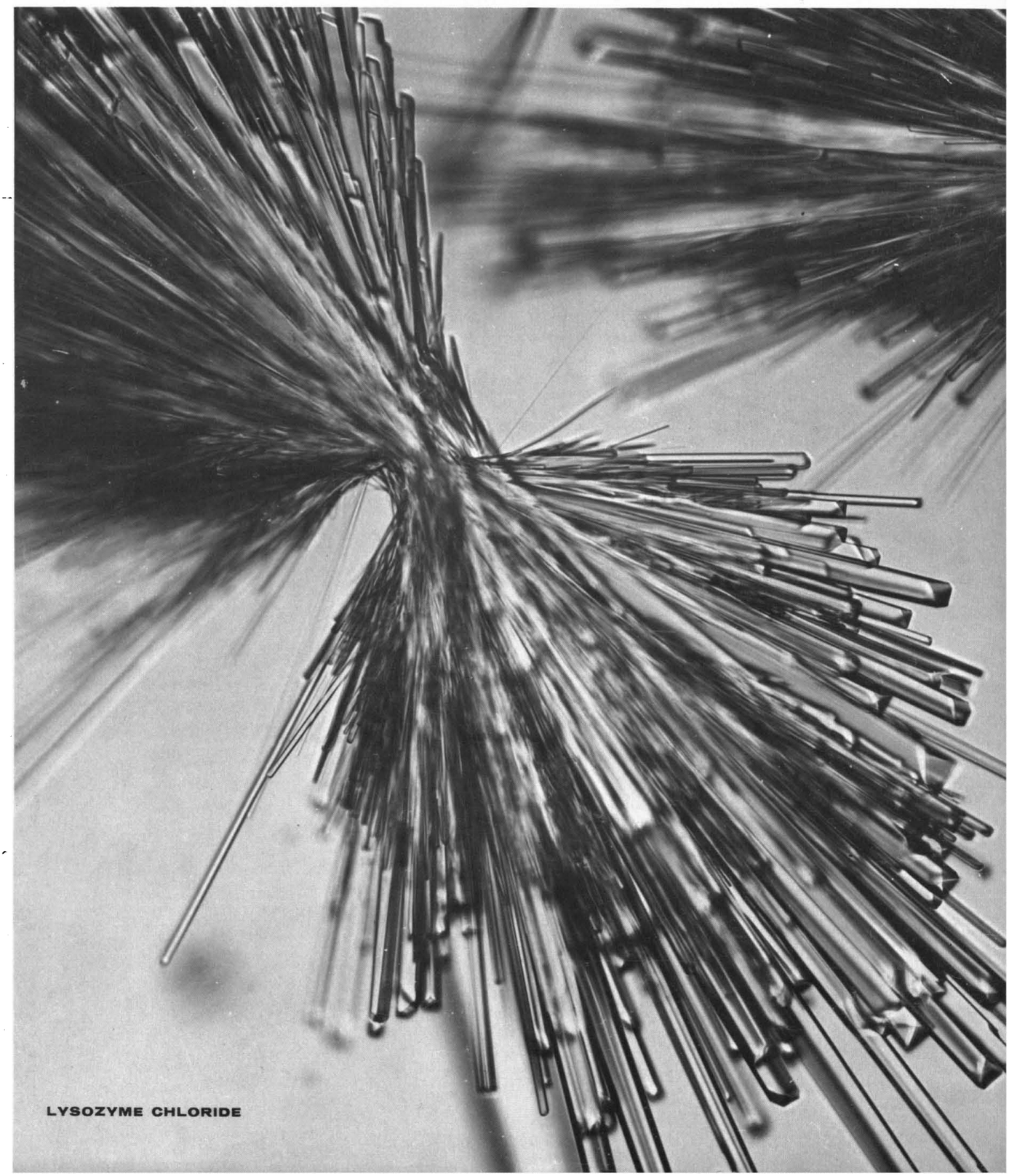
SCIENCE

24 March 1967

Vol. 155, No. 3769

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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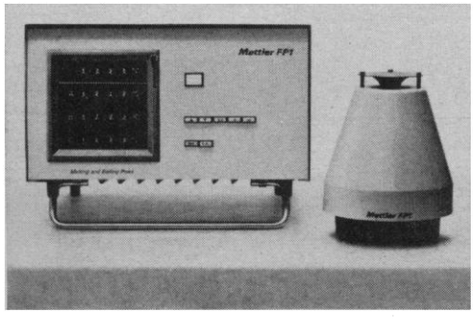
New Mettler FP-1 Determines Melting and Boiling Points Automatically

The Mettler FP-1 brings new significance and efficiency to melting and boiling point determinations. Once the instrument is programmed and started, determinations are completed and results displayed automatically. It completely eliminates the need for an operator's constant attention and close visual observation.

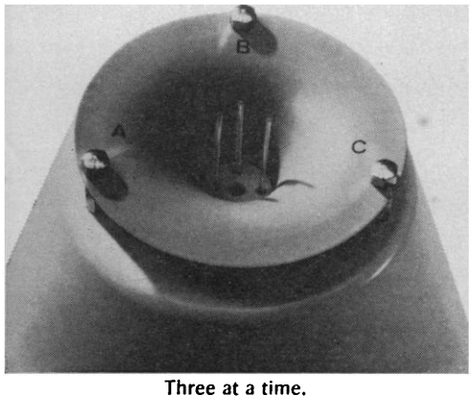


All it takes.

The instrument combines a fully-transistorized linear temperature program and control system, a precision platinum resistance thermometer, electronic sensing of the endpoint, and all-digital display of results. It provides greatly improved analytical data, with greater speed and precision than any other system for determining melting or boiling points.

MULTIPLE DETERMINATIONS

The Mettler FP-1 can perform three melting point determinations simultaneously, each with its result displayed in digital form. This not only increases operating efficiency, but makes the running of mixed melting points convenient and truly practical.

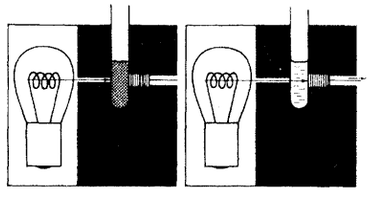


Three at a time.

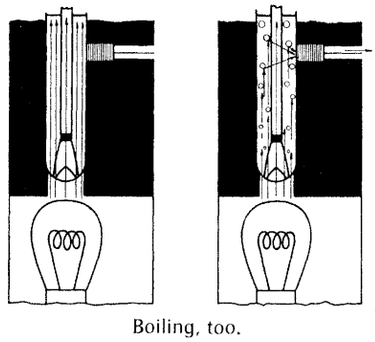
Overall performance is further enhanced by a high speed cooling fan which provides rapid cool-down between runs.

OBJECTIVE RESULTS

As the sample in a melting point test changes from solid to liquid, its light absorption decreases and it becomes transparent. The Mettler FP-1 detects changes in intensity of light transmitted through the sample to a precisely-calibrated photocell[1]. This sends an immediate stop signal to its digital counter when the melting point is reached.



Melting sensed electronically.



Boiling, too.

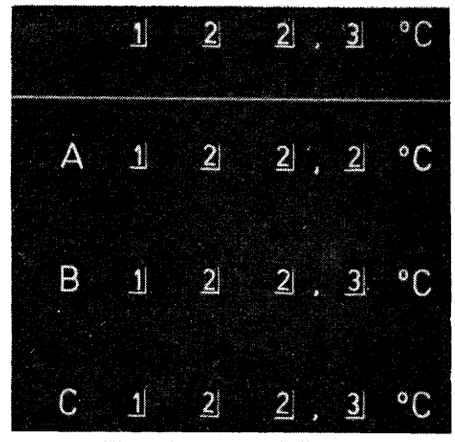
Boiling point determinations are made according to an adaptation of the classical Siwoloboff method. Dark field illumination enables a calibrated photocell to detect bubbles released by boiling. When bubbles are released with sufficient frequency to indicate true boiling, a digital counter registers the exact temperature.

Both melting and boiling point determinations thus are completely objective. There is no need for individual choice or estimation on the part of the operator.

[1] H. F. Stimson, "The International Temperature Scale", N.B.S. Jour. Res., 42, p. 209-217, (1949).

ALL-DIGITAL DATA

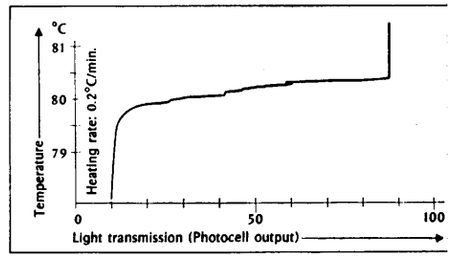
Digital readout eliminates subjecti errors associated with reading mercu thermometers and interpreting recordi charts. In addition, it provides greatly i proved speed and accuracy when readi results. By means of a hold feature, resu of a determination are retained on t readout panel until the instrument cleared for its next run.



All numbers, no eyeball fatigue.

RECORDING CAPABILITY

Used with a standard time-base recorde the Mettler FP-1 can provide curves shov ing changes in light transmission a sample temperature increases. This is useful aid in studying the dynamics the melting process and in analyzing th purity of compounds.



It even draws pictures.

LITERATURE AVAILABLE

Ask for literature describing the ne Mettler FP-1 or request a demonstratio or trial in your own laboratory. Writ Mettler Instrument Corporation, 20 Nassa Street, Princeton, New Jersey 08540.

Mettler

24 March 1967
Vol. 155, No. 3769

SCIENCE

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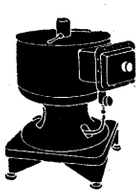
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Crystals of human lysozyme chloride. Lysozyme isolated from the urine of patients with monocytic leukemia crystallized from a 5-percent solution of sodium chloride at *p*H 10.5, 24 hours at 9°C. The largest crystals are 1.3 millimeters in length. See page 1536. [Lewis W. Koster, Columbia College of Physicians and Surgeons, New York, New York]

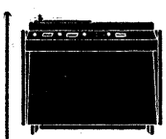
lline



EXD Centrifuge
Max. Speed — 5500 rpm
Max. Gravity — 4420 g
Max. Volume — 4 x 1000 ml
Same as Size 2, model K, except explosion proof for use in Class I Group D hazardous locations.

PR-2 Centrifuge
Max. Speed — 5300 rpm
Max. Gravity — 4070 g
Max. Volume — 4 x 1000 ml
Heavy duty refrigerated model. World's standard for Blood Bank use.

B-20 Centrifuge
Max. Speed — 20,000 rpm
Max. Gravity — 46,300 g
Max. Volume — 6 x 250 ml
High speed refrigerated belt drive model. Reliable workhorse for a variety of research applications.



B-35 Ultracentrifuge
Max. Speed — 35,000 rpm
Max. Gravity — 206,200 g
Max. Volume — 4 x 500 ml
Combines advantages of both preparative ultracentrifuge and high speed refrigerated centrifuge.

B-60 Ultracentrifuge
Max. Speed — 60,000 rpm
Max. Gravity — 405,900 g
Max. Volume — 2 liters
Combinations of volume/gravity levels, exclusive in ultra field. High g level allows investigation of new areas of biological research.

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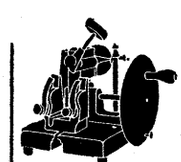

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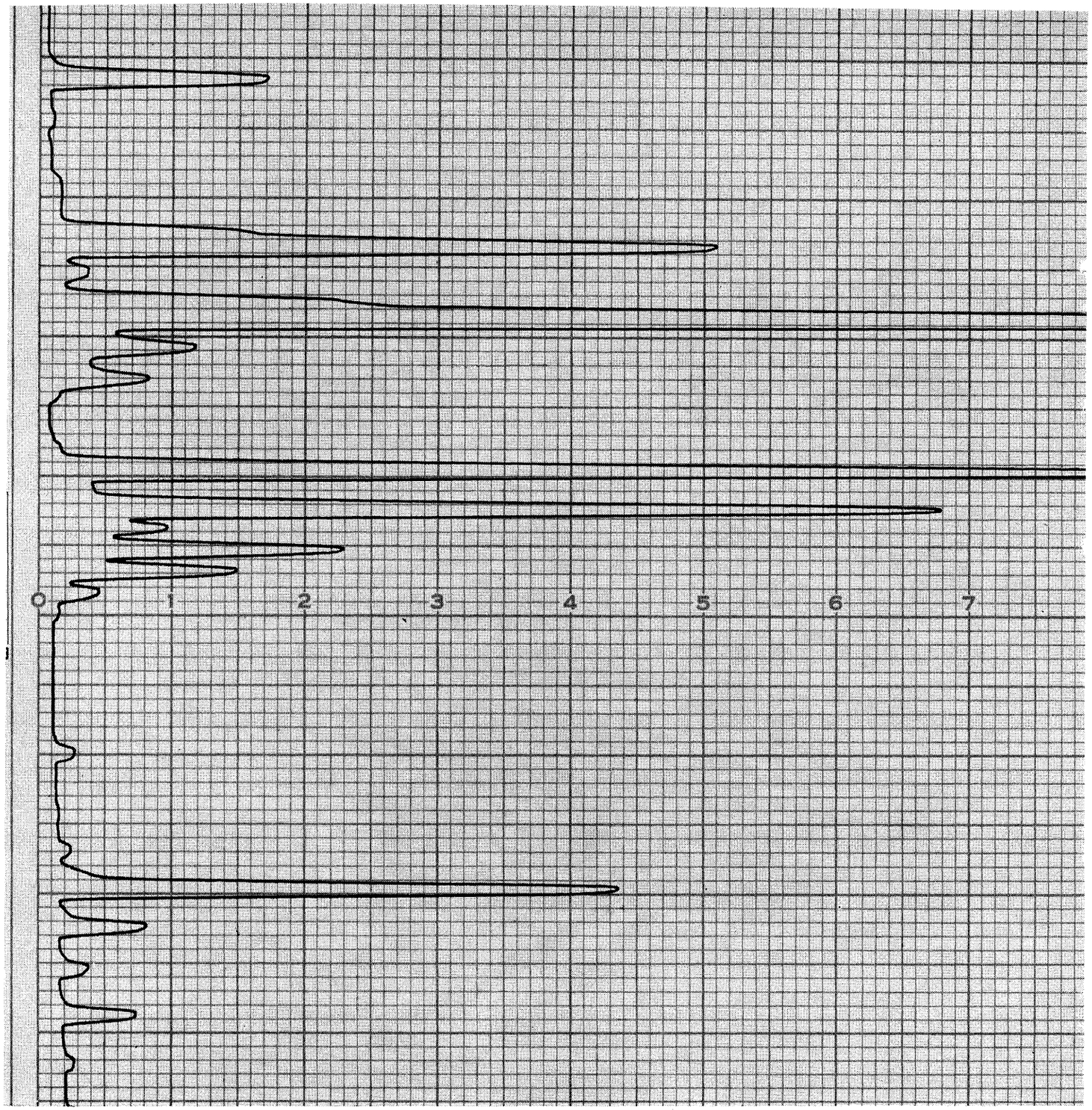

