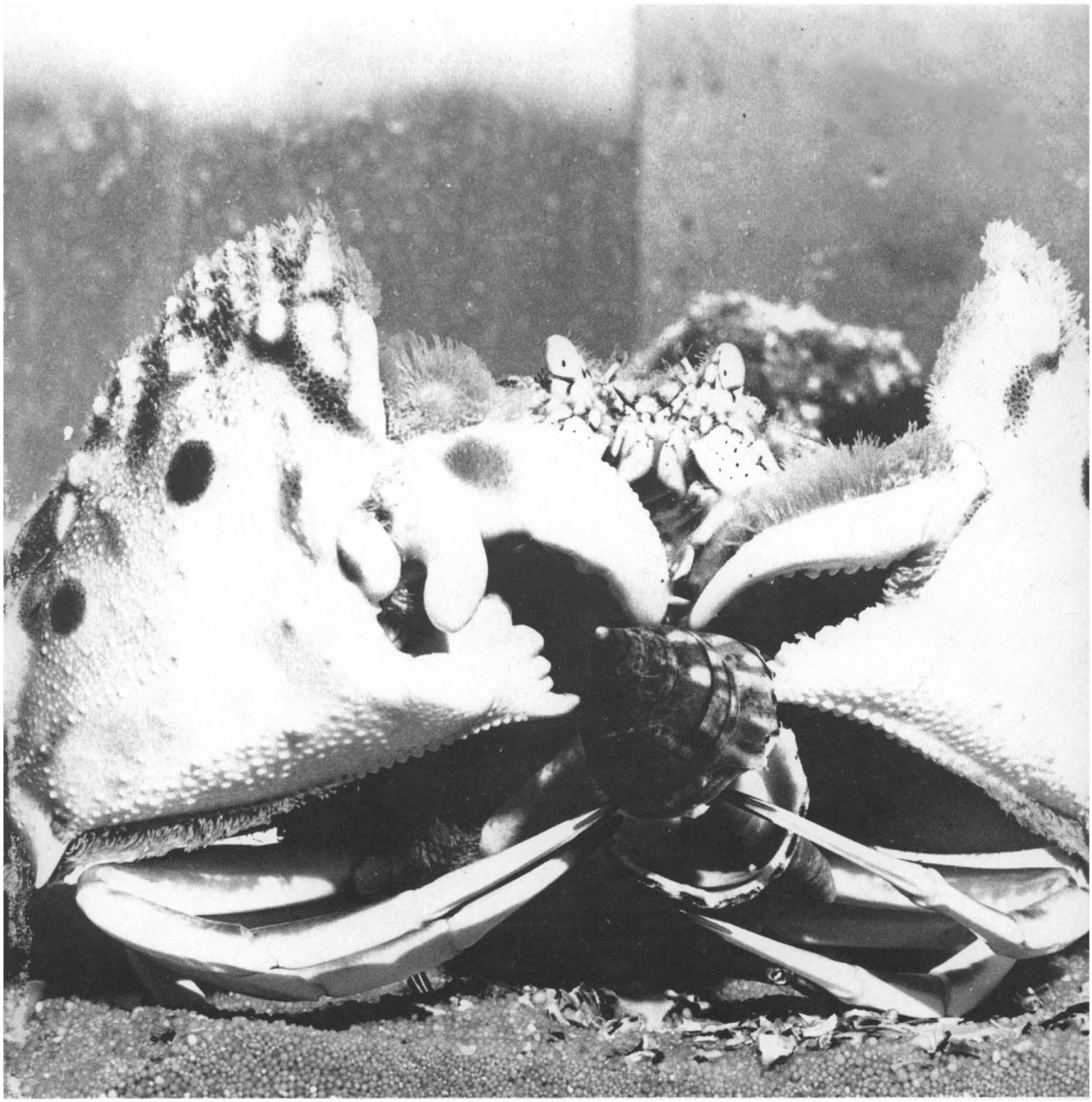
SCIENCE

24 May 1968

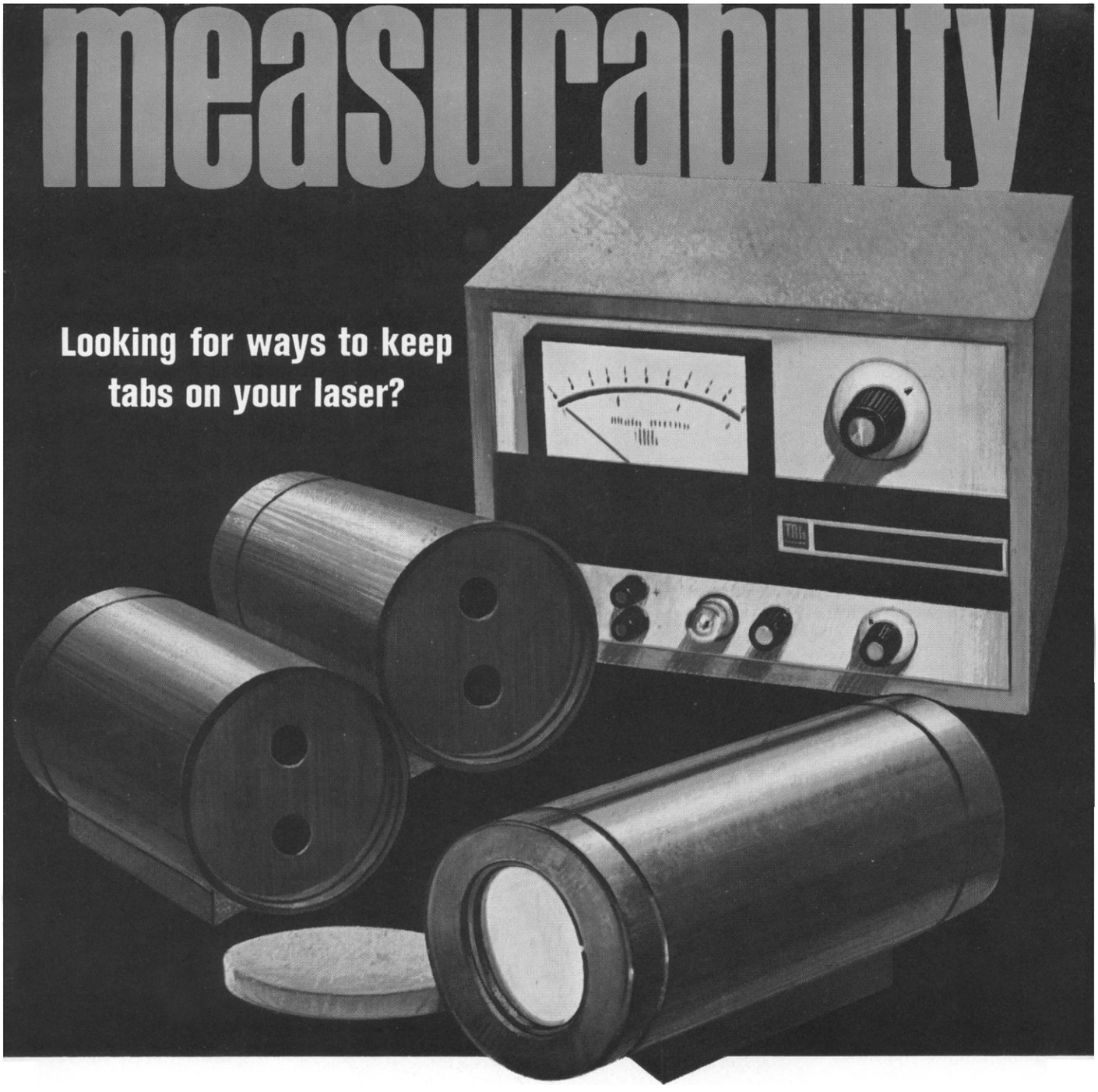
Vol. 160, No. 3830

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



CALAPPA SHELL OPENING

measurability



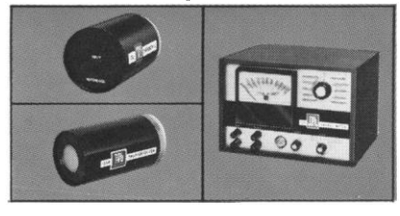
When you want components that accurately and consistently measure laser power and energy, you'll do well to look to TRG Division of Control Data Corporation. Typical units include:

TRG Energy Meters — Precision transistorized microvoltmeters for thermopiles with 35-300 microvolt/joule outputs. Response time less than 2.5 seconds on all scales. Zero stability of ± 2mj/day. Accuracy of ± 2% of full scale.

TRG Ballistic Thermopiles — High-sensitivity units for direct primary calorimetric measurement of energies to 1000 joules (normal mode) and peak powers in the gigawatt range. Available with 1, 2 and 3½ cm. diameter apertures, and in photodiode versions for simultaneous measurement and observation of optical pulse waveshapes.

TRG Photodetector — Contains vacuum photodiodes incorporated into a specially designed wideband microwave structure. Permits direct observation of axial mode beating of Q-switched ruby laser or monitors low-power CW sources. Standard optical filters available.

For full particulars on TRG measuring devices for laser systems, write TRG Division of Control Data Corporation, Section S, 535 Broad Hollow Road, Melville (Long Island), New York 11746. Phone (516) 531-6343.



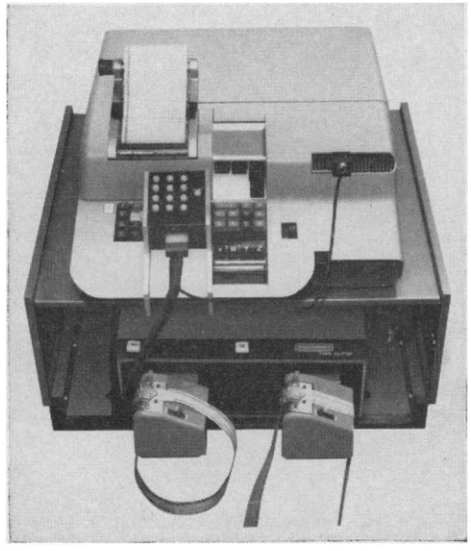
TRG DIVISION CONTROL DATA CORPORATION

Omega™:

computes and prints out data from up to 10 liquid scintillation counters in any data format in seconds.

Unlike on-line types, Omega is not electronically wired to any one L.S. counter. Nor to any specific data format. It converts raw measurements to final data in seconds *right in your own lab.* No more farming out for interpretation, or waiting for shared-time service. And no confinement to any one math computation. Omega solves anything from basic algebra to exotic formulas—anything you've been computing with a table, slide rule, calibration curve or desk calculator. Answers come automatically—in seconds—and absolutely error-proof. ■ Omega also reduces your set-up time. No dials to set. No knobs to turn. No mysterious programming language to learn. With one day's training, an operator can write involved programs up to 120 steps long. Programs involving quench-corrected DPM for single or multi-label samples. Data averaging. Quench-corrected isotope ratios. Half-life decay corrections. Constant efficiency results for varying quench samples. ■ The Omega two-unit system is *not* the most expensive one you can buy. Nor the least. It *is* the most utilitarian system—and the most practically priced.

Beckman's new off-line data reduction system: more capability per dollar than anything in the field.



For information on this exciting new system—write for Data File #401L or call your Beckman Sales Representative. Omega, the desk-top *off-line* data reducer.

Another reason why Beckman leads the liquid scintillation field on every count.

Beckman®

INSTRUMENTS, INC.

