc. for **Research in Ophthalmology**, Sarasota, Fla. (H. E. Kaufman, Office of Secretary-Treasurer, Dept. of Ophthalmology, Univ. of Florida Medical College, Gainesville 32601)

20–24. American **Oil Chemists'** Soc., San Francisco, Calif. (C. H. Hauber, The Society, 35 E. Wacker Drive, Chicago, Ill. 60601)

20–25. Society of **Motion Picture and Television Engineers**, 105th, Miami Beach, Fla. (Executive Secretary, 9 E. 41 St., New York 10017)

21–22. American Soc. for **Artificial Internal Organs**, Atlantic City, N.J. (E. F. Bernstein, Dept. of Surgery, Univ of Minnesota Medical School, Minneapolis 55455)

21–22. **Temperature Measurements** Soc., 6th, Hawthorne, Calif. (C. L. Vaughn, Paper Selection Committee, % The Society, P.O. Box 156, Palos Verdes Estates, Calif. 90274)

21–23. **Effective Use of Computers in the Nuclear Industry**, Knoxville, Tenn. (B. F. Maskewitz, Oak Ridge Natl. Lab., P.O. Box X, Oak Ridge, Tenn. 37830)

21–24. American **Industrial Health** Conf., Houston, Tex. (American Industrial Health Conf., 55 E. Washington St., Chicago, Ill. 60602)

21–25. **Astrodynamics and Related Planetary Sciences**, Washington, D.C. (J. W. Siry, NASA Goddard Space Flight Center, Code 550, Greenbelt, Md. 20771)

21–25. American College of **Physicians**, 50th, Chicago, Ill. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia, Pa.)

21–25. **Solid State Chemistry** Conf., 2nd, Scottsdale, Ariz. (L. Eyring and M. O'Keeffe, Dept. of Chemistry, Arizona State University, Tempe 85281)

21–26. American Acad. of **Neurology**, Washington, D.C. (S. A. Nelson, 4005 W. 65 St., Minneapolis, Minn. 55435)

22–23. National **Relay** Conf., 17th, Stillwater, Okla. (D. D. Lingelbach, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74074)

22–24. **Telemetering** Conf., Washington, D.C. (R. W. Rochelle, NASA Goddard Space Flight Center, Code 710, Greenbelt, Md. 20771)

22–25. American College **Health** Assoc., Oklahoma City, Okla. (J. W. Dilley, 2807 Central Ave., Evanston, Ill. 60201)

22–25. National **Pollution** Conf., Houston, Tex. (The Conference, 4710 Greeley St., Houston 77006)

23–24. **Electric Process Heating in Industry**, Inst. of Electrical and Electronics Engineers, Philadelphia, Pa. (G. Bobart, Westinghouse Electric Corp., Box 300, Sykesville, Md. 21784)

23–25. Institute of **Electrical and Electronics Engineers** Conv., San Antonio,

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Tex. (W. H. Hartwig, Dept. of Electrical Engineering, Engineering Science Bldg. 439, University of Texas, Austin 78712)

23–25. **Nondestructive Evaluation of Components and Materials in Aerospace, Weapons Systems, and Nuclear Applications**, San Antonio, Tex. (C. E. Lautzenheiser, Southwest Research Inst., 8500 Culebra Rd., San Antonio 78228)

24–26. American Acad. of **Physical Medicine and Rehabilitation**, Chicago, Ill. (C. C. Herold, 30 N. Michigan Ave., Chicago 60602)

24–26. New York **Roentgen** Soc., New York, N.Y. (S. H. Madell, 1 E. 82 St., New York 10028)

24–26. Illinois State Acad. of **Science**, Decatur, Ill. (K. Harmet, Dept. of Biology, Northern Illinois Univ., DeKalb 60115)

24–26. Ohio Acad. of **Science,** Delaware. (J. H. Melvin, Ohio Acad. of Science, 505 King Ave., Columbus 43210)

24–26. Annual **Wildflower** Pilgrimage, 19th, Gatlinburg, Tenn. (Gatlinburg Chamber of Commerce, Box 527, Gatlinburg, Tenn. 37738 or E. E. C. Clebsch, Dept. of Botany, Univ. of Tennessee, Knoxville 37916)

24–27. Association of **Clinical Scientists**, Mobile, Ala. (R. P. MacFate, 125 N. Rutledge St., Pentwater, Mich. 49449)

25–26. American Soc. for **Engineering Education**, Rocky Mountain Section mtg., Logan, Utah. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

25–26. American Society of **Group Psychotherapy and Psychodrama**, New York, N.Y. (A. Manzoeillo, P.O. Box 311, Beacon, N.Y. 12508)

25–26. Nebraska Acad. of **Science**, Lincoln. (C. B. Schultz, 101 Morrill Hall, University Museum, Univ. of Nebraska, Lincoln 68508)

25–26. South Dakota Acad. of **Science**, Vermillion. (T. Van Bruggen, Dept. of Botany, Univ. of South Dakota, Vermillion 57069)

26. American Soc. for **Engineering Education**, Illinois-Indiana Section Mtg., Terre Haute, Ind. (E. H. Wright, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

26–27. **Eye Bank** Assoc. of America, New Orleans, La. (W. Clark, 211 S. Saratoga St., New Orleans 70112)

27–30. American Soc. of **Maxillofacial Surgeons**, San Francisco, Calif. (D. Goulian, Jr., 116 E. 68 St., New York 10021)

27–30. **Southwestern and Rocky Mountain** Div. of AAAS, Colorado Springs, Colo. (M. G. Anderson, Dept. of Biology, New Mexico State Univ., Las Cruces 88001)

28. National **Cystic Fibrosis** Research Foundation, Atlantic City, N.J. (W. H. Boyer, 202 E. 44 St., New York 10017)

28–29. **Photo-Optical Techniques in Simulators**, South Fallsburgh, N.Y. (Photo-Optical Techniques in Simulators Seminar Committee, % SPIE Natl. Office, P.O. Box 288, Redondo Beach, Calif. 90277)

28–30. American Inst. of **Aeronautics and Astronautics**, Cincinnati, Ohio. (J. Lukasiewicz, ARO, Inc., Arnold Engineering Development Center, Arnold Air Force Station, Tenn. 37389)

28–30. Association of **Iron and Steel Engineers**, Detroit, Mich. (Managing Direc-

tor, The Association, 1010 Empire Bldg., Pittsburgh, Pa.)