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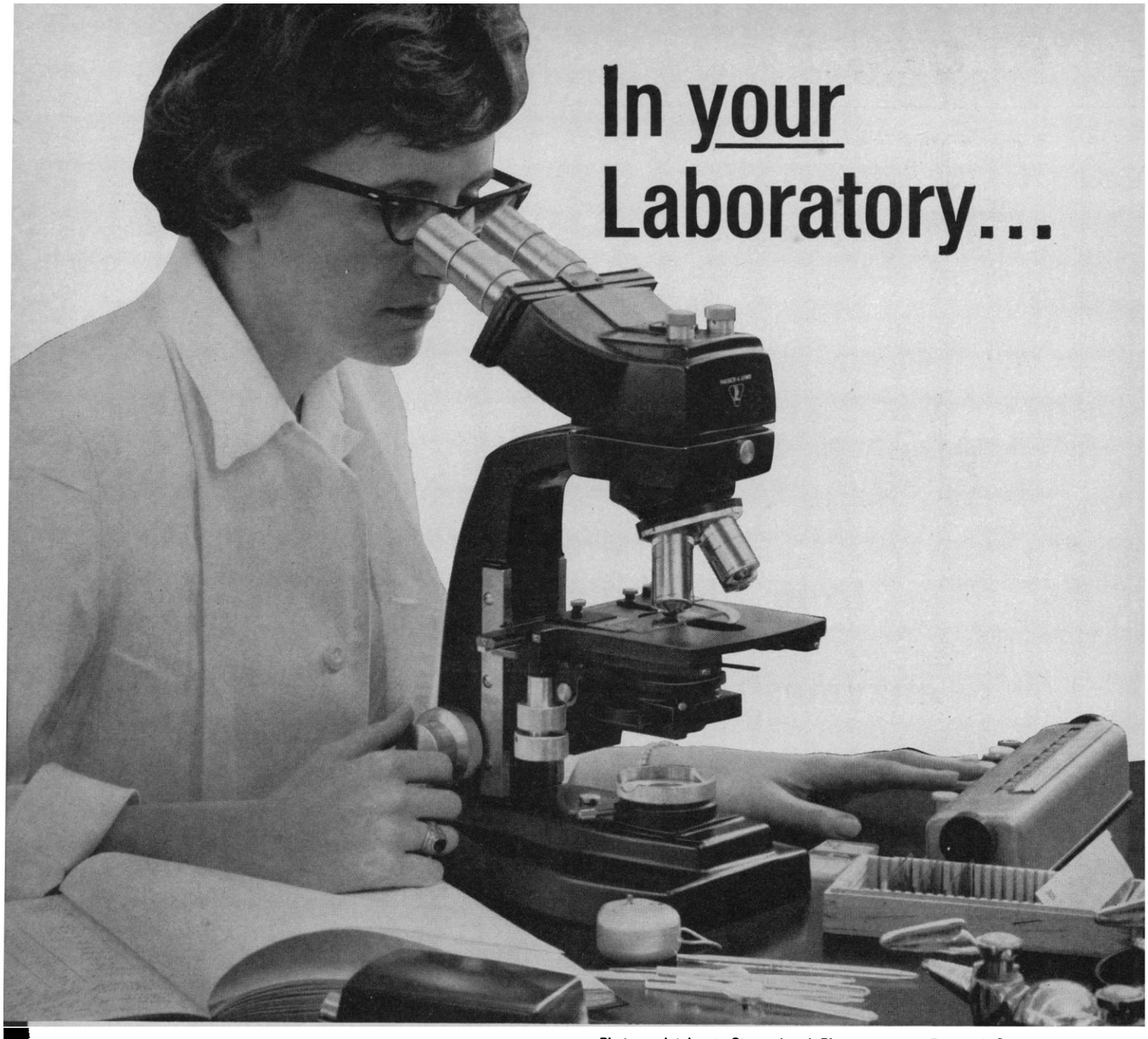

Photograph taken in Strasenburgh Pharmaceuticals Research Center,
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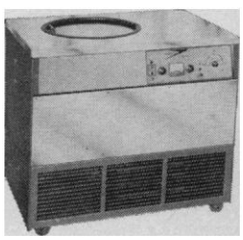

LOURDES Clini-Fuge 30-R
Combines low speed, super speed and ultra speed operations in one unit. Only one attachment is needed to increase maximum rpm from 6,000 to 25,000. Automatic, Refrigerated. Contains all safety features as in Beta-Fuge. The price is $2,775.00; high speed attachment only $385.00. Non-refrigerated model (No. 30)—$840.00.

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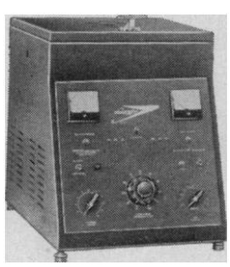
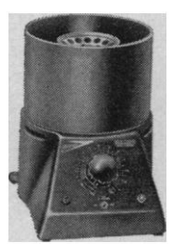
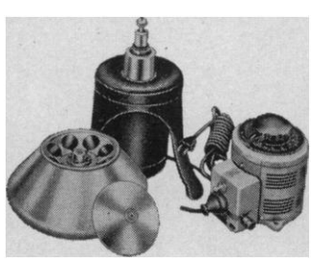


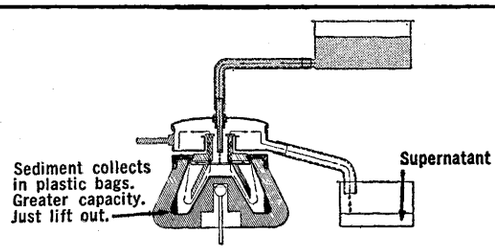
LOURDES Series LC
Bench type Centrifuges, automatic and non-automatic, with speed, volume and force combinations for every requirement. Prices — $760.00 and $925.00.



LOURDES Versa-Fuge
Super speed, versatile bench type centrifuge for batch and continous flow operations. Speeds to 17,000 rpm; forces to 34,800 x G. Only $420.00.



LOURDES Model AX
16,500 rpm with up to 400 ml; forces to 34,800 x G. Only $265.00.



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SEND FOR THE FACTS. Detailed data sheets available on request. Ask for Bulletin S-3-7

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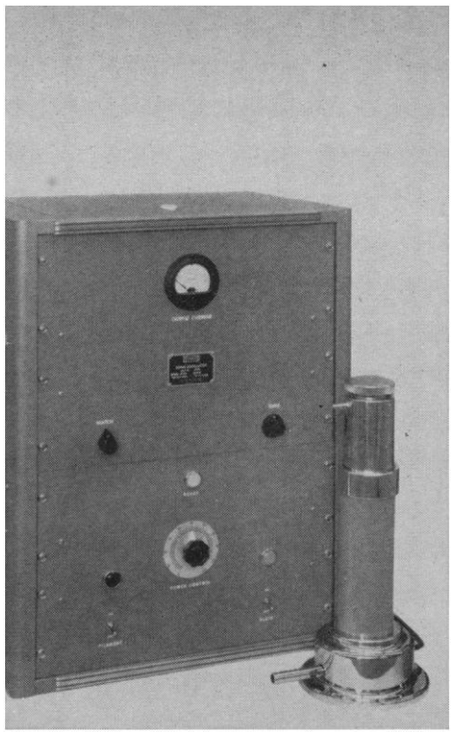

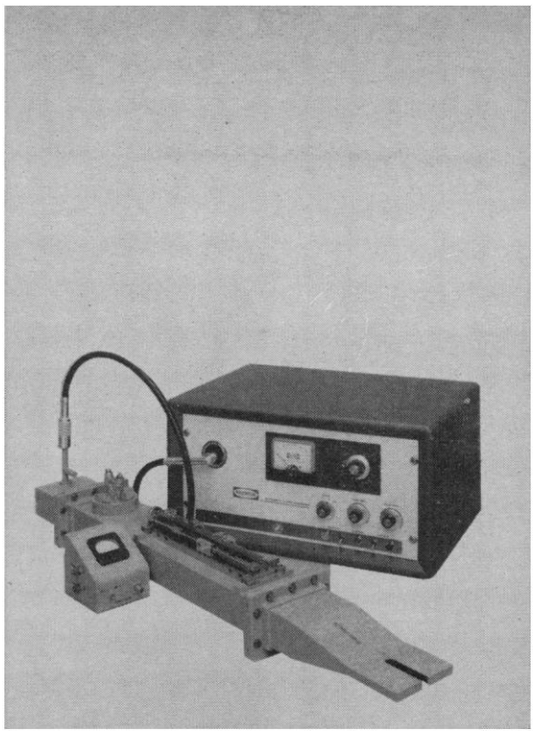

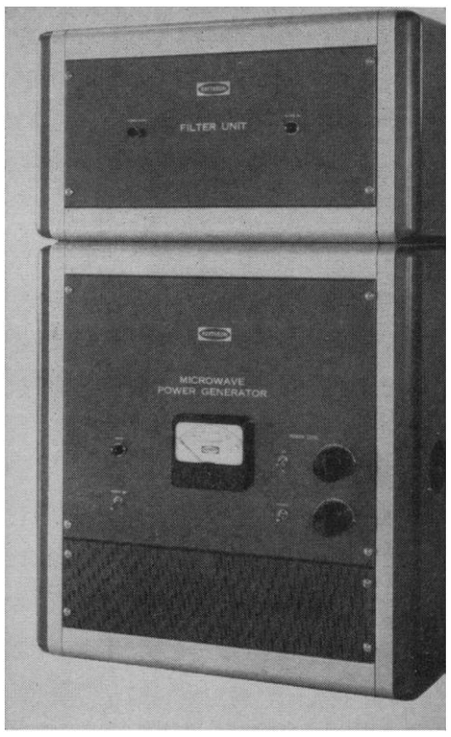

Sonic Oscillators and Microwave Generators for Research Applications

Applications include: Bacterial and cellular disruption, dispersion and homogenization, free radical research, spectroscopy and interferometry.

Model DF 101 sonic oscillator is a low frequency magnetostriction unit designed for the rapid duplication of physiochemical reactions in laboratories. The unit may be used in a wide variety of industrial and laboratory research projects such as studying the effects of sonic energy on liquids, living organisms, mixtures and chemical solutions. Power output (driver to stand) is 250 watts, 1.2 amperes. Frequency is 10 KC (nominal). Power requirements are 110 @ 50-60 cycles, 750 w. Recommended capacity is 50 cc however the stand will contain up to 165 cc.

Model PGM-10X2 microwave generator and its accessories are designed for the production of free radicals and the excitation of electrodeless discharge lamps in the fields of spectroscopy, raman spectroscopy and interferometry. Specifications: Power input—105-130 v @ 60 cycles, 385 watts. Power output—85 watts CW power at 2450 ± 25 MHz and/or variable pulse rate between 100—5000 Hz and duty cycle variable between 1% and 80%. The chosen operating frequency minimizes cleanup accumulation on the walls of the electrodeless lamps.

The Model PGM-100 microwave generator fills the need for higher power. Specifications: Standard JAN waveguide RG 104/U • Maximum CW power output 800 watts • Fixed frequency, 2450 ± 25 MHz • Modulation in the order of 10% or 120 Hz pulsed. The power output is constant through normal line fluctuations and variations of magnetron impedance with load and life. The unit contains a filter network that can be switched into the magnetron plate supply to provide a microwave power output with modulation of about 10% in the detected rf envelope.

Contact Raytheon Co., Sorensen Operation, Production Equipment Department, Richards Ave., Norwalk Conn. 06856. Tel: 203-838-6571.

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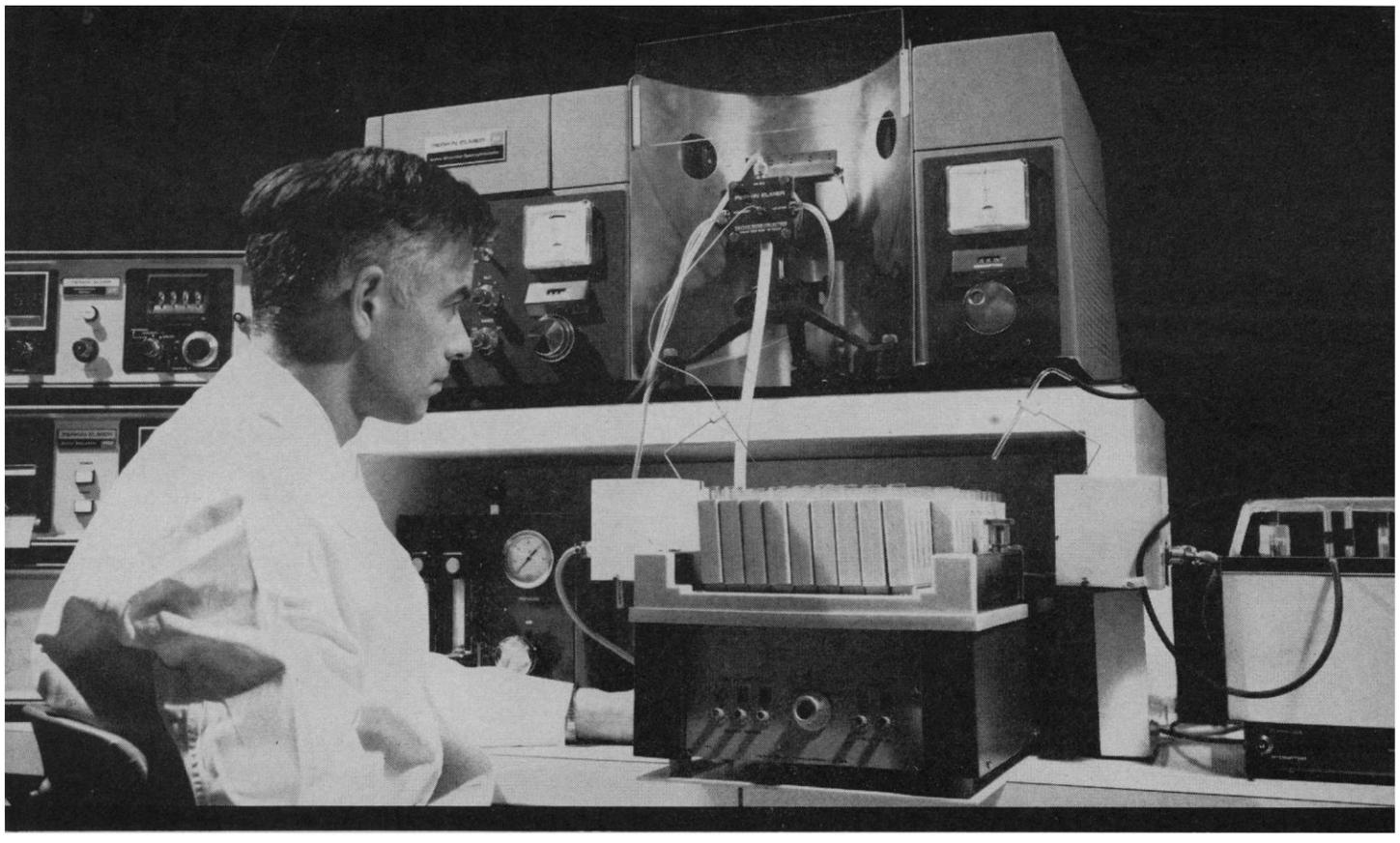

NOW ANALYZE UP TO 200 SPECIMENS AUTOMATICALLY BY ATOMIC ABSORPTION

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Our new Automatic Atomic Absorption Analyzer eliminates both these time-consuming steps.

It automates the entire run, so that now you can analyze up to 200 specimens *fully automatically* and read off their content of an element directly in concentration.

The new Analyzer is built around the Perkin-Elmer Model 303 double-beam atomic absorption spectrophotometer. If you already own a Model 303, you won't have to modify it to expand to the Automatic Analyzer system. Just add the Sampling Input Table, the Digital Concentration Readout Accessory (DCR-1) and the PRS-8 Printer.