SCIENTIFIC INSTRUMENTS DIVISION

FULLERTON, CALIFORNIA • 92634

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

24 May 1968
Vol. 160, No. 3830

SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C. Annual subscriptions $12; foreign postage: Americas $3; overseas $5; single copies, 50¢ (back issues, $1) except **Guide to Scientific Instruments**, which is $2. School year subscriptions: 9 months, $9; 10 months, $10. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature.**

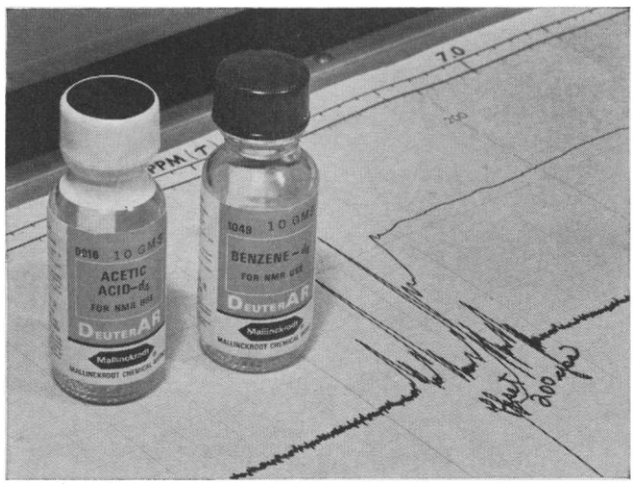
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

A female *Calappa flammea* (Herbst) (width of carapace, 91 millimeters) has finished breaking open a banded tulip shell (*Fasciolaria hunteria* Perry) and is in the process of eating the hermit crab [*Clibanarius vittatus* (Bose)]. The large tooth on the right claw, the claws, and the first two pairs of walking legs manipulate the shell. See page 887. [J. B. Shoup, Institute of Marine Sciences, University of Miami, Miami, Florida]

PARAMETRIC PURITY

MATCHED TO THE PARAMETERS OF YOUR WORK.



FOR NMR . . .
THE "OVERNIGHT EXPRESS"

Now there's no more waiting for NMR solvents. Mallinckrodt DeuterAR® solvents are made in the U.S.A. and stocked by distributors across the nation. You can get immediate delivery – even overnight, when your need is pressing. You get highest isotopic purity with guaranteed uniformity. DeuterAR solvents are checked not only in raw material and many manufacturing stages, but also after they're packaged. We open samples from every lot for testing by NMR, IR, GLC and other means. Then Mallinckrodt adds one more protection. Identification codes on every bottle permit total reconstruction of its production and packaging history, should any question arise.

FOR THE LAB . . . EVERYTHING AT YOUR FINGERTIPS

When you need an analytical solvent with high, broad-range purity, you'll find it in the Mallinckrodt AR® catalog. The vast AR list includes solvents not available from other sources. Such as Methyl Alcohol AR Karl Fischer – 33% drier than ordinary anhydrous methyl alcohol. And Ether Anhydrous AR with the preservative originated and patented by Mallinckrodt. No other solvents are more widely stocked for immediate delivery.

Mail to: Mallinckrodt Chemical Works, Industrial Chemicals Division, 2nd and Mallinckrodt Sts. St. Louis, Mo. 63160

Send data on: ☐ AR solvents ☐ SpectrAR solvents ☐ Nanograde solvents ☐ DeuterAR solvents

NAME

COMPANY

ADDRESS

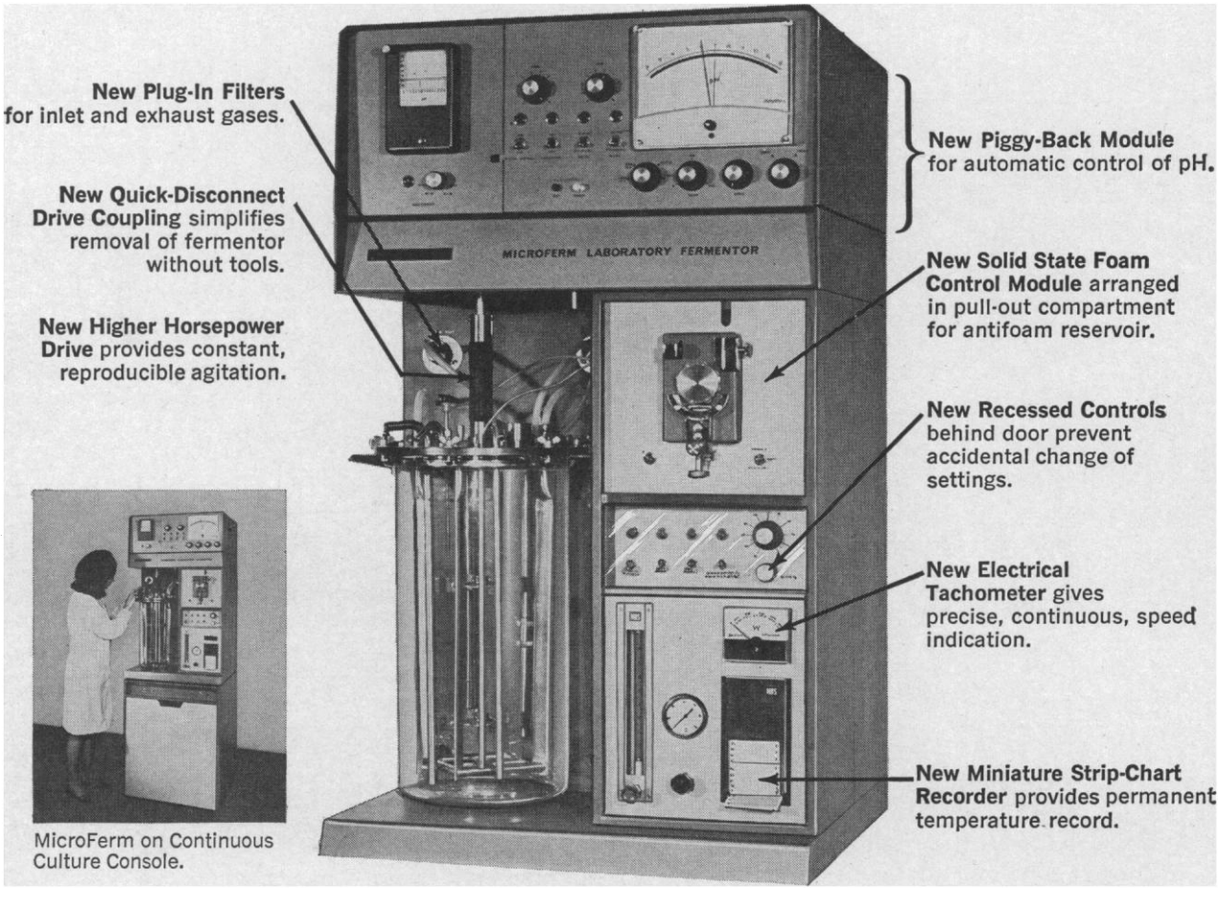
CITY

STATE ZIP

Mallinckrodt®

A new engineering advancement in fermentation

The new MODULAR MicroFerm®



MicroFerm on Continuous Culture Console.