28–30. American **Radium** Soc., Philadelphia, Pa. (J. V. Blady, 2201 Benjamin Franklin Parkway, Philadelphia 19130)

28–30. American **Vacumm** Soc., Los Alamos, N.M. (D. G. Schreiner, New Mexico Section, AVS, P.O. Box 11451, Albuquerque 87112)

28–30. **Water and Air** Conf., 6th, Assoc. of the Pulp and Paper Industry, Jacksonville, Fla. (H. O. Teeple, 360 Lexington Ave., New York 10017)

28–1. American College of **Obstetricians and Gynecologists**, Bal Harbour, Fla. (M. Newton, 79 W. Monroe St., Chicago, Ill. 60603)

28–1. American **Physical** Soc., Washington, D.C. (W. W. Havens, Jr., The Society, 335 E. 45 St., New York 10017)

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

29. **Cystic Fibrosis** Club, 10th, Atlantic City, N.J. (W. W. Waring, Tulane Univ. Medical School, 1430 Tulane Ave., New Orleans, La. 70112)

29. American Soc. of **Therapeutic Radiologists**, Philadelphia, Pa. (C. R. Bogardus, Jr., Univ. of Oklahoma Medical Center, Oklahoma City 73114)

29–1. Society of **Aerospace Material and Process Engineering**, Los Angeles, Calif. (Mail Station D-133, Hughes Aircraft Co., Centinela Ave. and Teale St., Culver City, Calif. 90230)

29–2. American **Chemical** Soc. (Div. of Rubber Chemistry), Los Angeles, Calif. (G. G. Winspear, R. T. Vanderbilt Co., Inc., 230 Park Ave., New York 10017)

29–3. **Student American Medical** Assoc., Chicago, Ill. (C. Hewitt, 2635 Flossmoor Road, Flossmoor, Ill. 60422)

30–2. **Chemical Marketing** Research Assoc., New York. (R. H. Mattson, Glidden-Durkee, Div. of SCM Corp., 900 Union Commerce Bldg., Cleveland, Ohio 44115)

30–2. **Electronic Components** Conf., Washington, D.C. (J. A. O'Connell, Electronic Components Conf., ITT Headquarters, 320 Park Ave., New York 10022)

30–2. American **Surgical** Assoc., Cincinnati, Ohio. (C. R. Hanlon, 1325 S. Grand Blvd., St. Louis, Mo. 63104)

30–3. Midwest **Anesthesiology** Conf., Chicago, Ill. (A. P. Winnie, Illinois Soc. of Anesthesiologists, 1825 W. Harrison St., Chicago 60612)

30–3. American Assoc. of **Plastic Surgeons**, San Francisco, Calif. (R. M. McCormack, 260 Crittenden Blvd., Rochester, N.Y. 14620)

30–4. Continual Education of the American Acad. of **Oral Medicine**, 23rd, San Juan, Puerto Rico. (W. M. Greenhut, 124 E. 84 St., New York 10028)

International and Foreign Meetings

April

7–11. Federation of European **Biochemical** Societies, 6th, Madrid, Spain. (Secretariat, Centro de Investigaciones Biologicas, Velazquez, 144, Madrid 6)

8–11. International Symp. on **Laboratory Animals**, Washington, D.C. (B. F. Hill,

Charles River Breeding Labs., Inc., Wilmington, Mass.)

9–12. **British Medical** Assoc., clinical mtg., Valletta, Malta. (British Medical Assoc. House, Tavistock Sq., London, W.C.1, England)

14–17. **Cleft Palate**, intern. congr., Houston, Tex. (B. J. McWilliams, Cleft Palate Research Center, Univ. of Pittsburgh, 313 Salk Hall, Pittsburgh, Pa. 15213)

15–17. **Civil Engineering Problems of the South Wales Valleys**, Cardiff, England. (Institution of Civil Engineers, Great George St., London, S.W.1, England)

15–18. International **Magnetics** Conf., Amsterdam, Netherlands. (T. Holtwijk, Philips Research Labs., Eindhoven, Netherlands)

17–18. British Inst. of **Radiology**, London, England. (British Inst. of Radiology, 32 Welbeck St., London, W.1)

19–27. Yugoslav Seminar and Exhibition of **Regulation, Measuring and Automation-Jurema** 1969, 14th, Zagreb. (Jurema, Unska U1, P.O.B. 123, Zagreb)

21–23. Canadian Inst. of **Mining and Metallurgy**, 71st, Montreal, Canada. (Executive Director, The Institute, Suite 906, 1117 St. Catherine St. W., Montreal 2)

21–25. **Switching Techniques for Telecommunication Networks**, London, England. (Conference Dept., Institution of Electrical Engineers, London, W.C.2)

21–26. Canadian **Pulp and Paper** Assoc., 10th, Vancouver, B.C. (W. K. Voss, Ontario Paper Co. Ltd., Thorold, Ont.)