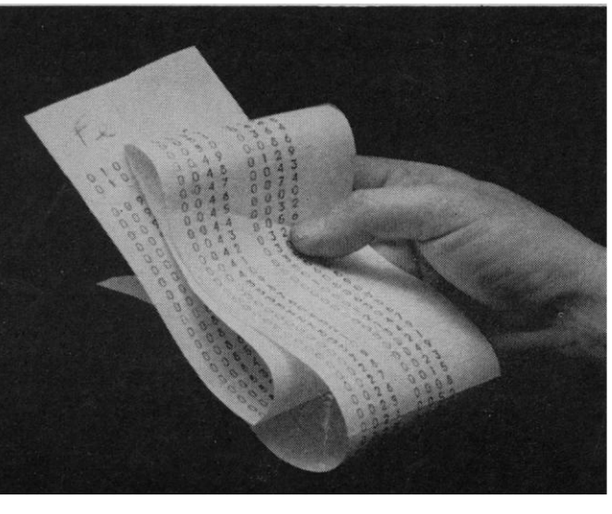
This new system gives you a sequentially numbered, printed analysis of every specimen. Your lab is freed from time-wasting repetitive work. Accuracy goes up, because human error is eliminated in both dilution and calculation. Cost per analysis is greatly reduced.

A number of design features developed by Perkin-Elmer have made the success of the Analyzer possible. The three-slot Boling burner is essentially free from clogging (it won't clog with 1:1 dilutions of serum or 50% solutions of sugar). The double-beam system of the Model 303 insures a stable baseline. The hollow cathode element lamps can be quickly interchanged, and the double-beam system of the 303 eliminates the need for warmup time. Multi-element cathode lamps shorten time of interchange even further.

Write for our new brochure describing the three models in our 4A series plus reprints of application articles. Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut 06852.

PERKIN-ELMER

Typical readout from Model 4A Automatic AA Analyzer shows, in the four-digit column at the left, the sequential number of the analysis. The four digits in the right-hand column represent concentration in any convenient unit—in this case concentration of iron in ppm.



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Carrie Nation, famous symbol of war against impurity

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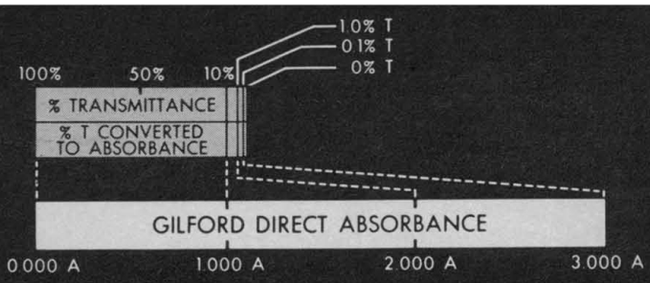
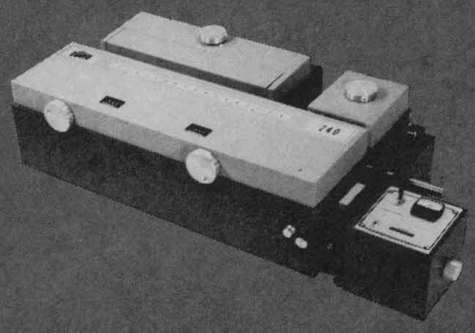
SPECTROPHOTOMETERS

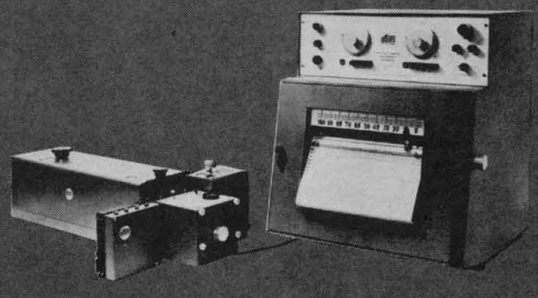


Gilford Spectrophotometers utilize a unique principle to measure Absorbance ***directly.*** The second and third decades, severely compressed in %—transmittance instruments, are fully expanded in Gilford Instruments—for equal accuracy and resolution throughout the complete range. Absorbance is presented digitally to 0.001 **A** —from 0.000 **A** to 3.000 **A** — or it can be readily recorded. Concentration is measurable directly over a 1000:1 range.



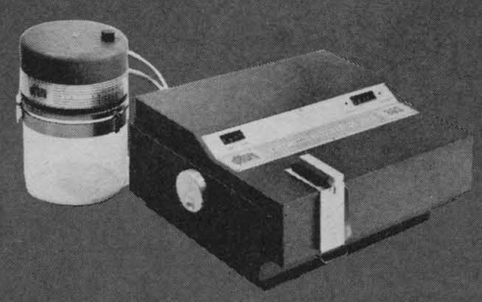
MODEL 240 SPECTROPHOTOMETER

The Model 240 spectrophotometer combines a quality Gilford-designe monochromator with the dependable Gilford photometric system. Th combination has produced an instrument of unusual accuracy, range and versatility—simple to operate and highly productive. The optica system, characterized by low stray light and high UV efficiency, fea tures linear wavelength and slit width controls with numerical indica tion. A rugged optical-bench accessory mount and clear, uncluttere exit aperture plane promote easy alignment and quick interchange o attachments. The wide range—0.000 to 3.000 A—photometer is linear absorbance measuring system of high resolution. Stabilizer for the photometer and dual-lamp source are contained in a singl solid state supply module. Equipped with a four-position manual ce positioner.



MODEL 2000 AUTOMATIC SPECTROPHOTOMETER

The Model 2000 is a versatile, all-purpose spectrophotometer o superior range, stability, and photometric resolution. It is package into two self-contained units: (1) The lamp source, monochromator automatic cuvette positioner, and photometer/indicator unit. (2) Th main console with controls, recorder, power source, photometric cir cuit, line-voltage regulator, extended cuvette dwell-timer (up to 1 minutes), and circuitry and connections for additional accessories. Th Model 2000 is particularly suited for determining time-dependen reaction rates and for automatic, quantitative monitoring of effluent from multiple chromatographic columns or density gradient tubes Other applications include observation of dissolution and polymer ization changes, spectrophotometric titration, precision turbidimetr and colorimetry, large-scale clinical testing, and industrial proces and quality control.



MODEL 300 MICRO-SAMPLE SPECTROPHOTOMETER

The Model 300 is a new concept in precision absorbance spectrophoto metry. It is a moderately priced, compact, integrated system whos photometric range and accuracy, combined with a unique rapid sam pling system, provide a versatility and simplicity of operation un matched by complex and costly instruments. The unusual capability o the Model 300 is achieved through the use of three new Gilford ele ments: a solid-state photometer, an excellent optical system, and vacuum-driven sampling system coupled to a digital absorbance indi cator. Accurately metered samples of 500 microliters or less may b analyzed at a rate of 4 to 6 per minute. The sample cell is filled the absorbance measured, and the cell flushed by means of a singl control lever. Absorbance range extends from 0.000 to 2.000A.

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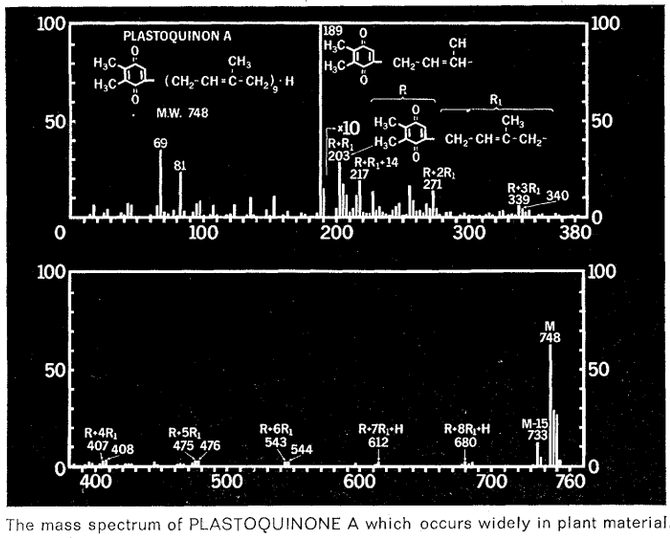
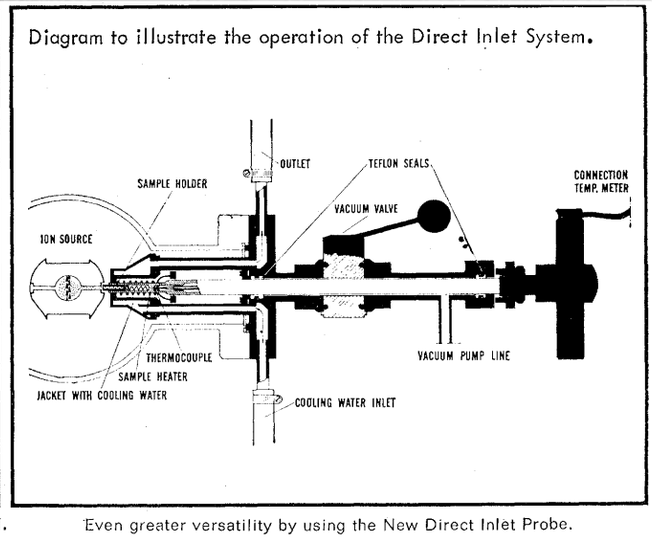


The mass spectrum of PLASTOQUINONE A which occurs widely in plant material.



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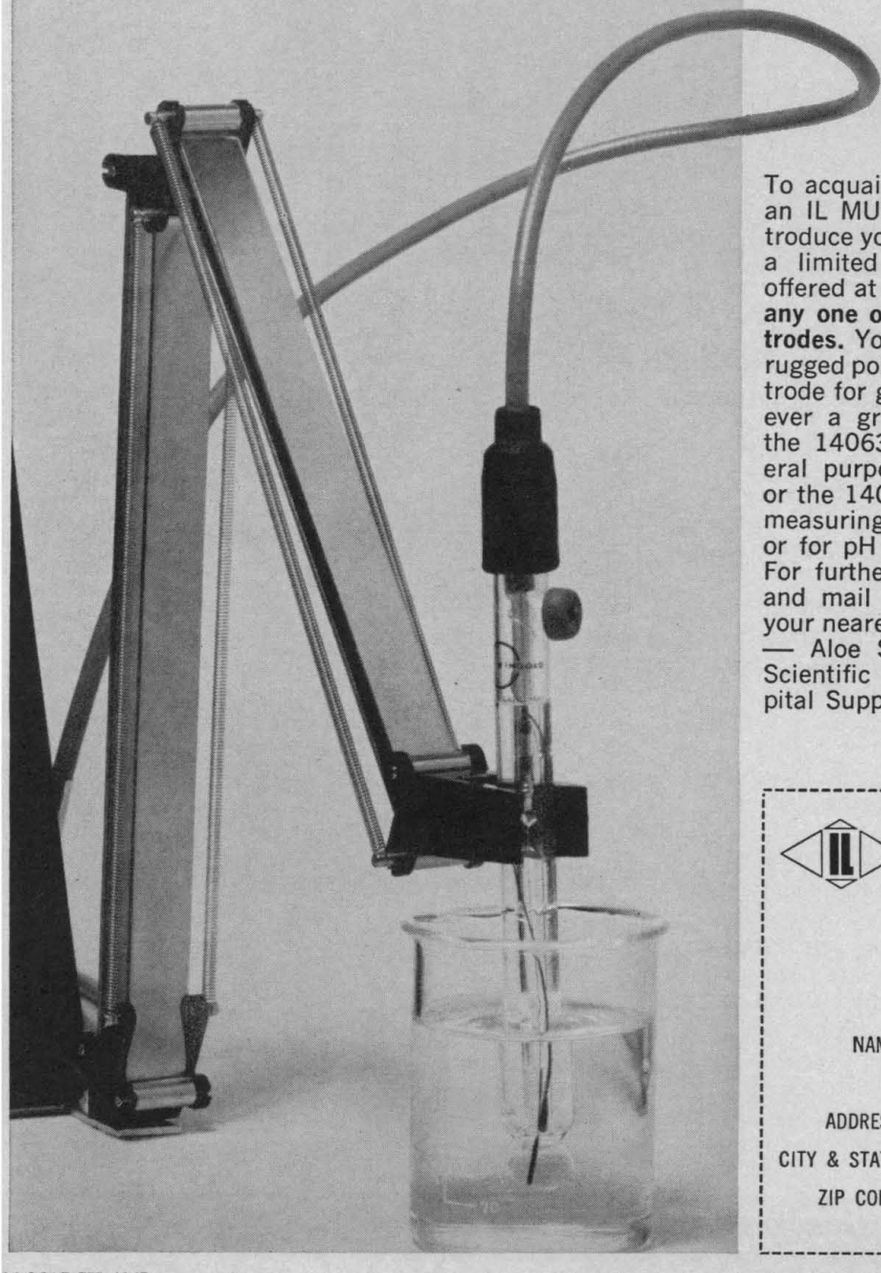

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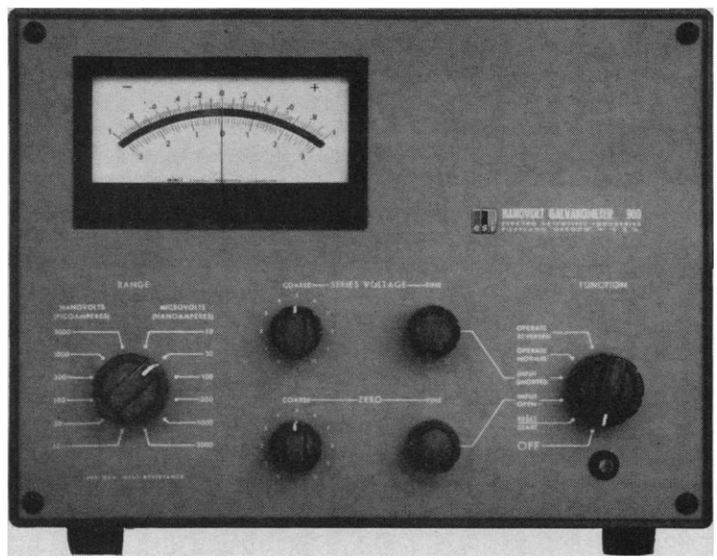
Galvanometer with brains



ESI has combined the best features of the classic galvanometer and the modern electronic voltmeter in the new Model 900 Nanovolt Galvanometer.

How do you create a galvanometer with true nanovolt sensitivity that is really *practical* to use... an instrument that doesn't require hours of delicate dial twiddling, trap-door adjustments or experimental hook-ups?

You give it brains. Brains in the form of feedback circuits that automatically control speed of response and damping for each of its 12 calibrated ranges. *It operates from any source resistance without changes in speed of response or damping characteristics.* Noise is less than 2 nanovolts regardless of the source impedance. With all this working for you, it's easy to make effective use of the extreme sensitivity of our Model 900 Nanovolt Galvanometer.

The instrument consists of *two* units—the control unit shown above, which is the brains of the outfit, and a galvanometer unit. The Model 900 is ideal for use with high-accuracy and high-resolution potentiometers and bridges; for the calibration of thermo-couples, strain gauges, thermopiles, standard cells and the like. It also has myriad applications in the measurement of tiny voltages or currents in experimental chemistry, physics, biology or medicine. A fixed input resistance of 1 kilohm allows calibrated ranges for *both* voltages and current.

Through solid state circuitry, we've been able to combine the best of two worlds in the Model 900. It has the high sensitivity and ac rejection of mechanical galvanometers. But it also has the multiple calibrated ranges, meter readout, and operation simplicity of modern electronic voltmeters. It's an honest nanovoltmeter whose high sensitivity and complete guarding also simplify measurements in the microvolt area.

You'll have more time to use your own brains if your galvanometer has some of its own. ESI, 13900 NW Science Park Drive, Portland, Oregon 97229.

Model 900 Nanovolt Galvanometer
Ranges: 10nV (10pA) end scale to 3mV (3μA) end scale on zero-centered meter; 12 overlapping ranges in 1, 3, 10 sequence.
Accuracy: 2% of end scale for voltage and current.
Input Resistance: 1kΩ on all ranges.
Minimum Detectable Signal: Less than 2nV or 2pA.
Superimposed AC Rejection: Greater than 120 db (Infinite common mode rejection).
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Price: $1975.