A new modular bench-top fermentor has been designed to accommodate a variety of plug-in accessories and control modules for regulation of pH, foam, continuous culture and illumination in photo-synthetic studies.

The modular concept enables you to meet critical research requirements by adding readily available instrumentation modules for control of specific process needs. Now you can expand your fermentation capabilities easily, quickly and economically as the need arises.

To conserve bench space, a piggyback pH control module can be mounted directly on top of the MicroFerm where it is readily connected to the fermentor. New optional foam control with metering pump, solid state controller and compartment for antifoam reservoir is arranged in a compact pull-out drawer that swivels into the instrument panel.

Temperature is maintained electronically within ±0.25°C by a Thermistor controller. Agitation is precisely regulated with a solid state proportional controller that adjusts impeller speed automatically to changes in viscosity and line voltage. The MicroFerm accommodates fermentors of 2, 5, 7½ or 14 liters.

Look into the New Modular MicroFerm.

Write for Catalog MFS/5248

NEW BRUNSWICK SCIENTIFIC CO., INC.

1130 SOMERSET ST. • P.O. BOX 606, NEW BRUNSWICK, NEW JERSEY 08903

21A

For sharper electrophoretic separations, start with a better strip--- then look into a better chamber.

Better separations begin on Sartorius Cellulose Acetate Strips.

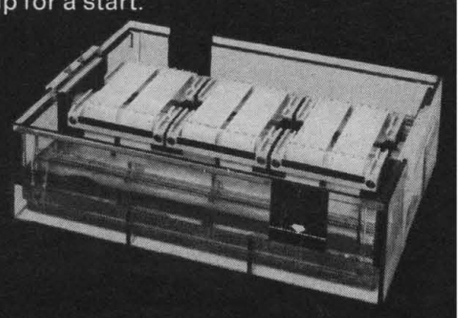
These new strips give you fast, distinct separations with clearly differentiated bands. They are made of pure cellulose acetate, come in a variety of sizes, and are characterized by uniform wetting and glass-like transparency. Their homogenous, foam-like structure does not absorb protein or retard molecular migration. This makes them ideal for separating amino acids, enzymes, and many other substances by electrophoresis.

Better separations end in a Sartorius Electrophoresis Chamber

You'll find the new Sartorius Chamber also deserves looking into. It is made of crystal-clear plexiglass and is designed to accept Sartorius and a variety of other strips in three different sizes. Utilizes minute quantities of sample for true micro-electrophoresis. For safety, power cord can be connected only when lid is properly closed. Cord also reverses for high or low capacities. The chamber comes with a convenient sample applicator that assures correct quantities and reproducible results. Power supply with built-in timer, meters and 40 mA capacity (0-500 volts dc) available as a separate unit.

Care to look into the Sartorius Electrophoresis System further? Get our literature and sample strip for a start.

Just write: Sartorius Acetate Strips,
Brinkmann Instruments,
Cantiague Road,
Westbury, N.Y. 11590.