22–25. **Cotton Textile Research**, 1st intern. symp., Paris, France. (Institut Textile de France, 23 rue des Abondances, 92, Boulogne, France)

22–29. **Hydrology of Deltas**, intern. symp., Bucharest, Rumania. (A. I. Johnson, Water Resources Div., U.S. Geological Survey, Denver, Colo. 80225)

28–2. Symposium on **Radiation-Induced Carcinogenesis**, Athens, Greece. (R. N. Mukherjee, Unit of Radiation Biology, Intern. Atomic Energy Agency, Karntner Ring 11–13, A-1010 Vienna, Austria)

May

5–8. **Instrumentation in Aerospace Simulation Facilities**, 3rd intern. congr., Farmingdale, N.Y. (C. R. Spitzer, MS-236, NASA Langley Research Center, Hampton, Va. 23365)

5–8. International **Microwave** Symp., Dallas, Tex. (J. B. Horton, MS 905, Texas Instrument Co., Box 5012, Dallas 75222)

5–9. Commonwealth **Mining and Metallurgical** Congr., 9th, London, England. (Congress Secretary, Commonwealth Council of Mining and Metallurgical Institutions, 44 Portland Pl., London, W.1)

6–8. **Nuclear Electronics** Symp., Ispra, Italy. (L. Stanchi, C.C.R. Euratom, 21020 Ispra)

6–8. **Power Thyristors and Their Applications**, London, England. (Conference Dept., Institution of Electrical Engineers, Savoy Pl., London, W.C.2)

6–8. **Radiosensitizing and Radioprotective Drugs**, 2nd intern. symp., Rome, Italy. (H. Moroson, Sloan-Kettering Inst. for Cancer Research, Donald S. Walker Lab., 145 Boston Post Rd., Rye, N.Y.)

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AAAS also sponsors the Gordon Research Conferences, informal week-long seminars that bring together active research workers from laboratories in the U.S. and abroad for consideration of new directions in chemical research.

BOOKS RECEIVED

(Continued from page 1054)

and W. West. Interscience (Wiley), New York, ed. 2, 1968. x + 486 pp., illus. $16.95. Technique of Organic Chemistry, vol. 9.

Chemistry. A Study of Matter. Alfred B. Garrett, W. T. Lippincott, and Frank Henry Verhoek. Blaisdell (Ginn), Waltham, Mass., 1968. x + 726 pp., illus. $11.75.

Coding and H-ICDA (Hospital Adaptation of ICDA). A Programmed Instruction Manual. Based on *Programmed Instruction in the Use of ICDA*, originally prepared by William H. Kincaid, John H. Griffith, and May Morrison. Revised by William H. Kincaid, Robert H. Seeman, and Karel M. Weigel. Commission on Professional and Hospital Activities, Ann Arbor, Mich., 1968. vi + 106 pp. Paper, $3.

The Columbus. Picture Analysis of Growth Towards Maturity. A Series of 24 Pictures and a Manual. M. J. Langeveld. Translated by G. Uildriks. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). iv + 72 pp. + 24 plates. Paper, $14.15.

Communication Theory Principles. Charles W. McMullen. Macmillan, New York; Collier-Macmillan, London, 1968. xvi + 416 pp., illus. $13.95.

Current Problems of Lower Vertebrate Phylogeny. Proceedings of the 4th Nobel Symposium, Stockholm, 1967. Tor Ørvig, Ed. Interscience (Wiley), New York; Almqvist and Wiksell, Stockholm, 1968. 540 pp., illus. $35. Nobel Symposium 4.

Current Topics in Developmental Biology. Vol. 3. A. A. Moscona and Alberto Monroy, Eds. Academic Press, New York, 1968. xxvi + 230 pp., illus. $11.50.

The Dictionary of Exceptions to Rules of Russian Grammar. Sigrid Schacht. Elsevier, New York, 1968. xxviii + 196 pp. $9.50.

Drugs on the College Campus. Helen H. Nowlis. Anchor (Doubleday), Garden City, N.Y., 1969. xvi + 144 pp. Paper, 95¢.

Electron Waves and Resonances in Bounded Plasmas. Paul E. Vandenplas. Interscience (Wiley), New York, 1968. xiv + 226 pp., illus. $11.50.

Energetics and Mechanisms in Radiation Biology. Proceedings of a NATO Advanced Study Institute held at Portmeirion, Wales, 1967. Glyn O. Phillips, Ed. Academic Press, New York, 1968. xviii + 530 pp., illus. $22.50.

Fermentations et Vinifications. 2e Symposium International d'Oenologie, Bordeaux-Cognac, 1967. In two volumes. Institut National de la Recherche Agronomique, Paris, 1968. vi + 666 pp., illus. Paper, 68 F.

Filtering for Stochastic Processes with Applications to Guidance. Richard S. Bucy and Peter D. Joseph. Interscience (Wiley), New York, 1968. xviii + 198 pp. $12.95. Interscience Tracts in Pure and Applied Mathematics, No. 23.

Fluorescence and Allied Radiations. William Clement Casperson. Exposition Press, Jericho, N.Y., 1968. 82 pp., illus. $5.

Forest Tree Planting in Arid Zones. A. Y. Goor and C. W. Barney. Ronald

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Press, New York, 1968. x + 414 pp., illus. $15.

Fundamental Problems in Scanning. Based on a symposium sponsored by Argonne Cancer Research Hospital, Northwestern University School of Medicine, and Abbott Laboratories, Chicago, 1965. Alexander Gottschalk and Robert N. Beck, Eds. Thomas, Springfield, Ill., 1968. xiv + 410 pp., illus. $26.75.

The Germ-Free Animal in Research. M. E. Coates, H. A. Gordon, and B. S. Wostmann, Eds. Academic Press, New York, 1968. xx + 292 pp., illus. $11.50.

Giant Molecules. The Technology of Plastics, Fibers, and Rubber. Morris Kaufman. Doubleday, Garden City, N.Y., 1968. 192 pp., illus. Cloth, $5.95; paper, $2.45. Doubleday Science Series.