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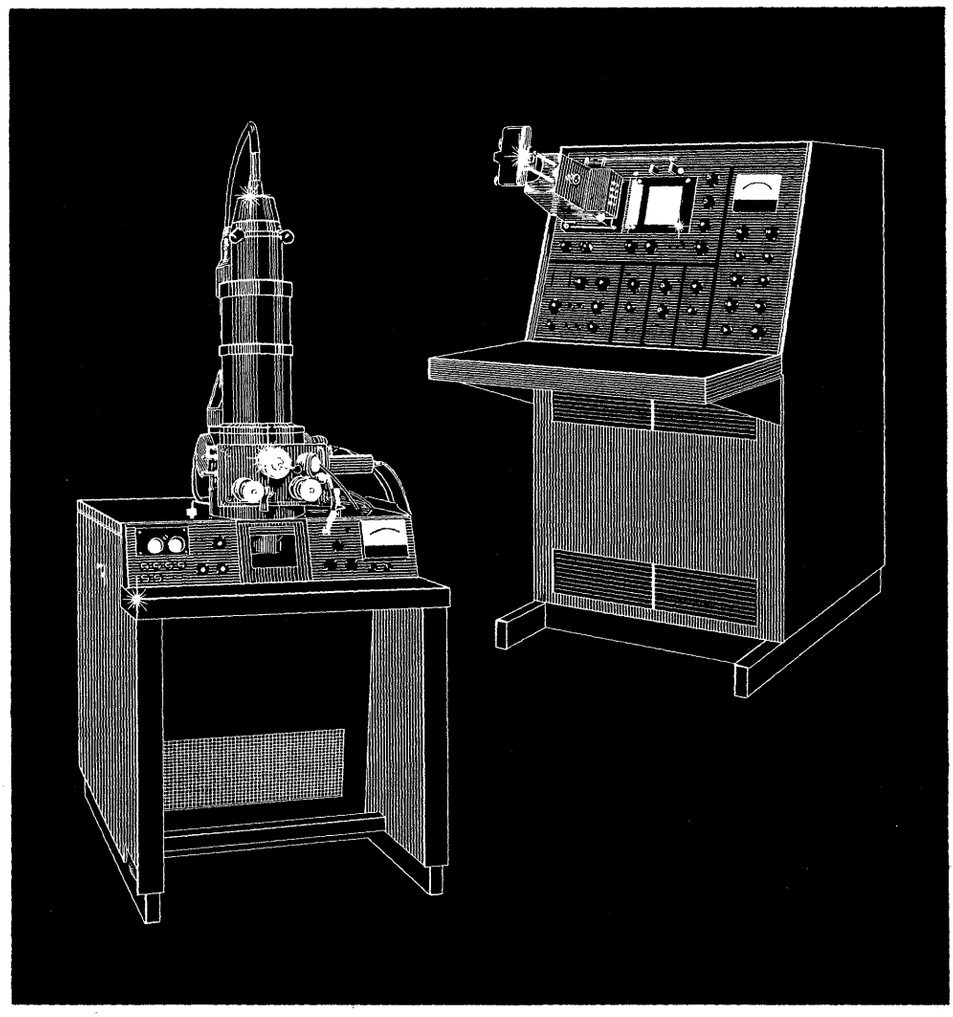

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7. Collagenase
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13. Protease
14. Trypsin

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2. Deoxyribonuclease II
3. Lysozyme
4. Micrococcal Nuclease (homogenous on gel electrophoresis)
5. Phosphatase, Acid (wheat germ)
6. Phosphatase, Alkaline (E. coli) (RNAse free)
7. Phosphodiesterase (bovine spleen)
8. Phosphodiesterase, venom
9. Ribonuclease
10. Ribonuclease A (free of unidentified component in ribonuclease, homogenous on polyacrylamide gel electrophoresis)
11. Ribonuclease B
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Packaging: To allow purchase of only amounts needed, many small, economical, non-wasteful packages are being made available.

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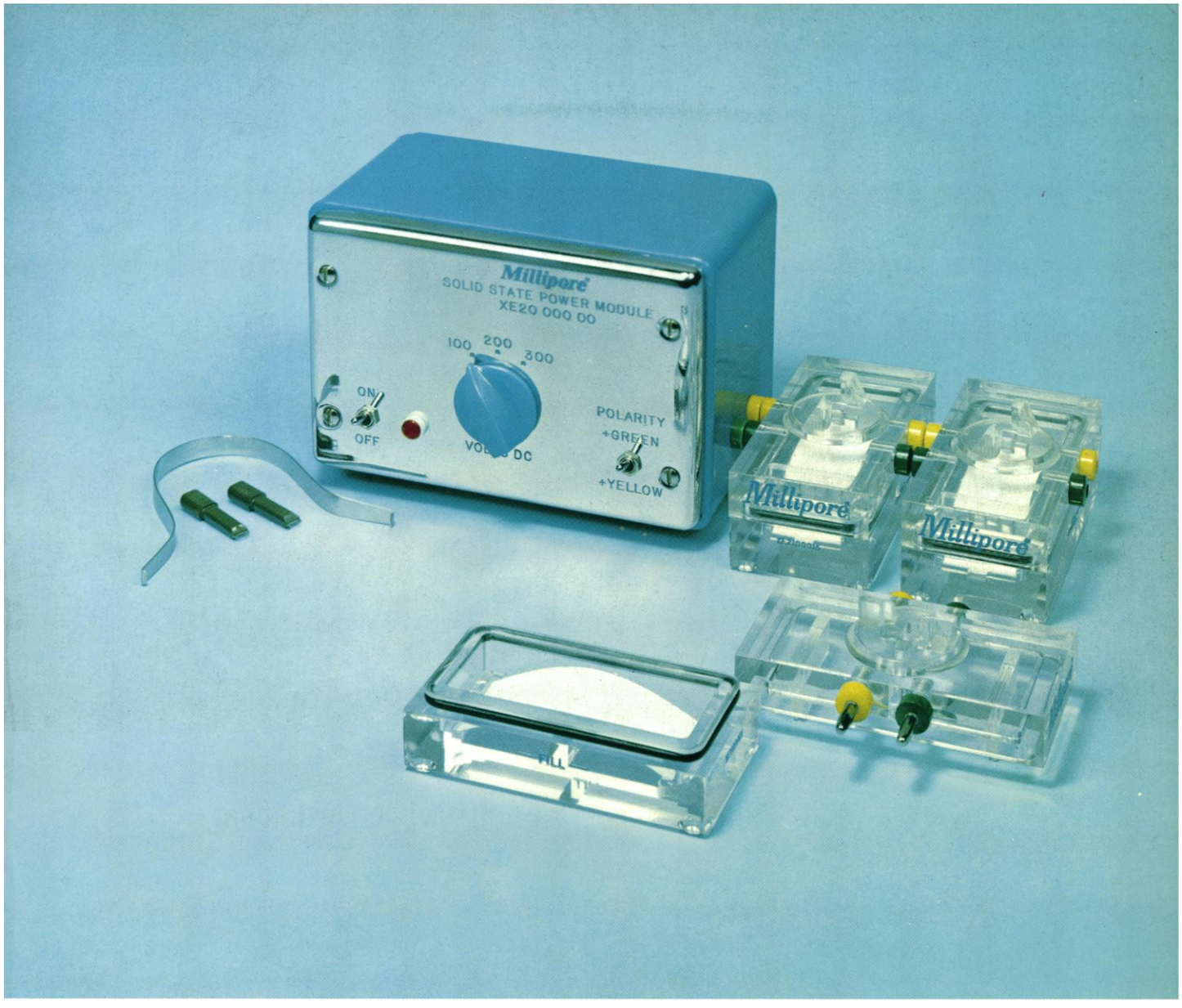


this is a totally *NEW* electrophoresis system

it makes life easier for people who are bothered by complicated, cumbersome separation methods

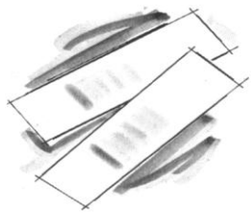
it costs just $147.50

Millipore® PhoroSlide™ Electrophoresis

See it at the Federation Meeting
Turn the page for further details

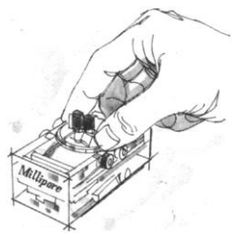
Millipore® PhoroSlide™ Electrophoresis

HERE is the zone-electrophoresis system that offers you the greatest simplicity and dependability, at by far the lowest cost for equipment and for each separation performed.



The Millipore PhoroSlide™ marks a radical advance in electrophoresis strip design. It provides the separation characteristics of cellulose acetate, in a flexible but dimensionally stable form that greatly simplifies handling and storage.

Each strip accepts two sample applications. Separation time is short — only seventeen minutes in some instances — with high resolution, and no tailing. The strips can be cleared for densitometry, and simple adapters are available for use with standard densitometers.

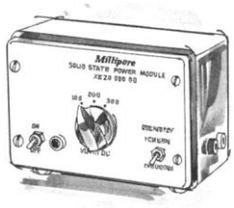


In addition, the spring-like stiffness of the strip makes it extremely easy to position in the cell, and automatically holds it clear of the buffer without complicated tensioning devices. Handling involves no risk of distorting the separation record.

The Millipore PhoroSlide Cell and Applicators in turn take full advantage of PhoroSlide characteristics to assure absolutely uniform strip geometry and sample application, from one separation to the next.

The simple, compact cell is of modular design, with plug-in electrical connections allowing simultaneous operation of five or more cells. Only 11 ml of buffer are needed to fill the chambers, and no equilibration waiting time is required.

Although designed for use with the Millipore power module, the cells can easily be used with other supplies providing the proper voltage and current.



The Millipore Solid-State Power Module is highly compact and functional in design, needing no adjustments other than simple switch-selection of the pre-set constant operating voltage.

A polarity-reversing switch is provided, and all circuits are completely solid-state, for long, trouble-free service.

The cost is $147.50 for the Power Module, a PhoroSlide Cell with two applicators, and special forceps to position the strips in the cell. PhoroSlide strips cost just 15 cents each.

WRITE FOR YOUR FREE COPY OF BULLETIN PE-1, *and learn more about why this new electrophoresis system truly obsoletes all others that are currently available. See it yourself at the April meeting of the Federation of American Societies for Experimental Biology, in Chicago.*

Millipore

MILLIPORE CORPORATION

BEDFORD, MASSACHUSETTS 01730

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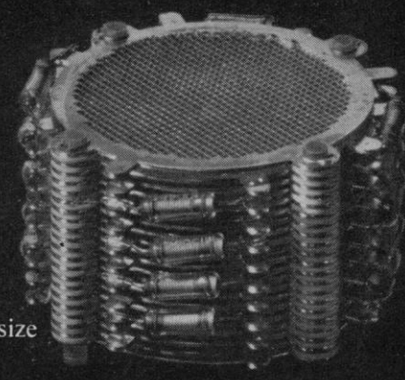

actual size

Do not throw this particle multiplier away if the gain drops. We'll reactivate it for you. And reactivate it for you. And reactivate it...

A particle multiplier for the pulse counting or current measurement of electrons, ions, and UV and x-ray photons that actually can be reactivated? And more than once?

Yes. Read on.

First off, we guarantee: at delivery, a gain better than 10^6 at 3 KV. (And, at a slightly higher voltage, 10^8 electrons per electron in pulse counting—with low noise.)

We then guarantee: to reactivate the unit if the gain drops below 10^6 at 3.5 KV.

We also guarantee: that if under normal operation reactivation is required within one year of purchase, this first reactivation will be gratis.

We further guarantee: subsequently to reactivate the unit at a small charge.

Now, having made so much of reactivation, we really should also emphasize the remarkable fundamental *stability* of this particle multiplier. We have yet to see its equal in terms of resistance to gain degradation.

Another important point: our MM-1 Focused Mesh Particle Multiplier forms a surprisingly compact, compatible, *complete system* when combined with our PAD-1 Fast Precision Pre-amplifier-Amplifier-Discriminator and our HV-2 High Voltage Power Supply. A brief description of all three components of this system comes next.

MM-1 Focused Mesh Particle Multiplier (Patented)
This is a high-gain, twenty-stage structure about one fourth as long as typical multipliers (we show it above in its actual size: 2″ diameter by 1¼″ long). The MM-1 is also bakeable (max. 400° C in vacuum), lightweight (3.6 oz.), rugged (has functioned in missiles in flight), and has a fast output rise time. It comes complete with integral voltage divider chain.

PAD-1 Fast Precision
Pre-amplifier-Amplifier-Discriminator
PAD-1 is a transistorized, charge-sensitive, low-noise device with a signal delay time of less than 15 nanoseconds and an output pulse of four volts at 50 ohms with a rise time of less than 5 nanoseconds. The discriminator has exceptionally low jitter for timing applications. The unit is compact (only 4″ long by 2″ wide by 1½″ high) for mounting in close proximity to the MM-1.

HV-2 High Voltage Power Supply
A small package (a mere 4″ long by 3¼″ wide by 2⅞″ high) which supplies a stable well-filtered voltage that effectively satisfies the high voltage power supply needs of the system.

To recapitulate all this in a single sentence: we offer a *complete system* for the pulse counting of electrons, ions, or hard photons which is based on our exceptionally stable, uniquely reactivateable (and so guaranteed), high-gain, small-sized MM-1 Particle Multiplier coupled with our PAD-1 and HV-2 units. Current measurements may be made using the MM-1 and the HV-2 combination.

A final reasuring afterthought. We guarantee *this* too: the quality of our workmanship, the quality of the materials we've used. Completely. And with no time limit.

More information follows your request for our file PD-S.

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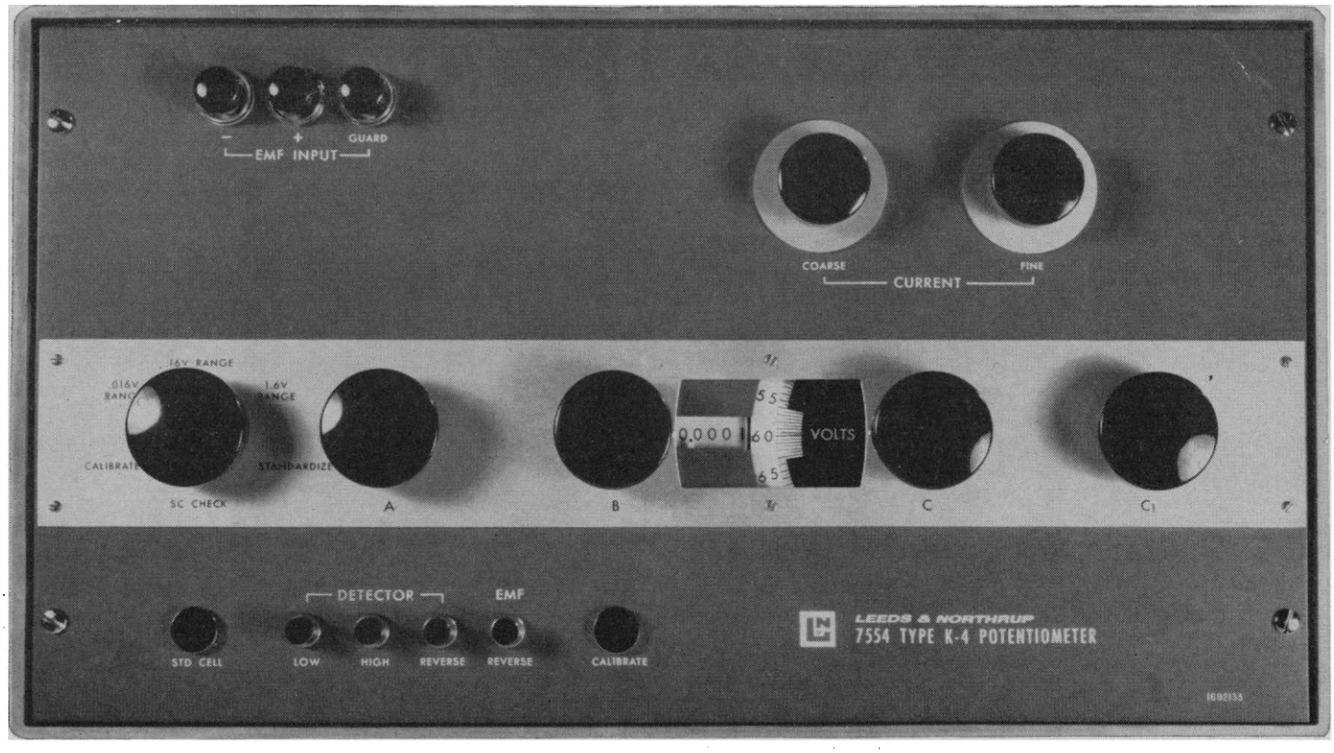
3617 Woodland Avenue, Baltimore, Maryland 21215



What comes after K-3? K-4, of course.