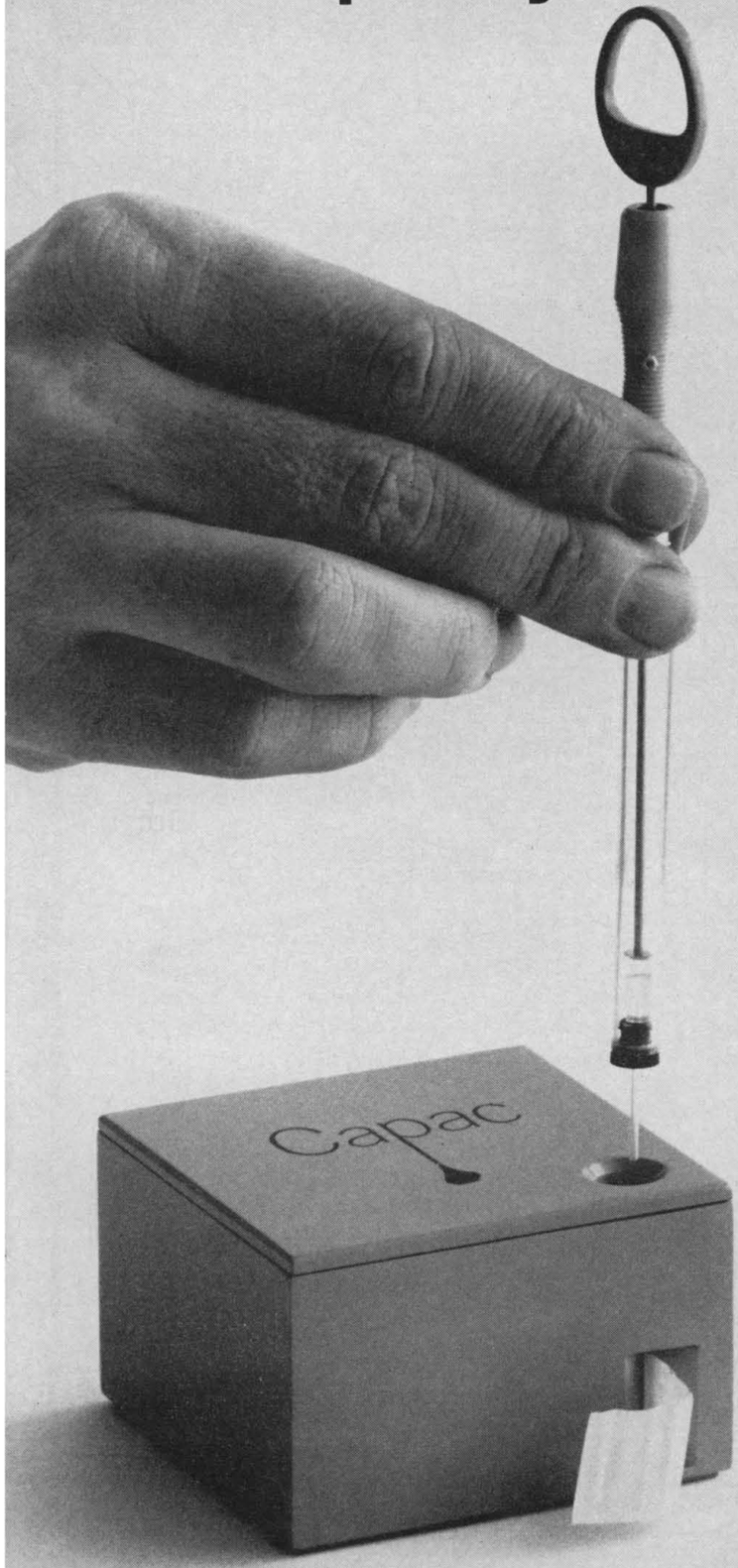


A DIVISION OF

BRINKMANN

sartorius electrophoresis system

You use our new micropipetting system without ever touching the capillary tube itself. (Really?)



These untouched disposable capillary tubes are part of our new Capac precision micropipetting system. With *this* system you can put a capillary tube into its holder, fill it, empty it, and finally eject the capillary itself *without* fingers having touched the tube at any time in the entire sequence. For these reasons, and others, many of the frustrations usually associated with repetitive micropipetting are minimized. Or totally eliminated.

The dispenser box with 250 capillary tubes: Part of the secret of how all this can be accomplished without handling the capillary tubes resides in the dispenser box shown on the left. It contains a roll of tape (see it protruding from the box?) which carries 250 tubes. When you pull this tape, you automatically position a new capillary beneath the hole in the top of the dispenser box.

The capillary tube holder: Now inserting the holder in the hole in the dispenser box automatically places a new capillary in the holder. The holder then does this: it controls the liquid level in the capillary, it ejects the liquid in the capillary, and finally, it ejects the capillary itself (whether filled or empty).

The capillary tubes: These tubes are accurate within ±1%, are inexpensive enough to be comfortably disposable, and are available in a wide range of sizes: 1, 2, 5, 10, 20, and 25 μl.

The cost: Modest. A Capac "demonstration package" with a single dispenser containing 250 capillary tubes *plus* a capillary tube holder costs only $11.25. The standard package has two dispensers and a capillary tube holder and costs only $21.50. Quantity costs are even more inviting.

A suggestion: Test the Capac precision micropipetting system. Order a Capac "demonstration package" of any one capillary size shown above, plus the holder, and simplify your life. Or, if you wish more information, write "Capac" on a postcard. Include your name, address and zipcode, please. Write Dept. S, Schwarz BioResearch, Mountain View Avenue, Orangeburg, N.Y. 10962.

Schwarz BioResearch

A Division of Becton, Dickinson and Company B·D

How many mass spectrometers can your laboratory afford?

Only one? Good. Call us.

We make only one basic model of mass spectrometer.

But it's a mass spectrometer that does many, many things.

From the analysis of gases to the analysis of high-temperature solids, with sensitivities for sub-microgram quantities.

How did we manage to pack such broad-band capabilities and high sensitivity into a single instrument? By engineering the design to the users' many needs. And by incorporating the latest developments in ultra-high vacuum technology.

Our instrument includes such features as ion pumping for lower pressures and a cleaner system; an electron bombardment source with an ambient or heated gas inlet system; gas chromatograph marriage with the appropriate separator; high temperature Knudsen cell; surface ionization source.

The completely quick-change design of the instrument also features adjustable and positionable slits on sources and collector; Faraday cup collector and electron multiplier with graphic recording or high-speed oscillograph; multi-adjustable magnetic scanning; high-stability precision electronics. And above all—ease of operation.

If your interest is more than academic, write or call (918) 437-1776 for our comprehensive brochure.

Avco Electronics Division, Tulsa Operation, Drawer N, Admiral Station, Tulsa, Okla. 74115.

AVCO

The people with new ideas in instrumentation

ADAMS DYNAC Centrifuge

Proof that a high performance centrifuge doesn't have to cost too much.

- **LARGE IN CAPACITY—UP TO 400 ML.** Specific models hold up to four 100 ml., twenty-four 15 ml., or thirty-six 10 x 75 mm. tubes.
- **VERSATILE**—Accommodates any one of eight interchangeable Horizontal and Angle-Heads. Permits over 50 different combinations of tube sizes, from micro to 100 ml.
- **ECONOMICAL**—Complete ADAMS DYNAC Centrifuge outfits are available from $192.00.
- SMALL IN SIZE—ONLY 10 INCHES HIGH.

WITH...WIDE SPEED RANGE (UP TO 5500 RPM) AND SOLID STATE ELECTRONIC CONTROL • AUTOMATIC 30-MINUTE TIMER • ELECTRIC BRAKE • LARGE ACCESS OPENING AND TRANSPARENT SHATTERPROOF COVER • COMPACT, LOW PROFILE DESIGN WITH EASY TO SEE AND USE CONTROL PANEL.

For more information, contact your Clay-Adams dealer or write Clay-Adams, 141 East 25th Street, New York, N.Y. 10010.