Gonadotropins 1968. Proceedings of the Workshop Conference, Vista Hermosa, Mor., Mexico, 1968. Eugenia Rosemberg, Ed. Geron-X, Los Altos, Calif., 1968. xxiv + 560 pp., illus. + 3 plates. $12.

Halides of the Second and Third Row Transition Metals. J. H. Canterford and R. Colton. Interscience (Wiley), New York, 1968. xx + 412 pp., illus. $15.95. Halides of the Transition Elements.

Herman Boerhaave. The Man and His Work. G. A. Lindeboom. Methuen, London, 1968 (U.S. distributor, Barnes and Noble, New York). xxiv + 454 pp., illus. + 34 plates. $22.50.

Hill Farmers of Nigeria. Cultural Ecology of the Kofyar of the Jos Plateau. Robert McC. Netting. University of Washington Press, Seattle, 1968. xx + 260 pp., illus. + 8 plates. $7.95. American Ethnological Society. Monograph 46.

Historical Archaeology. Ivor Noel Hume. Knopf, New York, 1969. xviii + 366 pp., illus. $10.

The History of the Earth's Crust. A Symposium, Goddard Institute for Space Studies, New York, 1966. Robert A. Phinney, Ed. Princeton University Press, Princeton, N.J., 1968. x + 246 pp., illus. + 2 plates. $13.50.

Human Migration. A Guide to Migration Literature in English, 1955–1962. J. J. Mangalam, with the assistance of Cornelia Morgan. University of Kentucky Press, Lexington, 1968. vi + 194 pp. $15.

Inflammation. Aetiopathogenetic, Clinical and Therapeutic Problems. Proceedings of an international symposium, Bologna, Italy, 1967. B. Silvestrini, S. Tura, and W. G. Spector, Eds. Excerpta Medica Foundation, Amsterdam, 1968. viii + 220 pp., illus. $15. Excerpta Medica International Congress Series No. 163.

Inorganic Electronic Spectroscopy. A. B. P. Lever. Elsevier, New York, 1968. xii + 420 pp., illus. $31.50. Physical Inorganic Chemistry, Monograph 1.

An Introduction to the Chemistry of Carbohydrates. R. D. Guthrie and John Honeyman. Oxford University Press, New York, ed. 3, 1968. viii + 144 pp., illus. Cloth, $7.20; paper, $4.

Logic, Methodology and Philosophy of Science III. Proceedings of the 3rd International Congress for Logic, Methodology and Philosophy of Science, Amsterdam, 1967. B. van Rootselaar and J. F. Staal, Eds. North-Holland, Amsterdam, 1968. xiv + 554 pp., illus. $22.50. Studies in Logic and the Foundations of Mathematics.

Lucrarile Institutului de Cercetari Veterinare si Biopreparate "Pasteur." Vol. 5, 1966. Redactia Revistelor Agricole, Bucharest, 1968. 500 pp., illus.

Malnutrition, Learning, and Behavior. Proceedings of an international conference, Cambridge, Mass., 1967. Nevin S. Scrimshaw and John E. Gordon, Eds. M.I.T. Press, Cambridge, 1968. xiv + 570 pp., illus. $12.50.

Mathematical Programming in Practice. E. M. L. Beale. Wiley, New York, 1968. xii + 196 pp., illus. $5.50. Topics in Operational Research.

Methods of Astrodynamics. Pedro Ramon Escobal. Wiley, New York, 1968. xiv + 344 pp., illus. $14.95.

Microbiology. A Programmed Presentation. William J. Payne and Dean R. Brown. Mosby, St. Louis, 1968. xii + 244 pp., illus. Spiral bound, $5.75.

Middle Age and Aging. A Reader in Social Psychology. Bernice L. Neugarten, Ed. University of Chicago Press, Chicago, 1968. xiv + 598 pp., illus. Cloth, $15; paper, $7.50.

Modern Fertility Guide. Practical Advice for the Childless Couple. Marie Pichel Warner. Funk and Wagnalls, New York, 1968. xii + 244 pp., illus. $5.95.

Moisissures Toxiques dans l'Alimentation. Claude Moreau. Lechevalier, Paris, 1968. 376 pp., illus. 140,000 F. Encyclopedie Mycologique, vol. 35.

Multicomponent Electrolyte Solutions. H. S. Harned and R. A. Robinson. Pergamon, New York, 1968. xiv + 110 pp., illus. $8. International Encyclopedia of Physical Chemistry and Chemical Physics, Topic 15, vol. 2.

The New University. John Lawlor, Ed. Columbia University Press, New York, 1968. viii + 200 pp. $4.50.

Nonlinear Programming. Sequential Unconstrained Minimization Techniques. Anthony V. Fiacco and Garth P. McCormick. Wiley, New York, 1968. xiv + 210 pp., illus. $9.95.

Notes on Cobordism Theory. Robert E. Stong. Princeton University Press, Princeton, N.J.; University of Tokyo Press, Tokyo, 1968. vi + 412 pp., illus. Paper, $7.50. Mathematical Notes.

The Nuclear Independent Particle Model. The Shell and Optical Models. A. E. S. Green, T. Sawada, and D. S. Saxon. Academic Press, New York, 1968. xiv + 370 pp., illus. $16.

Optical Properties and Band Structure of Semiconductors. David L. Greenaway and Günther Harbeke. Pergamon, New York, 1968. xii + 160 pp., illus. $9. International Series of Monographs in the Science of the Solid State, vol. 1.

Optical Properties of Dielectric Films. Proceedings of a symposium, Boston, 1968. Norman N. Axelrod, Ed. Electrochemical Society, New York, 1968. vi + 290 pp., illus. Paper, $9.