For more than ten years, the Leeds & Northrup Type K-3 general-purpose potentiometer has served well for precision thermocouple measurements, meter calibration, current and voltage measurements and a host of important research, calibration and engineering applications.

Now—after a decade of continuing improvement—the K-3 has been honorably retired.

The new Type K-4 Potentiometer—its highly qualified successor—not only retains the proven features of the K-3 (guarding, central readout, stable circuit components) but also offers so many additional user-oriented features that a new design was required.

For example:

1. Higher accuracy. Twice as good as the K-3; on the high range, for example, ± (50 ppm of reading + 20 μv).
2. Quick calibration. Provision for convenient internal consistency check between decades and main steps.
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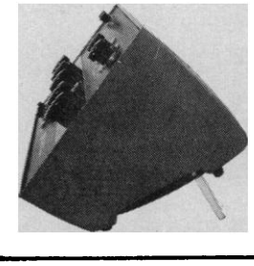
The price? Surprising. Despite the added features (and inflation), the price is *lower* than the K-3... by more than $50.

So when you think K-3... remember, it's now *K-4*.

For descriptive literature, call your nearby L&N field office or write us at 4926 Stenton Avenue, Philadelphia, Pa. 19144.



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THREE SAVANT FLAT PLATE ELECTROPHORESIS SYSTEMS THAT OFFER THE RESEARCHER VERSATILITY, RELIABILITY and RESOLUTION.

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☐ Compact spots for greater resolution.
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☐ Fingerprinting (two-dimensional separation).

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☐ A versatile system for wide and narrow sheets.

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☐ Adaptable for thin layer plates.

☐ Easily accessible buffer vessels allow for rapid buffer changeover if required.

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☐ The longest plate now available commercially for making mono-dimensional runs involving slow resolving mixtures.

☐ Flat plate 12"x30" will accept 36" long paper, up to 11" wide.

☐ Longer running paths helps to increase resolution.

☐ Allows the use of higher voltages.

Standard features built into each unit, insures the safety and dependable results required of the instruments.

☐ Stainless steel cooling coils ☐ Two buffer vessels ☐ Platinum electrodes ☐ Electrophoretic run can be observed through transparent lucite cover.

☐ A complete listing of all Savant's Flat Plate equipment and accessories may be obtained by writing for our latest Catalog FP-674.

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This is a new automatic pipette.

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

(How's that again?)

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

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

Safe? Safety is inherent in the design. Liquid does not come in contact with operator.

Reproducible delivery volume? Using the same instrument: ±1%.

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

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

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

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

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I Inosinic Acid	Poly AI C^{14}	Poly CI C^{14}	Poly I C^{14}	Poly UI C^{14}	Poly IG
U Uridylic Acid	Poly AU $C^{14}H^{3}$	Poly CU $C^{14}H^{3}$	Poly UI C^{14}	Poly U $C^{14}H^{3}$	Poly UG
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Also available: Poly AUC (other 3-base copolymers coming; keep in touch)

NB: All of above available unlabeled *and* labeled as indicated

Polyribonucleotides

(synthetic template RNAs from Schwarz)

The checkerboard above shows the polyribonucleotides that we are now manufacturing. (Forgive the checkerboard's redundancy, this being the inevitable nature of such grids.) In any case, note that the first item in the first column—either horizontally or vertically—is a homopolymer, as is the second item in the second column, the third in the third, and, finally, the fourth in the fourth. All others, of course, are copolymers. Everything shown is available *unlabeled.* But some are *also* available labeled with C^{14} (in the purine-8 and/or pyrimidine-2 positions) or H^{3} (in the purine or pyrimidine moieties); the grid shows this too. Accordingly, red means that *both* hot and cold versions are available, whereas black signifies that the compound is only available in the unlabeled form.

Our polyribonucleotides are potassium salts that come to you in the vials in which they have been lyophilized. They are free of nucleases and of low molecular weight materials including nucleosides and nucleotides. Their apparent average molecular weights run in the order of 10^{5} to 10^{6}.

These compounds are sold on the basis of the polynucleotide phosphorus present (which helps eliminate several unnecessary ambiguities). Each vial contains 2.5 μMoles of polynucleotide phosphorus per milligram of nominal polymer weight.

To reduce other possible ambiguities, we give you a reassuring Product Analysis Report which recounts the analytical data that we've developed on the specific material you receive. For example: the exact base ratios of the isolated copolymers. And a great deal more.

So: if your research is leading, or has led, into these intriguing areas, consider the possible advantages of using our pure, carefully characterized polyribonucleotides. Such consideration can now be abetted by asking us for two things: (1) more data on our polyribonucleotides, and (2) a selected list of relevant references. And while you're at it, why not ask for our complete 80-page catalog? Your move, please.

Schwarz BioResearch, Inc.
Orangeburg, New York 10962

basis, either at a uniform percentage for major organizational units within the institution, or at a uniform overall percentage for the institution, or in any reasonable combination.

3) Under a uniform-percentage plan for a major organizational unit, or for the institution as a whole, the contribution agreed to for any given period of time should be met in total, but not necessarily at the same percentage ratio for each grant, so long as some contribution is made in each case.

4) In some cases, the nonfederal contribution will be furnished from a source other than the educational institution. This might be in the form of services, materials, or funds. It should be possible for contributions to be furnished under any budget category, either in total or in part, at the discretion of the institution.

5) While it seems reasonable for Bureau of the Budget cost principles to be applicable to federal contributions, they should not necessarily apply to nonfederal contributions, particularly if a third party is involved.

6) Approval of government agencies should not be required for committal of nonfederal funds.

The solution to the problem is so simple it is hard to understand why some agencies make it so difficult and continue to thwart the wishes of the Congress.

ERIC A. WALKER
Pennsylvania State University, University Park 16802

Orlans almost made an important point in the first part of his article "Developments in federal policy toward university research" (10 Feb., p. 665). However, in his anxiety to castigate responsible scientists for trying to say that scientific research is important and is worth supporting, he got his point completely inverted. The conclusion he did assert was that less money for science would bring the opportunity to "reassert standards of research quality."

All responsible scientists believe that quality standards for research should be elevated. But this can only be done by putting more funds into quality projects and less into trivial ones. However, as Orlans points out, the pressures toward low quality have been *forced* on the science-supporting agencies of government by Congressional and Executive insistence on "geographical distribution" and on more "practical results." Thus, no longer is the National Science Foundation, for example, able to allocate its scarce funds solely on the basis of merit. It must support projects and institutions which have as their principal merit only the fact that they are in a "neglected' part of the country. Also, with some 90 percent of the R & D funds now going into applied research which seeks early "practical results," it will make little difference to increase this to 95 percent and thus slice the basic research portion by 50 percent. It will mean only that the basic knowledge and the trained people will *not* be available to do "practical" research tomorrow.

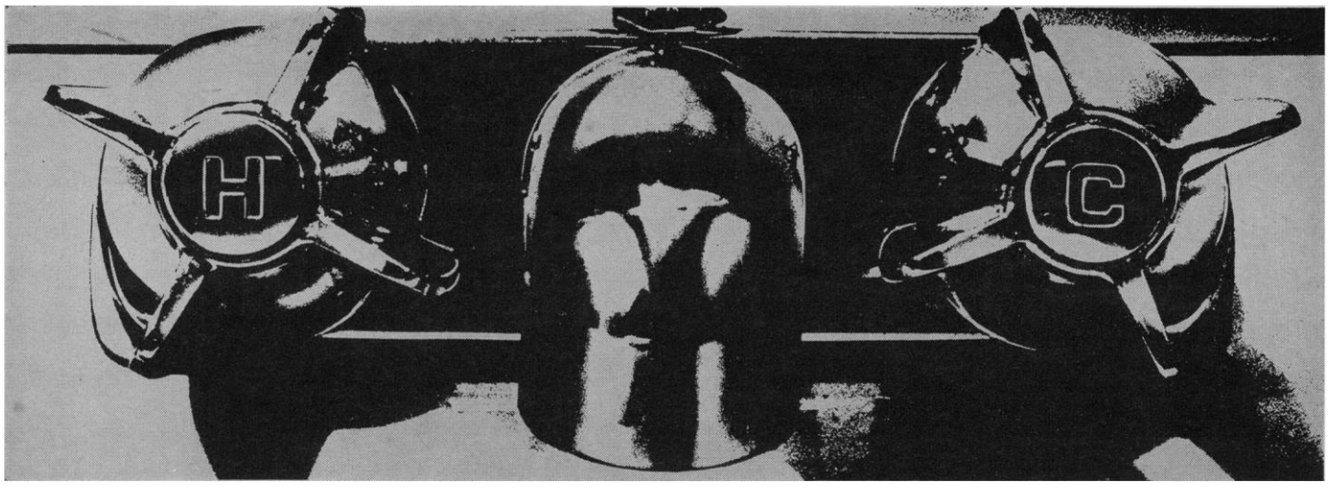
Thus, less money budgeted for basic research will only degrade the average quality still further unless political influences are removed which force the spread of already scarce funds to less meritorious areas. This is the point Orlans should have made. If these political pressures continue to exist, only *more*, not *less*, money for science can elevate the research quality—for only more money will make it possible to give adequate support to meritorious work and still have some left over to "spread the gravy." Granted, this is not a very sensible way to proceed. But if the political pressures continue, it is the only way. Seitz and Handler (as quoted by Orlans) were thus right after all in proposing a 15 percent rate of growth in basic research funds. They were not being selfish or unrealistic—for they did *not* suggest that such a rate be maintained for 30 years, as Orlans implies.

Let us admit that these are difficult times. Let us admit that research expenditures might be decreased if it were only the less worthy projects which were thereby eliminated. But the dilemma of our time is that emphasis on quality is not always the goal of those who pass on appropriations. Let us try to persuade them—not berate the scientists (all of those mentioned by Orlans) who are trying desperately to do just that.

L. A. DUBRIDGE
California Institute of Technology, Pasadena 91109

The following statement for publication was adopted by the Board of Permanent Officers of the Yale School of Medicine:

At a recent meeting, the Board of Permanent Officers of the Yale School of Medicine expressed concern at the increasing number of recent instances in which younger members of our faculty



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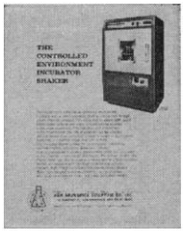

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have been informed by the National Institutes of Health that, although their applications for research support had been given high priority, insufficient funds were available to activate the grants. Promising young colleagues in the basic sciences have been particularly affected.

This nation's greatest scientific resource is the quality of the men and women who conduct research, and the continued excellence of American science depends in the first place on our investment in the potential of young scientists to become the future leaders in their chosen fields. It is essential, therefore, that support be given not only to outstanding research programs conducted by established investigators, but also to the new proposals of qualified young scientists, and that the federal funds available for basic research should be adequate to sustain both types of research effort.

VERNON W. LIPPARD
School of Medicine, Yale University, New Haven, Connecticut

Ph.D. Language Requirements Modified

As an additional comment to the three letters (30 Dec.) on the subject of the Ph.D. language requirements, may I contribute the information that the faculty of the graduate school of Cornell University last May 6th voted (4 to 1) to abolish the general language requirements for this degree and to allow each of the fields (about 74 authorized to offer Ph.D. programs for majors) to specify what foreign language proficiency, if any, it should require. It was understood, of course, that any professor might insist on having his students learn more languages than the field specified as minimal.

So far as I know, Cornell became the first of the so-called multiversities to adopt this reform. Currently, approximately 22 fields with 18 percent of the graduate students continue to operate under the two-language rule; 29 fields, with 50 percent of the students, have specified one foreign language; and 21 fields, with 32 percent of the students, have none. The largest of the fields officially in the first group are English, civil engineering, psychology, and linguistics; the largest of the second group are chemistry, education, mathematics, and electrical engineering; and in the last group the largest are physics, history, agricultural economics, entomology and limnology, and conservation. I believe more and more fields will eventually shift from the first group to the second and from the second to the third.

So far as I know, everyone on the faculty agreed that a thoroughgoing reading knowledge of two or three major European languages would be an asset for anyone in research or college teaching, even though more and more of the advanced scientific literature is published in English or is soon available in printed translations. However, the facts seemed to be that, for most fields, the information explosion and other modern developments has increased the importance of other areas of study while greatly reducing the actual use of foreign languages. Students generally needed more basic understanding of chemistry, physics, mathematics, statistical methodology, computer science, biology, economics, psychology, or sociology than they were able to get in their undergraduate training or to pick up in 3 to 8 years in graduate school. Even the advantages of having a student learn a second or third language for its effects on broadening his outlooks and sympathies and his appreciation of the modern world as a whole were surely far overrated. This was especially true for the student who, late in his career, was forced to acquaint himself with a language he had every reason to believe he would never use to any extent.

JOHN D. HARTMAN
New York State College of Agriculture, Cornell University, Ithaca 14850

While serving a term as Associate Dean for Graduate Studies of the College of Arts and Science, I proposed that the University drop any university-wide requirement of foreign languages for the Ph.D. degree, and substitute a policy of departmental option. Miraculously, the proposal passed and we now have a real operational criterion for relevant language requirements. Some departments have none, some have one or two or even three, and some have allowed an option in computing as a substitute for language requirements. The physics department, for instance, has none.

We also have avoided an enormous amount of administrative nonsense that resulted from the fact that passing the language requirement was prerequisite to taking the qualifying examinations. Ph.D. students are now treated in this respect like the adults they should be; if they need languages, they learn them.