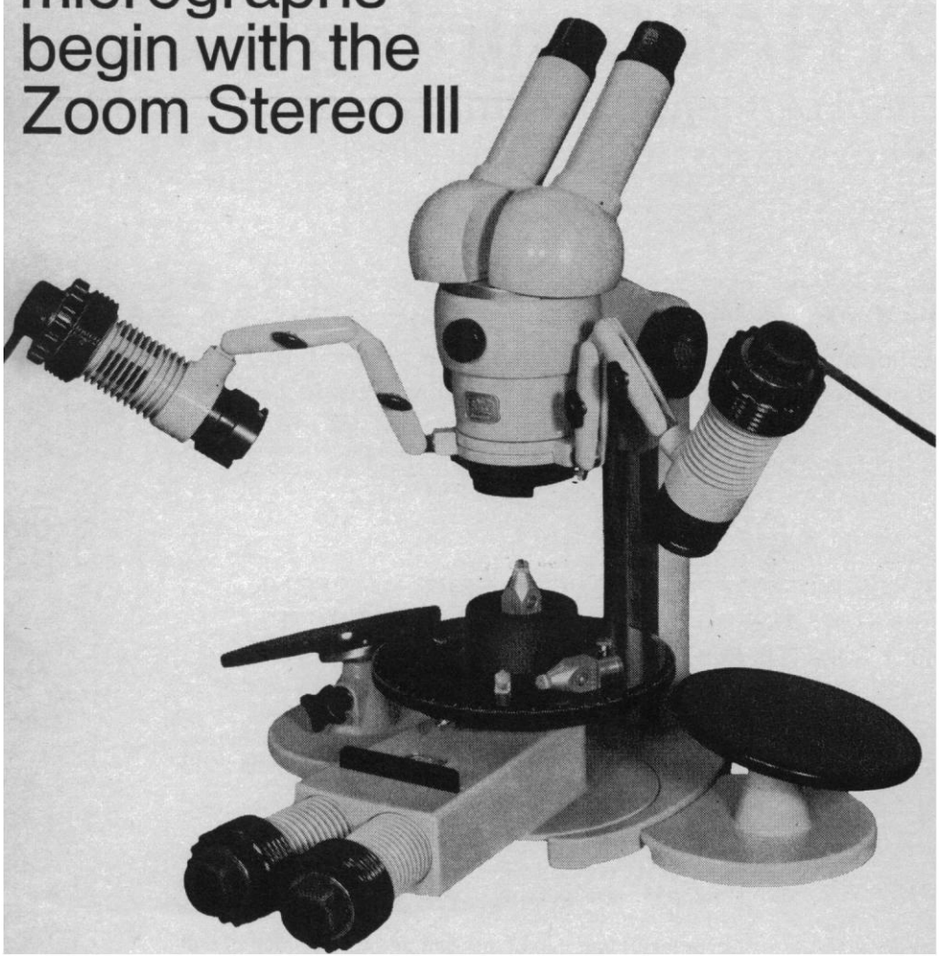
Clay-Adams
Division of Becton, Dickinson & Company B-D
New York, N.Y. 10010

Price shown is suggested retail price

ADAMS, DYNAC and B-D are trademarks

Conductive tissue in the style of cotton. Glutaraldehyde/osmium tetroxide fixation. Micrograph taken with Zeiss Electron Microscope EM 9 (6,000x). Courtesy of Professor William A. Jensen, Botany Department, University of California, Berkeley.

Quality electron micrographs begin with the Zoom Stereo III



In specimen preparation for electron microscopy, the Carl Zeiss Stereomicroscope III is a valuable tool in *every* phase of your work. Block trimming is simplified. Because with auxiliary lenses, you can accomplish block facing within fractions of a millimeter.

The instrument's unique substage light source provides Köhler illumination to both objectives, useful in tissue culture and cell isolation. The result is uniformity of illumination unequalled by any other stereomicroscope. The Stereo III can also be used with transmitted light, reflected light, or both simultaneously. For qualitative examinations in polarized light, a combination of polarizer and simple analyzer is available. The attachment camera, either 35mm or Polaroid®, is an indispensable accessory for the documentation of cell division.

Stereo III offers continuous magnification from 2 to 200x and working distances from 1 to 5 inches depending on the lens combination. The binocular body can be rotated 360° and is attachable to special stands to equip the instrument for many routine as well as specialized laboratory applications. In addition, different stages, measuring and drawing devices extend the versatility of the instrument.

For detailed information contact Carl Zeiss, Inc., 444 Fifth Ave., New York, N.Y. 10018. (212) 736-6070. Complete service facilities available.

ZEISS

THE GREAT NAME IN OPTICS

CARL ZEISS WEST GERMANY

ATLANTA, BOSTON, CHICAGO, COLUMBUS, DENVER, DURHAM, HOUSTON, LOS ANGELES, ST. LOUIS, SAN FRANCISCO, SEATTLE, WASHINGTON, D.C.

second-generation VPO extends measurement capability to all types of solutions... from dilute polymers to concentrated biological fluids ...directly

An improved second-generation version of the most popular Vapor Pressure Osmometer ever manufactured, the new H-P Model 302B VPO introduces a number of significant improvements over its predecessor.

Easily the most important of these is a change to a voltage-nulling measurement and readout system that increases the range of the *standard* 302B to a maximum $\triangle T$ of 10°C, which far surpasses any other vapor pressure instrument and even exceeds most freezing point osmometers. Consequently the 302B can measure *directly* the number-average molecular weight (between 50 and 25,000) of synthetic polymers in solutions as dilute as 1 millimole/kg . . . as well as the osmolality of undiluted blood, urine and other clinical samples to concentrations of >10,000 milliosmoles.