The Optimal Staging and Phasing of Multi-Product Capacity. Harold H. Wein and V. P. Sreedharan. Graduate School of Business Administration, Michigan State University, East Lansing, 1968. xiv + 134 pp., illus. $14.50. MSU Studies in Comparative and Technological Planning.

Organic Chemistry of Stable Free Radicals. A. R. Forrester, J. M. Hay, and R. H. Thomson. Academic Press, New York, 1968. xii + 406 pp., illus. $18.

Perceptrons: A Theory of Parallel Geometric Computation
by Marvin L. Minsky and Seymour Papert
It is the authors' view that although the time is not yet ripe for developing a really general theory of automata and computation, it is now possible and desirable to move more explicitly in this direction. This can be done by studying in an extremely thorough way well-chosen particular situations that embody the basic concepts. This is the aim of the present book, which seeks general results from the close study of abstract versions of devices known as perceptrons.

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Francis Bitter:
Selected Papers and Commentaries
edited by Thomas Erber and Clarence M. Fowler
Francis Bitter (1902–1967) left behind him a current of influence that surges on today, strong and lively. There is the Francis Bitter National Magnet Laboratory at M.I.T. There is a generation of students and researchers whom Bitter trained as a devoted teacher and as the author of widely used undergraduate texts. And, most pertinent of all, there is the monumental collection of scientific papers in which his results and his way of doing physics are preserved. This volume commemorates Bitter by reprinting a selection of the most significant of these papers.
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Proceedings of the Third Harvard-Smithsonian Conference on Stellar Atmospheres
edited by Owen Gingerich
Astrophysicists from nineteen countries met in Cambridge in April 1968 to consider the theory and observation of normal stellar atmospheres. The Proceedings contain not only the invited reviews and contributed papers, but also the discussions. In addition, the book contains physical and spectral data for a reference set of about sixty stellar atmospheres in the effective temperature range from 4000° to 50,000°.

The principal review papers include "Properties of Synthetic Spectra and Their Sensitivity to Uncertainties of the Physical Theory" by Stephen Strom, Smithsonian Astrophysical Observatory; "The Empirical Basis of Quantitative Spectral Classification" by Charles Whitney, Smithsonian Astrophysical Observatory; "The Comparison of Synthetic Spectra with Real Spectra" by Roger Cayrel, Observatoire de Paris; and "Astronomical Problems Influencing the Selection of Parameters for Model Stellar Atmospheres" by Bengt Strömgren, Copenhagen Observatory.
$12.50

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COMMUNICATIONS FROM CAMBRIDGE

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Orthopsychiatry and the Law. A Symposium. Morton Levitt and Ben Rubenstein, Eds. Published for the American Orthopsychiatric Association by Wayne State University Press, Detroit, 1968. 256 pp. Paper, $4.95.

Overlive. Power, Poverty, and the University. William M. Birenbaum. Delacorte, New York, 1968. xiv + 210 pp. $4.95.

Oxygen Transport in Blood and Tissue. D.-W. Lübbers, U. C. Luft, G. Thews, and E. Witzleb, Eds. Thieme, Stuttgart, 1968 (U.S. distributor, Intercontinental Medical Book Corp., New York). viii + 264 pp., illus. $14.75.

Le Pancréas Exocrine. Physiologie—Introduction à l'Exploration Fonctionnelle. André Ribet and Jean-Pierre Pascal. Preface by Henri Sarles. Masson, Paris, 1968. viii + 252 pp., illus. Paper, 70 F.

Paris in the Age of Absolutism. An Essay, Orest Ranum. Wiley, New York, 1968. xii + 324 pp., illus. Cloth, $7.95; paper, $3.95. New Dimensions in History.

Pathology of the Heart and Blood Vessels. S. E. Gould, Ed. Thomas, Springfield, Ill., ed. 3, 1968. xx + 1198 pp., illus. $42.50.

Pennsylvanian Brachiopods of Ohio. Myron T. Sturgeon and Richard D. Hoare. Ohio Division of Geological Survey, Columbus, 1968. vi + 98 pp., illus. + 22 plates. Paper, $3. Ohio Division of Geological Survey, Bulletin 63.

The Perception of People and Events. Peter B. Warr and Christopher Knapper. Wiley, New York, 1968. xiv + 446 pp., illus. $10.

Physics. An Introduction. Poets' Physics. Ernest C. Pollard and Douglas C. Huston. Oxford University Press, New York, 1969. x + 406 pp., illus. $8.25.

The Physiological Basis of Athletic Records. Ernst Jokl and Peter Jokl. Published for Research Committee, International Council of Sport and Physical Education, UNESCO, by Thomas, Springfield, Ill., 1968. xvi + 148 pp., illus. $8.50. American Lecture Series, No. 712.

Plant Diseases and Their Chemical Control. E. Evans. Blackwell Scientific Publications, Oxford, 1968 (U.S. distributor, Davis, Philadelphia). xvi + 288 pp., illus. $12.25.

Plastics for Electrical Insulation. Paul F. Bruins, Ed. Interscience (Wiley), New York, 1968. x + 206 pp., illus. $15. Polymer Engineering and Technology.

Positive Feedback. A General Systems Approach to Positive/Negative Feedback and Mutual Causality. John H. Milsum, Ed. Pergamon, New York, 1968. x + 170 pp., illus. $6.30.

Practical Programming. P. N. Corlett and J. D. Tinsley. Cambridge University Press, New York, 1968. xiv + 210 pp., illus. Cloth, $7.50; paper, $2.95. School Mathematics Project Handbooks.

Precision Measurement and Calibration. Selected NBS Papers on Temperature. J. F. Swindells, Ed. National Bureau of Standards, Washington, D.C., 1968 (available from the Superintendent of Documents, Washington, D.C.). vii + 520 pp., illus. $4.75. NBS Special Publication 300, vol. 2 (supersedes in part Handbook 77, vol. 2).