M. F. KAPLON
Department of Physics and Astronomy, University of Rochester, Rochester, New York 14627

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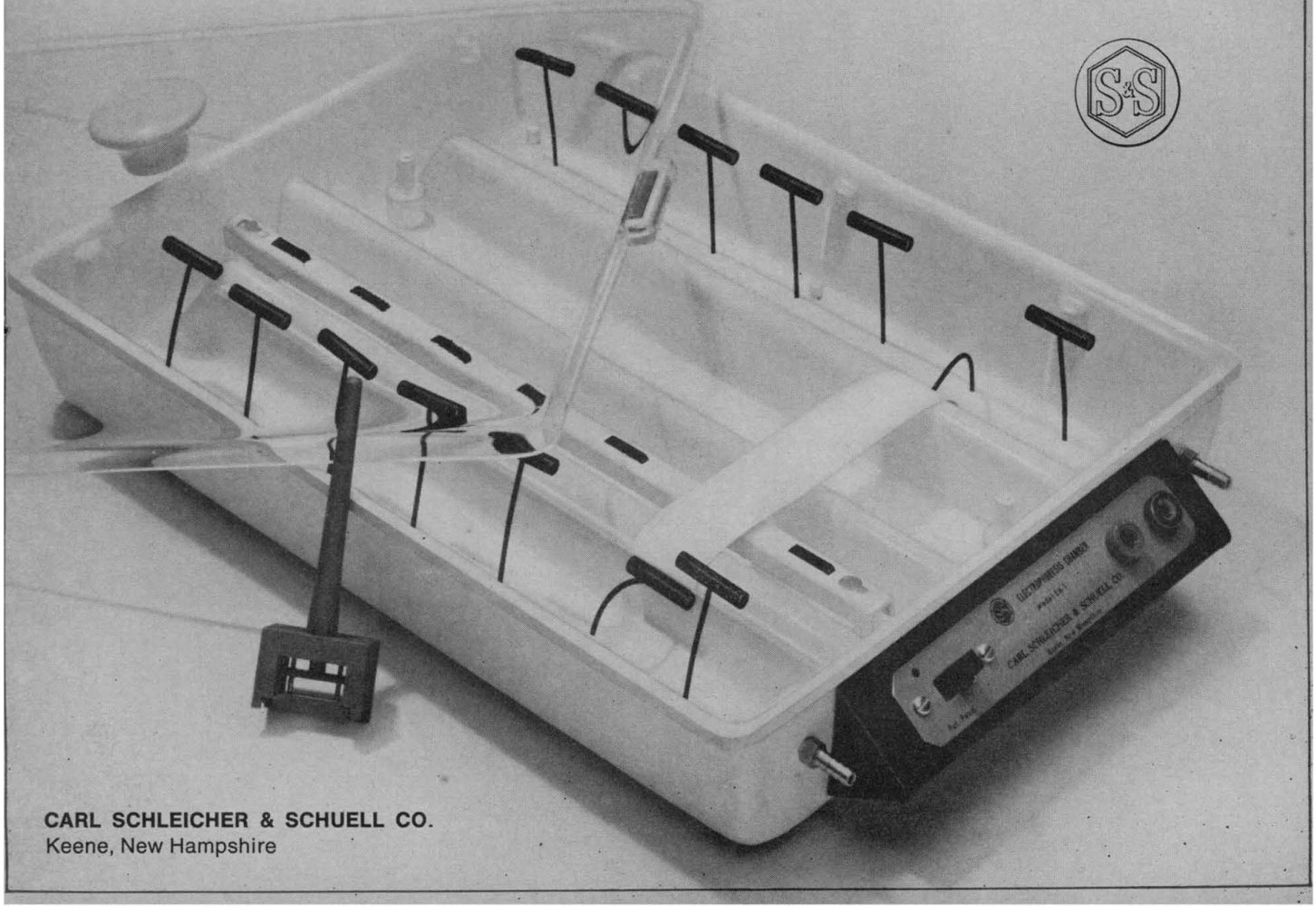

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Abiogenic Synthesis

The excellent review by Curtis A. Williams (20 Jan., p. 308) of Thomas Jukes's book *Molecules and Evolution* did not comment on any specific points in that author's evolutionary treatment of the genetic code. While a number of points might be argued, one citation, admittedly an obscure source, is herewith mentioned inasmuch as it antedates the author's preparation of the book and yet clarifies his argument.

Jukes refers (p. 68) to 15 amino acids that belong to a more primitive group of amino acids. He bases this classification, in part, on the fact that these ampholytes have been synthesized abiogenically from simpler chemicals. Cysteine, however, is included uncertainly in this group because it (as far as the author knew) had not been synthesized abiogenically.

The late Eric Ellenbogen of the University of Pittsburgh had indeed made sulfur-containing amino acids under simulated primitive-earth conditions. No less than 17 methods are described by his U.S. patent 2,765,554—20 Dec. 1960 (obtainable from the U.S. Patent Office). Many of these methods result in the formation of both cysteine (as cystine) and methionine.

On the basis of Jukes's criteria, this information should eliminate any partial ambiguity in the placement of cysteine in the primitive group of amino acids.

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Brain Drain: Further Solutions

With respect to Grubel's article ("The brain drain: a U.S. dilemma," 16 Dec., p. 1420) and to some of the succeeding correspondence (Letters, 3 Feb.), I fail to see the predicament. Unless we live in a police state with its restrictions on personal freedoms, there should be no question of requiring a scientist to work here or there. He should be as free to choose his country of work as is a mechanic, a businessman, or a common laborer. If, as seems likely, many find that their scientific work is best carried out in the United States, then here they will come if they are wanted. It is simply inefficient to attempt some scientific activities in backward countries, as is amply demonstrated in the letters of Rudin and Saini.

Let us do something constructive about the lack of trained people in the countries from which we immigrants come. I, for one, help support a student overseas while he studies the basic science or management training that is essential for the development of his country's economy. Students may be supported for $40 to $70 a month in countries with less fortunate living standards. Also, many of us could even afford to support a foreign graduate student studying in the United States. . . .

ROBERT N. ELSTON
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In his editorial, "Brain drain" (25 Nov., p. 965), Wolfle perceptively pointed out that "In educating foreign students, we give some of them better preparation for work here than for work at home." As a Peace Corps volunteer teaching biological sciences in a provincial university in Latin America during 1963–65, I observed the effects of two factors that support Wolfle's statement.

The first is the lack of research facilities that the returning scientist had grown accustomed to using in the United States. There are few provincial universities in Latin America with the relatively expensive, but necessary, instruments needed for modern research in the natural and biological sciences. If he is research-oriented, the returning professional becomes frustrated. A few might find positions in the major universities with modern equipment, but most go to the smaller universities which usually educate the majority of the country's students. If we are to help these U.S.-trained foreigners, why not supply more tangible research apparatus instead of monetary grants which are often spent in ways not beneficial to the university. Such a realistic approach would require U.S. technicians and scientists to become personally involved in the development and modernization of the small universities where most of these educated specialists work.

The second problem is certainly more complicated. Having studied in an educational system quite different from that of his own country, the returned scientist often tries to employ his new approach to teaching. By ad-

vocating and utilizing new, and often incongruous, teaching methods, he creates animosity and distrust in his home-educated colleagues who consider him a threat to their positions and status. He may find himself ostracized by his peers and by the students and even may be obliged to quit his teaching position. I knew three U.S.-trained chemists who left a university because of pressure from the faculty and sought funds to return to the United States.

There is no easy solution to this second source of discontent, unless a U.S.-trained foreigner is willing to forget much of what is theoretically valuable experience and return to often antiquated, yet deeply entrenched, systems of education. Perhaps if he is able to continue progressive modern research, he will decide to remain in his own country, where he is sorely needed. All Peace Corps volunteers going to developing countries as teachers are told to be "flexible." A similar precaution should be observed by U.S.-trained foreigners.

LAWRENCE E. LICHT
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University of Texas,
Austin 78712

. . . I should like to refute the statement and conclusion advanced by Labbauf in his letter (3 Feb.) in regard to Iran. U.S. aid to Iran has been spent reasonably well in recent years and much progress in the health and education of Iranians (partly due to that aid) has been achieved. Labbauf is apparently unaware of the work now carried out by the Health Corps and the Education Corps, which were initiated a few years ago by the Shah. Great improvements in the health of the population and substantial reduction in the illiteracy rate have been achieved throughout the country by these two well-functioning organizations.

Also Labbauf's statement that "public authorities in Iran refuse to recognize the needs and aspirations of the educated segment" is completely false. Presently almost all members of the Iranian cabinet are foreign-trained and about half of them are American-trained. An increasing number of American-trained Iranians are going home to occupy important positions in the government and at various universities. Those who are still remaining in this country after completion of their training are mainly highly specialized scientists for whom research facilities

are, as yet, either unavailable or limited in Iran. Iran is now a vigorously developing country and I have no doubt that facilities for such specialized fields will become available in due time. I can assure Labbauf that eventually the great majority of American-trained Iranians will go home to take part in the development of the land of such "World Greats" as Darius, Avicenna, and Khayyam.

ABBAS M. BEHBEHANI
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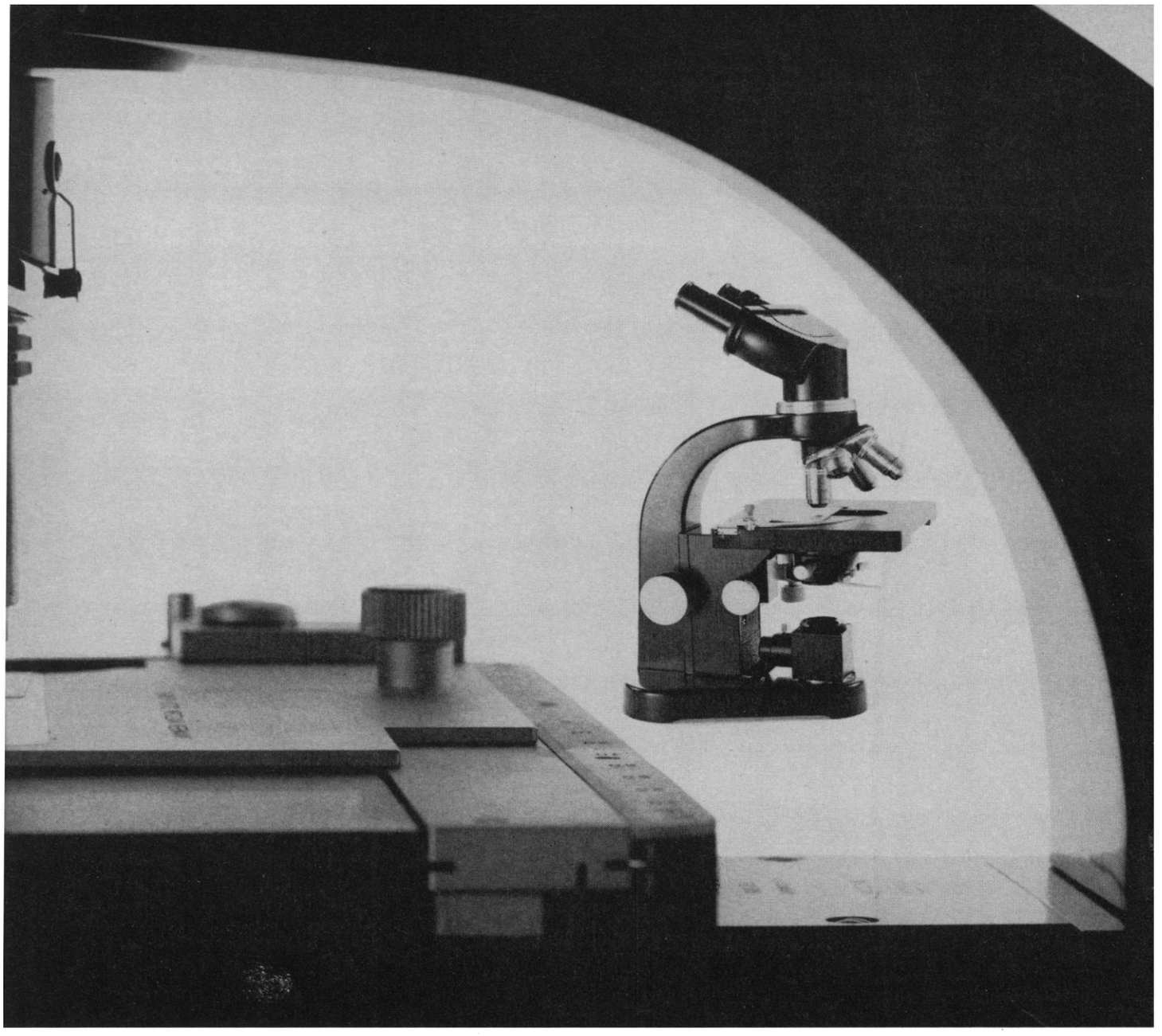
Much could be done to help to stem the brain drain from the poorer to the wealthier countries, but the main effort will have to come from the latter. Permission to go to the West should be more difficult for students to obtain, as should permission to stay on indefinitely once they are there. Visas should be limited to the specific courses for which the student travels to Western Europe or America. Much of the training received abroad not only fails to fit a student for work in his own country but creates a profound dissatisfaction with anything but the superlative. Increased support of universities in the developing countries for all but the highest level of training (the Ph.D.) would dam the brain drain at its source and would improve the quality and increase the prestige of educational institutions in these countries.

DONALD STEWART MCLAREN
School of Medicine,
American University of Beirut,
Beirut, Lebanese Republic

Publishing in Valid Media

Van Bavel would not have cause for concern about "unedited publication media" (Letters, 6 Jan.) if the lesser institutions would follow their leaders. The better universities consider as valid publications only those articles on current research which have survived an adequate review process. Trade journals, educational journals, technical reports, and letters columns simply do not count for "brownie points." If all institutions were to follow this policy, the media which bother him would begin to wither.

DONALD M. MCELIGOT
College of Engineering,
University of Arizona, Tucson 85721



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SCIENCE

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Selective Service Changes

In a technologically advanced nation the selection of men for military service cannot be handled satisfactorily unless the related problem of selecting other men for deferment or exemption is considered simultaneously. The recent report of the National Advisory Commission on Selective Service deals fully with the first of these problems, but inadequately with the second. Briefly, the commission proposes: that (with a few exceptions) no further student or occupational deferments be granted; that younger men be drafted first, rather than older ones as has been the practice; and that draftees be selected by chance from the I-A pool. Lotteries were tried in the Civil War, in World War I, and in the early years of World War II. Under some circumstances they can select satisfactorily the men who enter military service, but they failed before, and cannot be expected now, to select effectively those who are of greater value in the civilian sector.

There are two categories of men who should not be inducted. The easier category to handle includes men excused for personal reasons, chiefly hardship cases, and those who do not meet minimum mental or physical standards. The harder category to handle includes those who should be deferred or exempted for reasons of national interest: persons necessary to maintain civil government; persons of greater value in civilian than in military positions; and persons who will be of greater military value after completion of training as officers, physicians, or other highly trained specialists.

This "national interest" category causes difficulty because inclusion can be subject to abuse or favoritism; because deferment seems to confer special privilege and sometimes leads to de facto exemption; and because white men have qualified more often than Negroes. The fear of abuse and special privilege, the desire to minimize the number in the "national interest" category, and the desire to achieve greater Negro-white equity in the percentages of the physically and mentally qualified who are called for induction seem to have determined the proposals of the National Advisory Commission.

Changes are necessary, for some of the selective service machinery has grown rusty and there has been too much variation in the application of standards for selection and for deferment. In the debate about proposed changes, conflicts of value and emotional appeals can be expected. There will be talk of discrimination and of rich college kids. Significantly, the National Advisory Commission entitled its report *In Pursuit of Equity*, and the lottery system proposed by the President was given the acronym FAIR.

The solid political and social reasons for the commission's proposals must be considered. But so must their effect on national strength and welfare. Minimizing deferments and inducting men earlier would make it easier for the services to get manpower, but more difficult in a few years to get officers, doctors, and other trained specialists. Abolition of student and occupational deferment would damage industry and education. Some of the bills before Congress and the report of the Civilian Advisory Panel to the House Committee on Armed Services are framed to try to avoid these consequences.

In attempting to resolve the conflicts involved, it will be necessary to listen to the emotional arguments and to pay attention to the goals emphasized by the commission, but it will also be necessary to give more consideration than the commission did to the "national interest" category if we are to preserve the fundamental principle of a *selective* service system—the optimal deployment of available manpower resources.