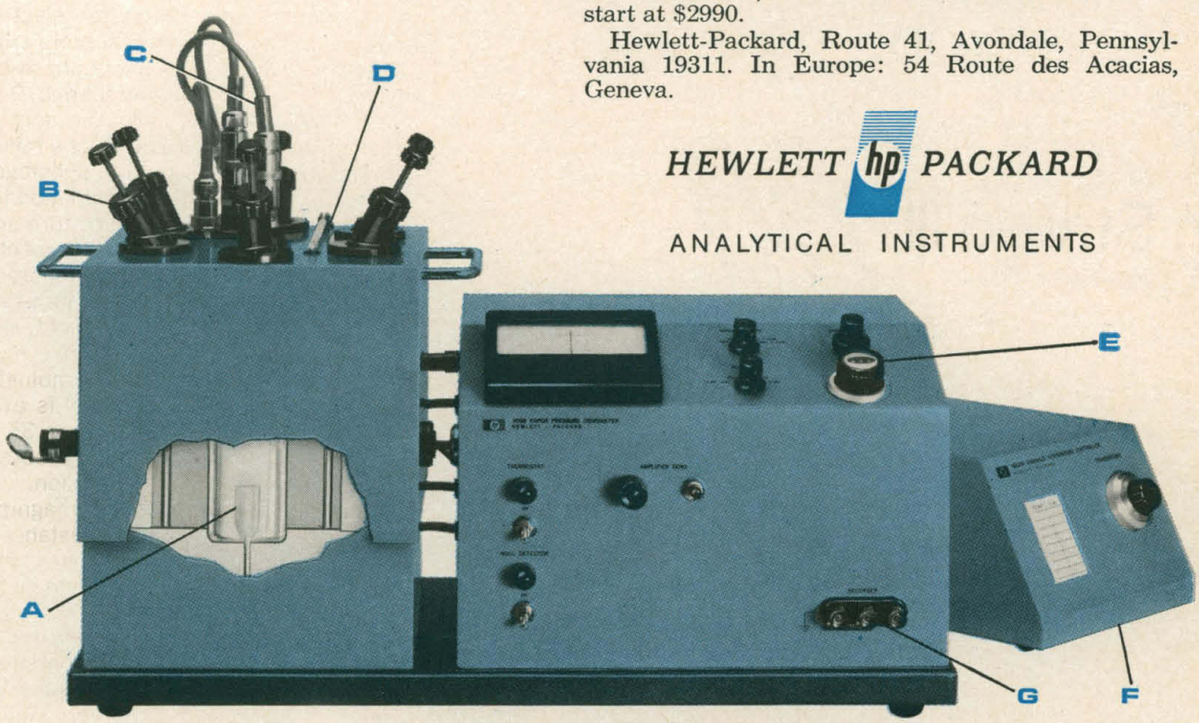
The 302B can be operated at any temperature within a continuously variable range of ambient to 130°C. This significant feature extends the applicability of the 302B to polyolefins and similar materials, and to a variety of difficult solvents such as DMAC and DMF.

For the full catalog of improvements in the 302B VPO and how they can benefit you, call the nearest H-P sales office, or write for Data Sheet 3021. Prices start at $2990.

Hewlett-Packard, Route 41, Avondale, Pennsylvania 19311. In Europe: 54 Route des Acacias, Geneva.

HEWLETT hp PACKARD

ANALYTICAL INSTRUMENTS



A **Self-draining Solvent Cup** prevents contamination and reduces clean-up frequency

B **Four Sample Syringes** can be loaded one at a time or all together, to speed analysis

C **Wide-range Thermistor Probes**—only one for aqueous operation to 80°C; two for non-aqueous operation to 130°C

D **Thermometer** for continuous indication of sample chamber temperature

E **3-Digit Readout** for fast, continuous bridge balance

F **Variable Temperature Controller** for continuous operation between ambient and 130°C

G **Recorder Output** can be used in addition to integral null meter

43803

TWICE AS FAST... 3 TIMES AS ACCURATE

PLUS UNIQUE AUTOMATIC REFERENCING and AUTOMATIC CONVERSION TO LINEAR ABSORBANCE

COLEMAN DATA READER

For Model 111 and Other Spectrophotometers... pH Meters...Computer Systems

Studies by psychologists have shown that reading data from digital counters is twice as fast and three times as accurate as reading the same information from dials or scales. The Coleman Model 41 Data Reader saves more time, provides greater convenience with the unique set-reference control.

Reference value is set automatically by a touch of the SET-REF bar. It is no longer necessary to adjust your meter tediously to exactly 100% T or 0.00A.

This unique Coleman feature minimizes temptation of operators to skip the referencing step and thus permits more consistent analyses in shorter periods of time.

The Model 41 Data Reader also automatically converts % T output (common to most spectrophotometers, such as the new Coleman Model 111) to digital **linear absorbance** readings. Concentration can be related directly to absorbance readout, making interpolation simpler and much easier.

For descriptive literature, write today to Coleman Instruments Division, The Perkin-Elmer Corporation, 42 Madison St., Maywood, Ill. 60153.

WRITE FOR BULLETIN 324-5

PERKIN-ELMER

Where can you get accuracy to .0001g in a low cost balance... without sacrificing speed?

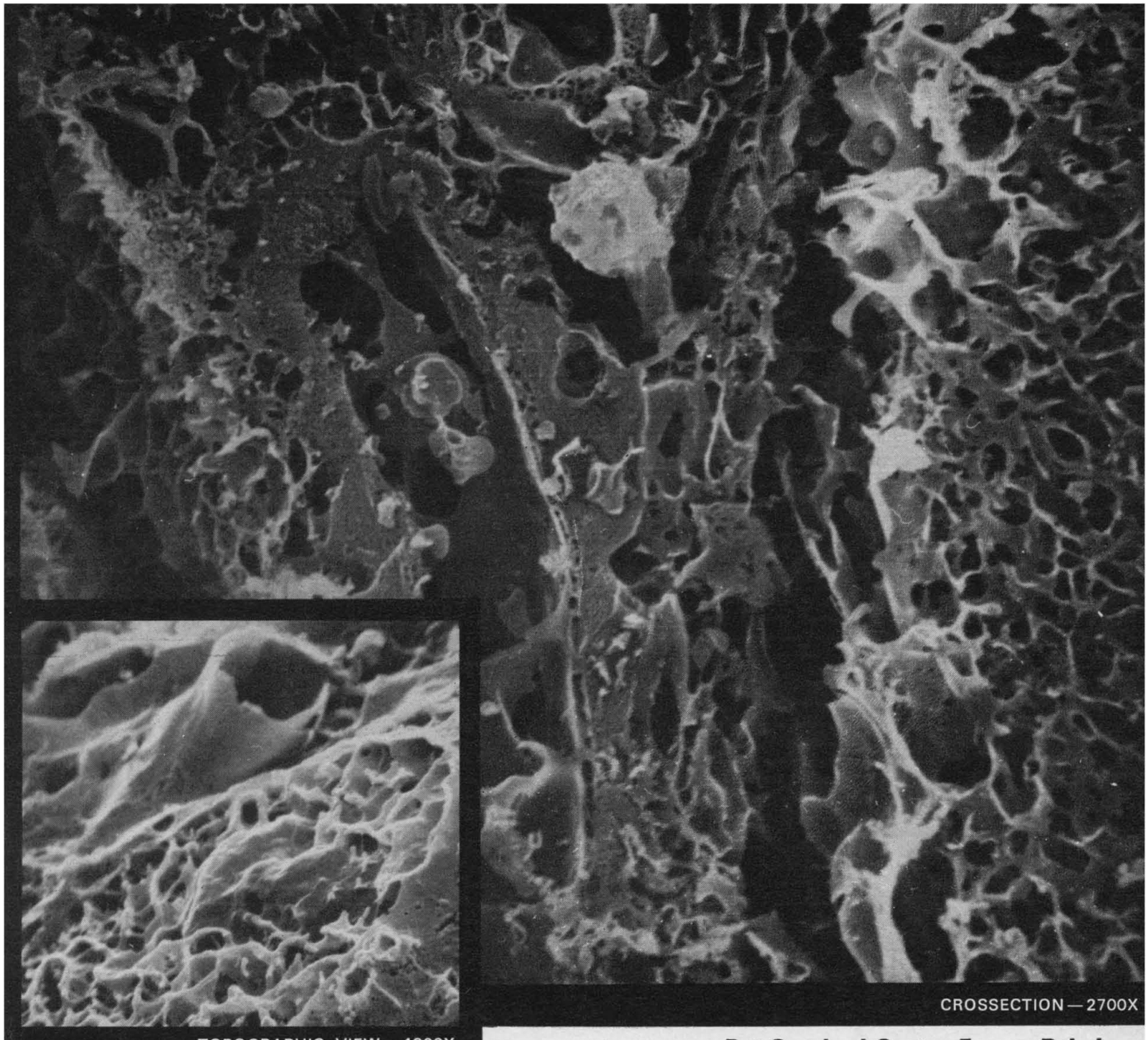
Unit also available with pre-weigh.