A Preliminary Archaeological Survey of Guaymas, Sonora, Mexico. Part 1, Ensenada Bocochibampo to San José de Guaymas (contd.). George E. Fay. Mu-

seum of Anthropology, Colorado State College, Greeley, 1968. Unpaged. Paper, $2.50. Katunob-Occasional Publications in Mesoamerican Anthropology, No. 3, 1968.

Preparative Inorganic Reactions. Vol. 5. William L. Jolly, Ed. Interscience (Wiley), New York, 1968. vi + 250 pp., illus. $14.50.

Preparative Methods of Polymer Chemistry. Wayne R. Sorenson and Tod W. Campbell. Interscience (Wiley), New York, ed. 2, 1968. xii + 504 pp., illus. $15.

Prevention of and Protection Against Accidental Explosion of Munitions, Fuels and Other Hazardous Mixtures. A conference, New York, 1966. Edward Cohen, Ed. New York Academy of Sciences, New York, 1968. 916 pp., illus. Paper, $26. Annals of the New York Academy of Sciences, Vol. 152, Art. 1.

Proceedings in Echo-Encephalography. International Symposium on Echo-Encephalography, Erlangen, Germany, 1967. E. Kazner, W. Schiefer, and K. J. Zülch, Eds. Translated by Margareta Lewke. Springer-Verlag, New York, 1968. xii + 260 pp., illus. $17.

Progress in Experimental Tumor Research. F. Homburger, Ed. Vol. 11, International Symposium on Carcinogenesis and Carcinogen Testing, Boston, 1967. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). xii + 496 pp., illus. $33.10.

Progress in Human Behavior Genetics. Recent Reports on Genetic Syndromes, Twin Studies, and Statistical Advances. Steven G. Vandenberg, Ed. Johns Hopkins Press, Baltimore, 1968. xii + 356 pp., illus. $12.50.

Project Icarus. Interdepartmental Student Project in Systems Engineering at the Massachusetts Institute of Technology, 1967. Louis A. Kleiman, Ed. M.I.T. Press, Cambridge, 1968. xvi + 128 pp., illus. Paper, $6.95. M.I.T. Report No. 13.

The Prometheus Project. Mankind's Search for Long-Range Goals. Gerald Feinberg. Doubleday, Garden City, N.Y., 1968. 216 pp. $4.95.

Prominent Scientists of Continental Europe. Compiled by John Turkevich and Ludmilla B. Turkevich. Elsevier, New York, 1968. x + 206 pp. $16.

Prophylaxe und Therapie der Schielschwachsichtigkeit. Wolfram Aust. Karger, Basel, 1968 (U.S. distributor, Phiebig, White Plains, N.Y.). vi + 42 pp., illus. Paper, $2.40.

Protein Biosynthesis and Membrane Biochemistry. Richard W. Hendler. Wiley, New York, 1968. xiv + 354 pp., illus. $11.95.

Psychiatry for Lawyers. Andrew S. Watson. International Universities Press, New York, 1968. xiv + 330 pp. $10.

The Psychology of Play. Susanna Millar. Penguin, Baltimore, 1968. 288 pp. Paper, $1.45.

Publications Mathématiques. No. 32. Éléments de Géométrie Algébrique. Part 4, Étude Locale des Schémas et des Mophismes de Schémas. A. Grothendieck, with the assistance of J. Dieudonné. Institute des Hautes Études Scientifiques. Benjamin, New York, 1967. ii + 362 pp. $15.75.

Publications Mathématiques. No. 33. Institut des Hautes Études Scientifiques.

Benjamin, New York, 1967. ii + 158 pp. $7.75.

The Quaternary of Illinois. A symposium in observance of the centennial of the University of Illinois, Urbana, 1968. Robert E. Bergstrom, Ed. University of Illinois, Urbana, 1968. vi + 182 pp., illus. Paper, $5. University of Illinois College of Agriculture Special Publication No. 14.

Radioactive Dating and Methods of Low-Level Counting. Proceedings of a symposium organized by the International Atomic Energy Agency in cooperation with the Joint Commission on Applied Radioactivity (ICSU), Monaco, 1967. IAEA, Vienna, 1967. xii + 748 pp., illus. Paper, $15.

Recent Progress in Hormone Research. Vol. 24. Proceedings of the 1967 Laurentian Hormone Conference at Mont Tremblant, Quebec. E. B. Astwood, Ed. Academic Press, New York, 1968. xviii + 754 pp., illus. $29.50.

Recherches Vétérinaires. No. 1. Paul Mornet, Ed. Institut National de la Recherche Agronomique, Paris, 1968. iv + 192 pp., illus. + 5 plates. Paper, 20 F.

Regulation of the Antibody Response. Bernard Cinader, Ed. Thomas, Springfield, Ill., 1968. xii + 404 pp., illus. $29.50.

The Relations between the Sciences. Based upon the Tarner Lectures of Trinity College, 1959. C. F. A. Pantin. Edited and with an Introduction and Notes by A. M. Pantin and W. H. Thorpe. Cambridge University Press, New York, 1968. xii + 208 pp., illus. $7.50.

The Relationship of Time and Dose in the Radiation Therapy of Cancer. Proceedings of the 3rd Annual San Francisco Cancer Symposium, 1967. Karger, Basel, 1968 (U.S. distributor, Phiebig, White Plains, N.Y.). viii +252 pp., illus. $16.55. Frontiers of Radiation Therapy and Oncology, vol. 3.

Reproductive Behavior in Ungulates. A. F. Fraser. Academic Press, New York, 1968. x + 202 pp., illus. $8.

A Revision of the Moth Genus Stenoporpia (Lepidoptera, Geometridae). Frederick H. Rindge. American Museum of Natural History, New York, 1968. Paper, $5. Bulletin of the American Museum of Natural History, vol. 140, article 2, pp. 65–136, illus. + 16 plates.