—DAEL WOLFLE

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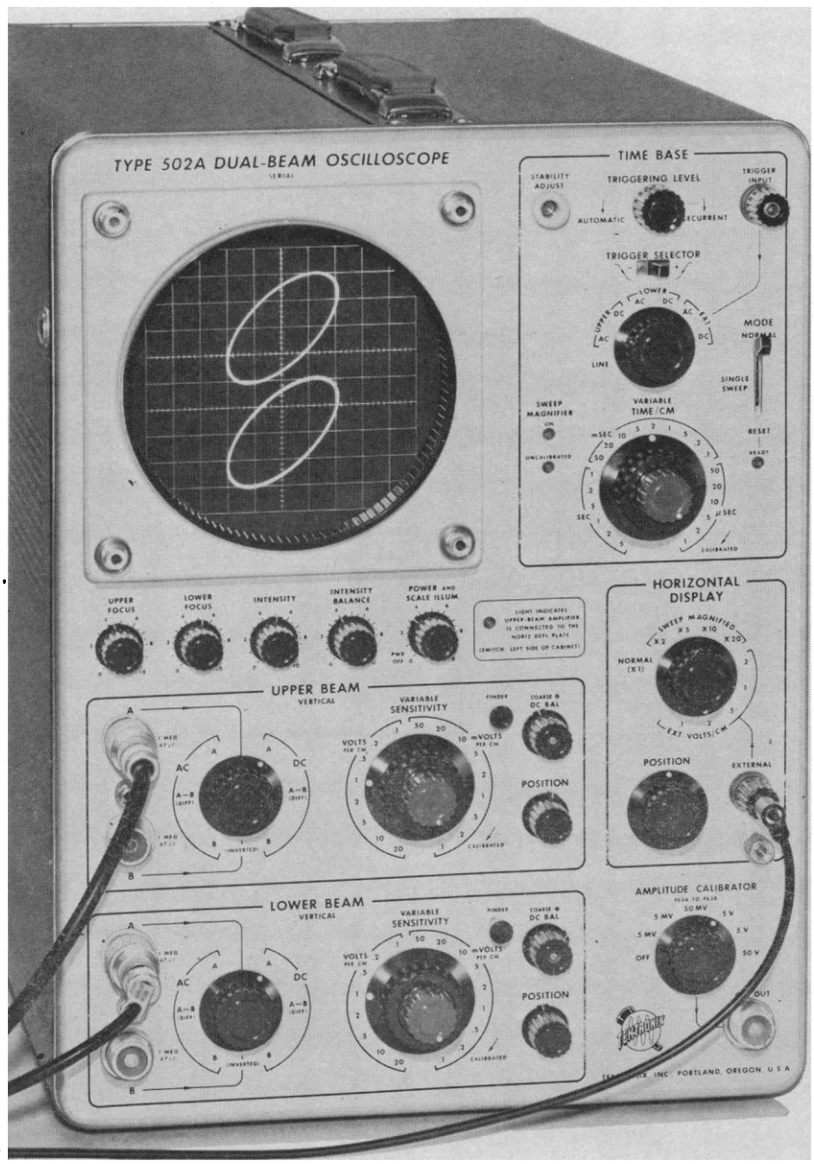

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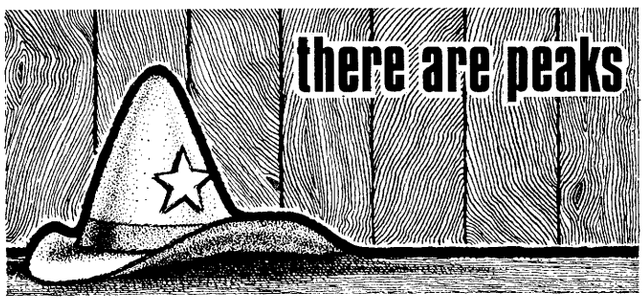
conference. T. O. Ranger ("Towards the historical study of traditional religion in East and Central Africa") stated that it was time the historian considered seriously the study of African religious systems in his particular historical environment; the history of religions can throw real light on the political history of the period under study.

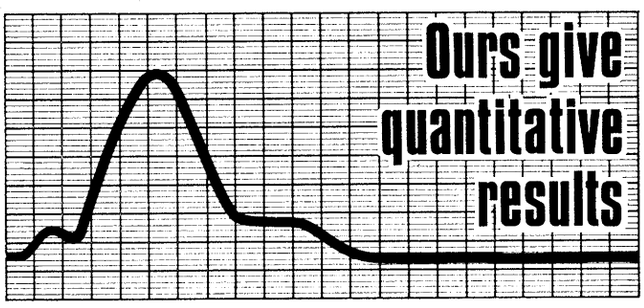
M. S. Kiwanuka on "Nationalism, tribalism, and violence in Africa" discussed one of the most important topices in Africa today. In "The function of myth in nation building," F. W. Welbourn argued that in Africa today, only the myth of 'Africanism' is the one most likely to succeed, even if it has tinges later of Christianity and Marxism, and has to face the stiff challenge of competing nationalisms. R. C. Soper ("A survey of our present knowledge and future prospects, concerning the Early Iron Age in East Africa") reviewed the evidence for the earliest iron-using or presumed iron-using peoples in East Africa and assessed their significance in the light of recent and current research. The author stated that the most urgent need for researchers in this field is to fit the known cultural manifestations into a chronological and geographical framework. This task can only be accomplished by locating and excavating stratified sites, in practice caves and rock-shelters, and then dating by means of a sufficient number of radiocarbon readings.

Papers on economics were presented by W. A. J. Okumu and W. Muriithi. Okumu reported on the proposed central bank of Kenya, and on the policy of economic assistance. Muriithi dealt with the contemporary East African scene; his paper discussed the problems of equity and growth in the context of developing economies and the current interest in manpower planning.

In the only paper read on languages, ("The relevance of Kiswahili in present day East Africa") S. Chiraghdin made a strong plea for actively promoting Kiswahili as an established academic subject in the educational institutions in East Africa. In his opinion, this is the prelude toward greater use of the language in all the phases of national life.

Special sessions and special activities were new additions to the program of the Academy. Throughout the duration of the symposium, exhibitions of the latest books, periodicals, and scientific instruments were presented by local representatives of overseas publishers and





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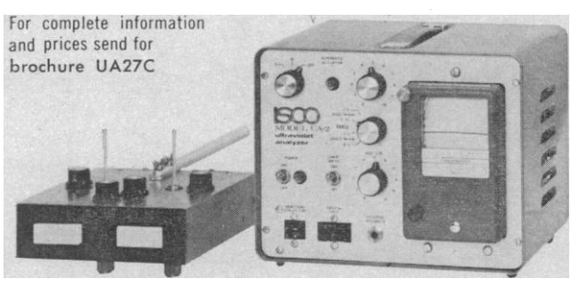

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manufacturers, as well as the local firms. Because of the value of this program, it is hoped to be repeated in an expanded form.

Also, as a sign of its interest in the teaching of science to high school pupils, the Academy held a panel discussion on the topic "The Academy and high school Science." A number of high school science teachers and pupils from schools in Uganda were invited to lectures presented by members of the University and by the UNESCO Science expert from Dar es Salaam. Discussions centered around the current status of science and the efforts being made in East Africa to present it with improved scientific techniques. P. E. Vernon (University of London) discussed methods of selection for secondary education.

At the Annual General Meeting, the following persons were all reelected: W. K. Chagula (University College, Dar es Salaam), president; Thomas R. Odhiambo (University College, Nairobi), secretary; B. A. Ogot (University College, Nairobi), treasurer; and R. S. Odingo (University College, Nairobi), assistant secretary. Reuben J. Olembo (Makerere University College) was elected editor of the Academy. J. D. Rubadiri (Makerere University College) was named the new chairman of the Research and Studentships Committee.

The opening address and papers presented at the general session will appear in a special publication of the Academy. The Presidential Foundation Lecture and the first Distinguished Lecture will be the subjects of two special pamphlets issued by the Academy. Papers presented in the three disciplinary sessions (physical and chemical sciences, biological sciences, and the arts and social sciences) will be published separately as *Proceedings* of the Fourth Symposium.

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Forthcoming Events

April

7–9. **American Psychosomatic** Soc., 24th annual mtg., New Orleans, La. (The Society, 265 Nassau Rd., Roosevelt, N.Y. 11575)

7–9. American Soc. of **Internal Medicine**, annual, San Francisco, Calif. (A. V. Whitehall, 3410 Geary Blvd., San Francisco 94118)

8. New Mexico **Acad. of Science**, Socorro. (E. L. Cleveland, New Mexico State Univ., Las Cruces 88001)

8–9. **Arizona Chest Disease** Symp., Tucson. (L. D. Hudson, Arizona Chest Disease Symp., P.O. Box 6067, Tucson 85716)

8–13. **Stereology**, 2nd intern. congr., Chicago, Ill. (H. Elias, 2020 W. Ogden Ave., Chicago 60612)

9–13. **Aerospace Medical** Assoc., 38th annual, Washington, D.C. (Executive Vice Pres., The Association, c/o Washington Natl. Airport, Washington, D.C. 20001)

9–14. American **Pharmaceutical** Assoc., 114th annual mtg., Las Vegas, Nev. (The Association, 2215 Constitution Ave., NW, Washington, D.C. 20037)

9–15. **Cryogenic Engineering**, intern. conf., Kyoto, Japan. (K. Oshima, Dept. of Nuclear Engineering, Univ. of Tokyo, Bunkyo-Ku, Tokyo, Japan)

9–16. Inter-American Inst. of **Agricultural Sciences**, mtg., Rio de Janeiro, Brazil. (The Institute, Apt. 4359, San Jose, Costa Rica)

10. **Blood Group Nomenclature**, mtg., New York, N.Y. (A. S. Wiener, Office of Chief Medical Examiner of New York City, 520 First Ave., New York 10016)

10–12. Methods and Techniques for **Hospital Volunteers**, American Hospital Assoc., Pittsburgh, Pa. (E. J. Lanigan, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

10–12. American Soc. of **Mechanical Engineers**, conf., Detroit, Mich. (Meetings Manager, ASME, 345 E. 47 St., New York 10017)

10–12. European Federation of **International College of Surgeons**, congr., Barcelona, Spain. (Secretary, International College of Surgeons, 1516 Lake Shore Dr., Chicago, Ill. 60610)

10–12. **Great Lakes Research**, 10th conf., and Intern. Assoc. for Great Lakes Research, 1st mtg., Toronto, Ont., Canada. (Mrs. J. S. Seddon, Great Lakes Inst., Univ. of Toronto, Toronto 5)

10–12. Institute of **Environmental Sciences**, Washington, D.C. (R. P. Jones, Admiral Corp. 3800 W. Cortland, Chicago, Ill. 60647)

10–13. American **Industrial Health** Conf., New York, N.Y. (Industrial Medical Assoc., 55 E. Washington St., Chicago, Ill. 60602)

10–13. American Assoc. of **Petroleum Geologists**, 52nd annual conv., Los Angeles, Calif. (E. W. Ellsworth, AAPG, 1444 S. Boulder, Box 979, Tulsa, Okla. 74101)

10–14. American **College of Physicians**, 48th annual session, San Francisco, Calif. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia, Pa.)

10–14. **Hospital Librarianship**, American Hospital Assoc., Birmingham, Ala. (E. J. Lanigan, Conv. and Mtg. Bureau, AHA, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

10–14. **Management for Engineers**, Atlanta, Ga. (Director, Dept. of Continuing Education, Georgia Inst. of Technology, Atlanta 30332)

10–14. **Inorganic Reaction Mechanisms**, intern. conf., Cork, Ireland. (E. N. Mulcahy, Chemistry Dept., University College, Cork)

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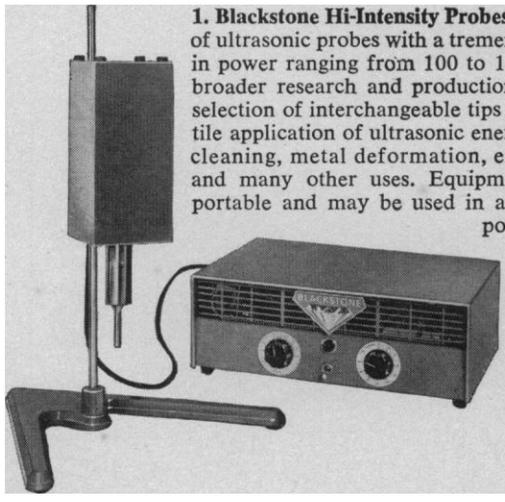

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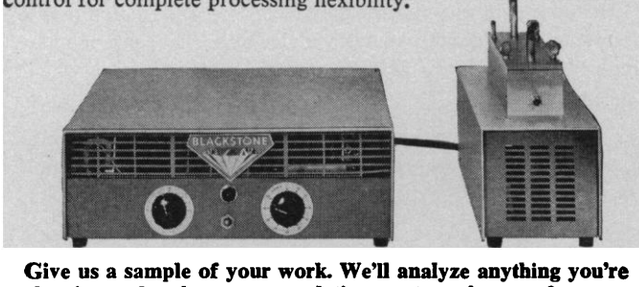

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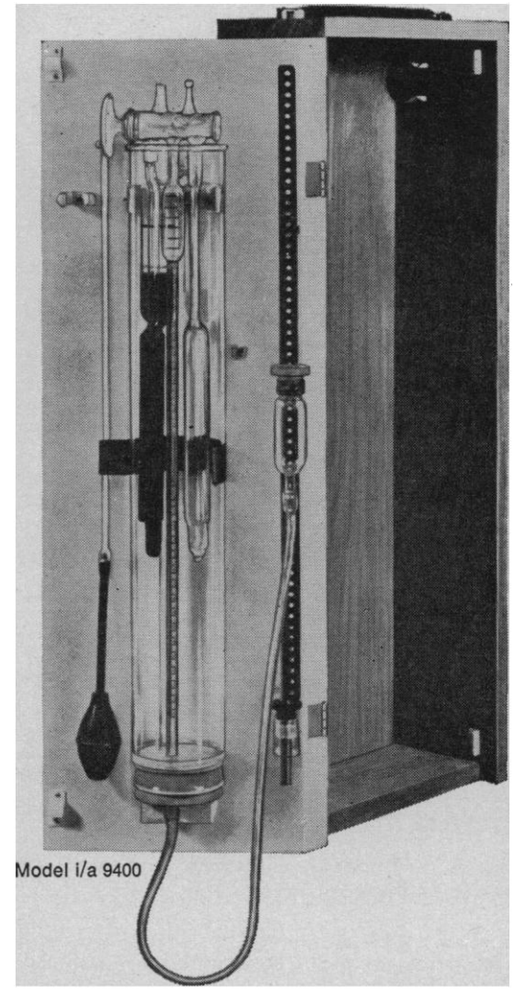

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10–14. **P.A.L. Colour Television System,** conf., Nottingham, England. (J. L. Regan, Inst. of Electrical Engineers, Savoy Pl., London, W.C.2, England)

10–15. Budapest Festival of **Technical Films,** Budapest, Hungary. (Festival of Technical Films, Szabadsag ter 17, Budapest)

10–15. French Inst. of **Electrical and Electronic Engineers,** intern. conf., Paris. (Colloque Intern. sur l'Electronique et de l'Espace, 16 rue de Presies, Paris 15°)

10–15. Seminar on **Nutrition,** Santo Domingo, Dominican Republic. (Inter-American Children's Inst., Health Section, Ave. 8 de Octubre 2882, Montevideo, Uruguay)

11–13. **Hospitals and Rehabilitation,** American Hospital Assoc., Denver, Colo. (E. J. Lanigan, AHA, 8400 N. Lake Shore Dr., Chicago, Ill. 60611)

11–13. **Nursing Service and Hospital Administration,** American Hospital Assoc., Chicago, Ill. (E. J. Lanigan, AHA, 840 N. Lake Shore Dr., Chicago 60611)

11–13. British **Biophysical** Soc., Oxford, England. (A. R. Peacocke, St. Peter's College, Oxford)

11–13. Cleveland **Electronics** Conf., Cleveland, Ohio. (Office of Technical Activities Board, 345 E. 47 St., New York 10017)

11–13. **Faraday Soc.,** Exeter, England. (Faraday Soc., 6 Gray's Inn Sq., London, W.C.1, England)

11–13. **Decision Making in National Science Policy,** symp., London, England. (Ciba Foundation, 41 Portland Pl., London, W.1)

12–13. **Point Defects on Metals,** Inst. of Physics and Physical Soc. and Inst. of Metals, conf., Reading, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

12–14. **Electronic Information Handling,** 2nd natl. conf., Pittsburgh, Pa. (A. Kent, Knowledge Availability Systems Center, Univ. of Pittsburgh, Pittsburgh 15213)

12–14. **Optical Soc.** of Amer., Columbus, Ohio. (Miss M. Warga, OSA, 1155 16th St., NW, Washington, D.C. 20036)

12–14. **Shock Tube** Symp., 6th intern., Freiburg, West Germany. (R. G. Fowler, Dept. of Physics, Univ. of Oklahoma, Norman 73069)

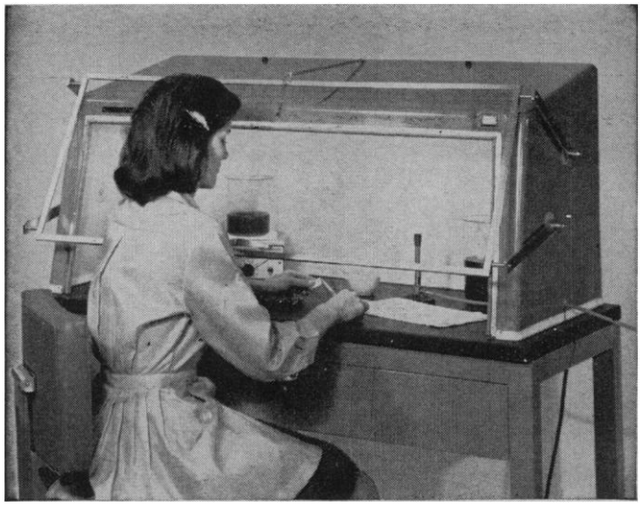
13–15. American Assoc. for **Cancer Research,** 48th annual mtg., Chicago, Ill. (Secretary-Treasurer, The Association, 7701 Burholme Ave., Philadelphia 11, Pa.)