The Role and Status of Women in the Soviet Union. Donald R. Brown, Ed. Teachers College Press, Columbia University, New York, 1968. xii + 140 pp. $6.25.

Schools Without Failure. William Glasser. Harper and Row, New York, 1969. xvi + 240 pp. $4.95.

The Science and Technology of Polymer Films. Vol. 1. Orville J. Sweeting, Ed. Interscience (Wiley), New York, 1968. xii + 888 pp., illus. $35.

Science Year. The World Book Science Annual, 1968. Field Enterprises Educational Corporation, Chicago, 1968. 450 pp., illus. $5.95.

Sea and Air. The Naval Environment. Jerome Williams, John J. Higginson, and John D. Rohrbough. U.S. Naval Institute, Annapolis, Md., 1968. xxiv + 344 pp., illus. $11.50.

Serotonin. Irvine H. Page. Year Book Medical Publishers, Chicago, 1968. 144 pp., illus. $7.95.

Silver-Bearing Copper. A Compendium of the Origin, Characteristics, Uses and Future of Copper Containing 12 to 25 Ounces Per Ton of Silver. Walter L. Finlay. Corinthian Editions, New York, 1968. viii + 360 pp., illus. $12.50.

Social Work Practice, 1968. Selected Papers, 95th Annual Forum, National Conference on Social Welfare, San Francisco, 1968. Published for the National Conference on Social Welfare by Columbia University Press, New York, 1968. xvi + 208 pp. $6.

The Sonoran Desert. Its Geography, Economy, and People. Roger Dunbier. University of Arizona Press, Tucson, 1968. xiv + 426 pp., illus. $10.

Spectra of Nucleic Acid Compounds. Tat'yana V. Venkstern and Aleksandr A. Baev. Translated, with additions by the authors, from the Russian edition (Moscow, 1967). IFI/Plenum, New York, 1968. viii + 80 pp., illus. $15.

Standard Handbook for Electrical Engineers. Donald G. Fink and John M. Carroll, Eds., McGraw-Hill, New York, ed. 10, 1968. 2506 pp., illus. $32.50.

Stars and Clouds of the Milky Way. The Structure and Motion of Our Galaxy. Thornton Page and Lou Williams Page, Eds. Macmillan, New York; Collier-Macmillan, London, 1968. xx + 364 pp., illus. $7.95. Macmillan Sky and Telescope Library of Astronomy, vol. 7.

State Increment Dynamic Programming. Robert E. Larson. Elsevier, New York, 1968. xvi + 256 pp., illus. $14.50. Modern Analytic and Computational Methods in Science and Mathematics, No. 12.

Statistics. Uncertainty and Behavior. I. Richard Savage. Houghton Mifflin, Boston, 1968. xiv + 344 pp. $8.95.

The Strength of Government. McGeorge Bundy. The Godkin Lectures at Harvard University, 1968. Harvard University Press, Cambridge, Mass., 1968. xiv + 114 pp. $3.75.

Strength of Hard Alloys. Gersh S. Kreimer. Translated, with revisions by the author, from the Russian edition (Moscow, 1966). Consultants Bureau (Plenum), New York, 1968. viii + 168 pp., illus. Paper, $25.

Structural Geology. An Introduction to Geometrical Techniques. Donal M. Ragan. Wiley, New York, 1968. x + 166 pp., illus. Paper, $5.95.

Structure and Bonding. Vol. 5. C. K. Jorgensen, J. B. Neilands, Ronald S. Nyholm, D. Reinen, and R. J. P. Williams, Eds. Springer-Verlag, New York, 1968. iv + 152 pp., illus. Paper, $8.

Structure and Function of Cytochromes. Proceedings of the Symposium on Structural and Chemical Aspects of Cytochromes Held at Osaka, 1967. Kazuo Okunuki, Martin D. Kamen, and Ichiro Sekuzu, Eds. University of Tokyo Press, Tokyo; University Park Press, Baltimore, 1968. xviii + 744 pp., illus. $29.50.

The Structure and Function of Nervous Tissue. Geoffrey H. Bourne, Ed. Vol. 1, Structure I. Academic Press, New York, 1968. xiv + 546 pp., illus. $28.

The Structured Universe. Harry Tipper, Jr. Paragon, Wilmington, Del., 1968. 156 pp., illus. Paper, $2.95.

Studies in Number Theory. A. V. Malyshev, Ed. Translated from the Russian edition (Moscow, 1966). Consultants Bu-

reau (Plenum), New York, 1968. viii + 68 pp. Paper, $12.50. Seminars in Mathematics, V. A. Steklov Mathematical Institute, Leningrad, vol. 1.

Studies of Appalachian Geology. Northern and Maritime. E-an Zen, Walter S. White, Jarvis B. Hadley, and James B. Thompson, Jr., Eds. Interscience (Wiley), New York, 1968. xviii + 480 pp., illus. $29.50.

The Sun. Patrick Moore. Drawings by Cyril Deakins. Norton, New York, 1968. 128 pp. $4.95.

Surgery. Old and New Frontiers. Robert G. Richardson. Scribner, New York, 1968. xiv + 316 pp. + 20 plates. $7.95. Revised edition of *The Surgeon's Tale.*

Synopsis of Electroencephalography. Or Guide to Brain Waves. Thomas C. Barnes. Hafner, New York, 1968. iv + 180 pp. $10.

Synthèse des Propriétés Chimiques et Physiques des Houilles. Les Houilles Belges. P. L. Coppens. Institut National de l'Industrie Charbonnière, Liége, 1967. 216 pp., illus. Paper, 500 FB.

Synthetic Procedures in Nucleic Acid Chemistry. Vol. 1, Preparation of Purines, Pyrimidines, Nucleosides, and Nucleotides. W. Werner Zorbach and R. Stuart Tipson, Eds. Interscience (Wiley), New York, 1968. vi + 570 pp., illus. $16.95.

Systems, States, Diplomacy and Rules. J. W. Burton. Cambridge University Press, New York, 1968. xii + 256 pp., illus. $7.

Tables of Spectral Lines of Neutral and Ionized Atoms. A. R. Striganov and N. S. Sventitskii. Translated, with additions and corrections by the authors, from the Russian edition (Moscow, 1966). IFI/Plenum, New York, 1968. xii + 900 pp. $40.

Technology of Enamels. V. V. Vargin. Translated from the Russian edition and edited by Kenneth Shaw. Hart, New York, 1968. viii + 296 pp., illus. $18.50.

Technology of Liquid Helium. R. H. Kropschot, B. W. Birmingham, and D. B. Mann, Eds. National Bureau of Standards, Washington, D.C., 1968 (available from the Superintendent of Documents, Washington, D.C.). x + 374 pp., illus. $2. NBS Monograph No. 111.

Temper Embrittlement in Steel. A symposium, Philadelphia, 1967. American Society for Testing and Materials, Philadelphia, 1968. vi + 254 pp., illus. $21; 20 percent discount to members. ASTM Special Technical Publication No. 407.

Ten-Year Index to the Journal of Wildlife Management (Volumes 21–30, 1957–1966). Thomas G. Scott, Marthanne B. Norgren, and W. Scott Overton. Wildlife Society, Washington, D.C., 1967. vi + 234 pp. Paper, $4.

The Tetracyclic Diterpenes. J. R. Hanson. Pergamon, New York, 1968. viii + 136 pp., illus. $8. International Series of Monographs in Organic Chemistry, vol. 9.

Thermodynamic Tables in SI (Metric) Units (Système International d'Unités). With Conversion Factors to Other Metric and British Units. R. W. Haywood. Cambridge University Press, New York, 1968. vi + 42 pp. + 2 diagrams. Paper, $1.95.

Through Rugged Ways to the Stars. Harlow Shapley. Scribner, New York. Bound proof copy. Probable price $6.95.

Tikchik Village. A Nineteenth Century Riverine Community in Southwestern Alaska. James W. Vanstone. Field Museum of Natural History, Chicago, 1968. vi + 157 pp., illus. Paper, $6. Fieldiana: Anthropology, vol. 56, No. 3.

Time-Sharing Computer Systems. M. V. Wilkes. Elsevier, New York, 1968. viii + 104 pp., illus. $4.95. Computer Monograph Series, No. 5.

Topics in Population Genetics. Bruce Wallace. Norton, New York, 1968. x + 486 pp., illus. $14.

Topics in Stereochemistry. Vol. 3. Ernest L. Eliel and Norman L. Allinger, Eds. Interscience (Wiley), New York, 1968. x + 382 pp., illus. $15.

Transportation in the World of the Future. Hal Hellman. Evans, New York, 1968 (distributor, Lippincott, Philadelphia). iv + 188 pp., illus. $4.95.

Treatment of Hemorrhagic Disorders. Oscar D. Ratnoff, Ed. Harper and Row, New York, 1968. ii + 244 pp., illus. $8.50.

Ultrasoft X Rays. An Historical and Critical Review of the World Experience with Grenz Rays and Other X Rays of Long Wavelength. Mark B. Hollander. Williams and Wilkins, Baltimore, 1968. xii + 200 pp., illus. $10.50.

Understanding Quantum Mechanics. An Introduction to the Abstract Formalism and the Basic Ideas of Quantum Mechanics. Gordon Troup. Methuen, London, 1968 (U.S. distributor, Barnes and Noble, New York). x + 86 pp., illus. Paper, $3.

Variable Stars. John S. Glasby. Harvard University Press, Cambridge, Mass., 1969. x + 334 pp., illus. $6.95.

Vistas in Science. The 13th Air Force Office of Scientific Research Science Seminar, Albuquerque, 1968. David L. Arm, Ed. University of New Mexico Press, Albuquerque, 1968. vi + 258 pp., illus. $5.95.

Water. Canadian Needs and Resources. J. S. Cram. Preface by I. W. Akerley. Introduction by Christian de Laet. Harvest House, Montreal, 1968. 190 pp., illus. Cloth, $5; paper, $2.50.

Weed Control Handbook. Issued by the British Crop Protection Council. J. D. Fryer and S. A. Evans, Eds. Vol. 1, Principles (xx + 494 pp., illus., $11.50). Vol. 2, Recommendations (xx + 326 + xxvi pp., illus., $5). Blackwell Scientific Publications, Oxford, ed. 5, 1968.

Where's Hannah? A Handbook for Parents and Teachers of Children with Learning Disorders. Jane Hart and Beverly Jones. Hart, New York, 1968. 272 pp., illus. $8.50.

William Bartram. Botanical and Zoological Drawings, 1756–1788. Reproduced from the Fothergill Album in the British Museum (Natural History). Joseph Ewan, Ed. American Philosophical Society, Philadelphia, 1968. xiv + 180 pp., illus. $35. Memoirs of the American Philosophical Society, vol. 74.

Women University Graduates in Continuing Education and Employment. An exploratory study initiated by the Canadian Federation of University Women, 1966. Patricia Cockburn and Yvonne R. Raymond. Canadian Federation of University Women, Laurentian University, Sudbury, Ont., 1967. 196 pp., illus. Paper.

World Review of Nutrition and Dietetics. Vol. 9. Geoffrey H. Bourne, Ed. Karger, Basel, Switzerland, 1968 (U.S. distributor, Phiebig, White Plains, N.Y.). x + 290 pp., illus. $18.