13–14. **Teaching of Mathematics to Physicists,** Inst. of Physics and Physical Soc. and Inst. of Mathematics and Its Applications, conf., Exeter, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

13–16. **British Medical Assoc.,** annual clinical conf., Londonderry, Northern Ireland. (Secretariat, Tavistock Sq., London, W.C.1, England)

13–17. **WESTEC,** 4th Western Metal and Tool Exposition and Conf., Los Angeles, Calif. (Director of Engineering Conf., 20501 Ford Rd., Dearborn, Mich.)

14–15. **Echoencephalography,** intern. symp., Univ. of Erlangen-Nurnberg, West Germany. (W. Schiefer, 8520 Erlangen, Krankenhausstrasse 12, West Germany)



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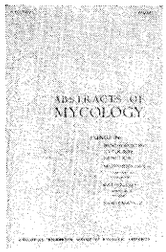

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14–21. **French Physical Soc.**, 61st exhibition, Paris. (The Society, 33 rue Croulebarbe, Paris 13e)

15–16. American Soc. for **Artificial Internal Organs**, annual mtg., Atlanta, Ga. (P. M. Galletti, Dept. of Physiology, Emory Univ., Atlanta)

15–16. **Histochemical** Soc., 18th annual mtg., Chicago, Ill. (G. M. Lehrer, Div. of Neurochemistry, Mount Sinai School of Medicine, 11 E. 100 St., New York 10029)

15–16. **Nucleic Acids** Symp., Santa Monica, Calif. (M. S. Dunn, 9325 Venice Blvd., Culver City, Calif.)

15–16. **Scientfic Photography**, 2nd symp., Pacific Northwest Chapter of Biological Photographic Assoc., Univ. of Washington, Seattle, (J. W. McKim, Symp. on Scientific Photography, Univ. of Washington, Seattle 98105)

16–21. American **Physiological** Soc., spring mtg., Chicago, Ill. (The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

16–21. Federation of American Societies for **Experimental Biology**, annual mtg., Chicago, Ill. (FASEB, Convention Office, 9650 Rockville Pike, Bethesda, Md. 20014)

16–21. International **Cartographic** Assoc., general assembly and technical conf., Amsterdam, Netherlands. (F. J. Ormeling, Secretary-Treasurer, Bachlaan 39, Hilversum, Netherlands)

16–21. Society of **Motion Picture** and **Television Engineers**, 101st semiannual conv., New York, N.Y. (Executive Secretary, 9 E. 41 St., New York 10017)

16–21. Society for **Pharmacology and Experimental Therapeutics**, spring mtg., Chicago, Ill. (The Society, 9650 Rockville Pike, Bethesda, Md. 20014)

17–19. **Elementary Particles**, Inst. of Physics and Physical Soc., conf., London, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1)

17–19. Technical Assoc. of **Pulp** and **Paper Industry**, 4th annual water conf., Philadelphia, Pa. (Technical Secretary, 360 Lexington Ave., New York 10017)

17–19. Institute of **Electrical** and **Electronics Engineers**, Jackson, Miss. (J. E. May, 1120 Auburn Dr., Jackson)

17–19. **Urban Transportation**, 2nd intern. conf., Pittsburgh, Pa. (W. H. Shepard, P.O. Box 1291, Pittsburgh 15230)

17–20. American **Geophysical Union**, annual mtg., Washington, D.C. (F. R. Boyd, Eastern Natl. Mtg. Committee, AGU, 1145 19th St., NW, Washington, D.C. 20036)

17–21. American Assoc., of **Immunologists**, Chicago, Ill. (Executive Secretary, Massachusetts General Hosp., Boston)

17–21. American Inst. of **Nutrition**, annual mtg., Chicago, Ill. (Secretary, The Institute, Dept. of Foods and Nutrition, Michigan State Univ., East Lansing)

17–21. American Soc. of **Biological Chemists**, Chicago, Ill. (Secretary, The Society, c/o Harvard Univ., 12 Oxford St., Cambridge, Mass.)

17–21. Central **Service Management**, American Hospital Assoc., Miami Beach, Fla. (E. J. Lanigan, Conv. and Mtg. Bureau, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

17–21. Use of Isotopes and Radiation in **Plant Pathology** Studies, Intern. Atom-

ic Energy Agency and Food and Agriculture Organization, symp., Vienna, Austria. (J. H. Kane, Chief, Conf. Branch, Div. of Technical Information, Atomic Energy Commission, Washington, D.C. 20545)

18–19. Applications Related Phenomena in **Titanium Alloys**, American Soc. for Testing Materials, symp., Los Angeles, Calif. (The Society, 1916 Race St., Philadelphia, Pa. 19103)

18–20. **Computer** Conf., Atlantic City, N.J. (American Federation of Information Processing Societies, 211 E. 43 St., New York 10017)

18–20. **Space Instrumentation for Industry**, southeastern instrument conf., Cocoa Beach, Fla. (A. L. Keith, 1127 S. Patrick Dr., Satellite Beach, Fla. 32935)

18–21. National Council of **Teachers of Mathematics**, 45th annual, Las Vegas, Nev. (J. D. Gates, NCTM, 1201 16th St., NW, Washington, D.C. 20036)

18–2. International **Hydrographic** Bureau, intern. conf., Monte Carlo, Monaco. (Contre-Amiral Charles Pierre, Quai des Etats Unis, Monte Carlo, Monaco)

19. Intensity of **Casual Relationships in Schizophrenia**: Living in Imagination, Assoc. for the Advancement of Psychoanalysis, New York, N.Y. (The Association, 329 E. 62 St., New York 10021)

19. **Oral Cancer** Symp., 5th, St. Francis Hospital, Poughkeepsie, N.Y. (M. A. Engelman, 1 E. Academy St., Wappingers Falls, N.Y.)

19–20. 1967 **Electronics** and **Instrumentation** Conf. and Exhibit, Cincinnati, Ohio. (G. McVey, Procter & Gamble Co., Ivorydale Technical Center, Cincinnati 45227)

19–21. Extended **Care Facilities in General Hospitals**, American Hospital Assoc., Miami Beach, Fla. (E. J. Lanigan, Conv. and Mtg. Bureau, 840 N. Lake Shore Dr., Chicago, Ill. 60611)

19–21. **Child Dental Health**, intern. symp., London, England. (D. S. Berman, British Paedodontic Soc. London Hospital Dental Inst., Stepney Way, London, S.E.1)

19–21. Institute of **Electrical** and **Electronics Engineers**, southwestern conf., Dallas, Tex. (Office of Technical Activities Board, IEEE, 345 E. 47 St., New York 10017)

20–21. Middle Atlantic States **Textile Industry** Conf., Charlotte, N.C. (G. L. Bassett, Micro Switch, 2410 Dunavants, Charlotte 28203)

20–22. **Biological Energy Conversion**, conf., NASA Ames Research Center, Moffett Field, Calif. (Letters and Science Extension, Univ. of California, 2223 Fulton St., Berkeley)

20–22. **Ohio Acad. of Science**, 76th annual mtg., Dayton, Ohio. (J. H. Melvin, Executive Officer, The Academy, 505 King Ave., Columbus, Ohio 43221)

20–23. **German Roentgen** Soc., 48th congr., Baden Baden. (H. Poppe, 34 Gottinggen, Gosslerstrasse 10, West Germany)

21–24. American **Oil Chemists'** Soc., Memphis, Tenn. (C. H. Hauber, Executive Secretary, 35 E. Wacker Dr., Chicago, Ill.

23–26. European **Congr. of Neurosurgery**, 3rd, Madrid, Spain. (S. Obrador, Eduardo Dato, 23, Madrid 10)

23–27. American Soc. of **Mechanical Engineers**, Chicago, Ill. (Meetings Manager, The Society, 345 E. 47 St., New York 10017)

24–26. Coordinating Committee for **Human Tumour Investigations**, intern. symp., Rome, Italy. (W. Davis, C. Beatty Research Inst., Inst. of Cancer Research, Royal Cancer Hosp., Fulham Rd., London, S.W.3, England)

24–26. **Environmental Health Management**, natl. congr., New York, N.Y. (Dept. of Environmental Health, American Medical Assoc., 535 N. Dearborn St., Chicago, Ill. 60610)

24–26. **Frequency Control** Symp., 21st annual, Atlantic City, N.J. (Director, Electronic Components Laboratory, U.S. Army Electronics Command, Attention: AMSEL-KL-ST, Fort Monmouth, N.J. 07703)

24–26. **Image Detection and Processing**, Inst. of Physics and Physical Soc., conf., Great Malvern, Worcester, England. (Meetings Officer, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

24–26. **National Acad. of Sciences**, 104th annual, Washington, D.C. (Office of Home Secretary, NAS, 2101 Constitution Ave., NW, Washington, D.C. 20418)

24–27. **Management Technology and the Optimization of Research and Development**, American University Inst., Washington, D.C. (Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C. 20006)

24–27. **Simulation** and **Training** Conf., 3rd intern., New York, N.Y. (J. E. Ekstromer, C1-250, SAE 3rd Intern. Simulation and Training Conf., Douglas Aircraft Div., 3855 Lakewood Blvd., Long Beach, Calif.)

24–28. American Soc. of **Tool and Manufacturing Engineers**, Chicago, Ill. (Director, Engineering Conf., ASTME, 20501 Ford Rd., Dearborn, Mich. 48128)

24–28. International Office for **Motor Trades** and **Repairs**, 21st congr., Tokyo, Japan. (Japan Automobile Dealers Assoc., 5-chome, 52-2, Jingumae, Shibuya-ku, Tokyo)

24–6. **Lindauer Psychotherapy Week**, 17th, Munich, West Germany. (Secretary, Lindauer Psychotherapy Week, 8 Munich 27, Adalbert-Stifter-Str.31)

25–27. **Power** Conf., American Soc. of Mechanical Engineers, Chicago, Ill. (Meetings Manager, The Society, 345 E. 47 St., New York 10017)

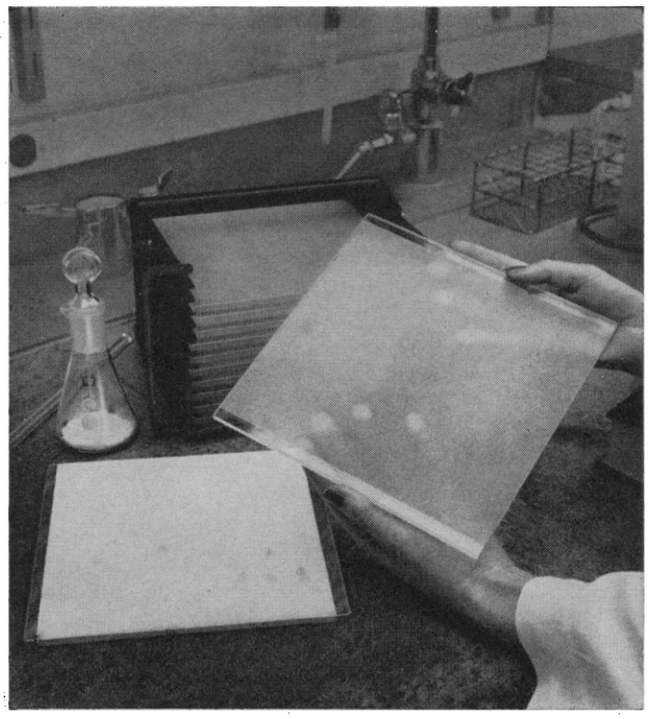
25–27. **British Nuclear Forum**, 3rd congr., London, England. (European Atomic Forum, 26 rue de Clichy, Paris 9e, France)

25–27. International **Sugar Confectionery Manufacturers** Assoc., congr., Amsterdam, Netherlands. (B. H. Wellmann, Nederlandse Vereniging voor Suikerwerken Chocolade-verwerkende Industrie, Marnixstr. 380, Amsterdam)

26–27. Advanced Technology Available for **Commercialization**, symp., Research Triangle Park, N.C. (Director, North Carolina Science and Technology Research Center, P.O. Box 12235, Research Triangle Park 27709)

26–27. International **Lead Zinc Research Organization**, Inc., Montreal, P.Q., Canada. (W. C. Hall, American Zinc Inst., Basford Inc., 1301 Avenue of Americas, New York 10019)

26–27. National Acad. of **Engineering**, Washington, D.C., 3rd annual. (Secretary, NAE, 2101 Constitution Ave., NW, Washington, D.C. 20418)



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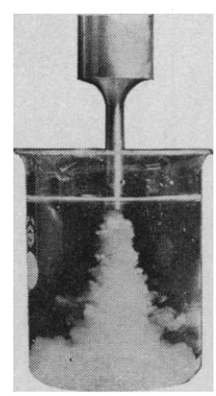

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Basic Electrotechnology. N. Jones. Elsevier, New York, 1966. 280 pp. Illus. $8.50.

Biochemie und Physiologie der Alkaloide. An international symposium held at Halle (Saale), June 1965. Kurt Mothes, Dieter Gross, Hans-Werner Liebisch, and Horst-Robert Schütte, Eds. Akademie-Verlag, Berlin, 1966. 636 pp. Illus.

Biochemistry and Pharmacology of the Basal Ganglia. Proceedings of a symposium (New York), November 1965. Sponsored by National Institute of Neurological Diseases and Blindness and Parkinson's Disease Foundation. Erminio Costa, Lucien J. Cote, and Melvin D. Yahr, Eds. Raven Press, Hewlett, N.Y., 1966. 254 pp. Illus. $10.95. There are 16 papers.

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