The NEW Ainsworth Type 28N balance has it... for only $492!

Take an easy-to-see seven-digit readout to 0.1 milligram, speed of a top loading balance, easily accessible front-mounted controls — and you **know** your critical measurements will be highly accurate, fast and easy to make. Add an all-metal case, a baked acrylic finish and a glass base in the weighing chamber and you **know** the Type 28N Balance is safe from spills. You can use it in industry, hospitals and schools. Put in Class S weights, Delrin cams in the mechanism for high wear resistance, and a stirrup with four ruby jewels and you **know** you have a high-quality balance. **Where else but from Ainsworth would you expect this American-made quality—and at a foreign-made price?** For complete information on the new Type 28N Balance, write to Ainsworth, 2151 Lawrence Street, Denver, Colorado 80205, or call your Ainsworth Distributor for a demonstration.

Keeping America in balance since 1880!

AINSWORTH



TOPOGRAPHIC VIEW—4800X

CROSSECTION—2700X

Rat Cerebral Cortex Freeze-Dried
(from a preliminary study)

the NEW mark IIa STEREOSCAN®
(SCANNING ELECTRON MICROSCOPE)

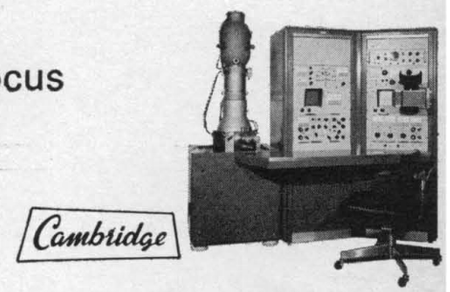
Now provides largest field of view... greater magnification range...greater depth of focus

Important Advantages Include:

- Resolution 150-300 Å at 20 KV
- Useful magnification range 14X to 50,000X
- At 20X, it offers sample scan area of 5mm x 5mm at a working distance of 1.1cm
- Interchangeable final apertures—increases depth of focus by a factor of 4

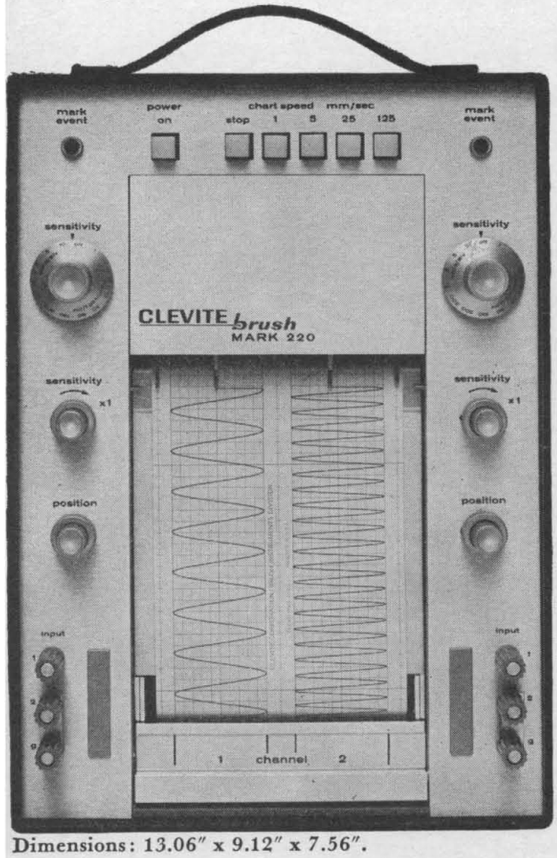
Write to Engis Equipment Company, Instrumentation Division for Mark IIa catalog no. SS-568. Contains detailed information.

Engis
INSTRUMENTATION DIVISION
ENGIS EQUIPMENT COMPANY
8035 Austin Avenue, Morton Grove, Illinois 60053 • 312—966-5600



The *new* Mark IIa Stereoscan, scanning electron microscope, is a product of Cambridge Instrument Co., Ltd., London, England, and is sold and serviced exclusively in the U.S.A. by Engis Equipment Company.

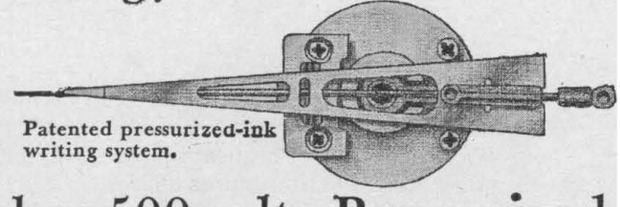
The end of the non-portable portable



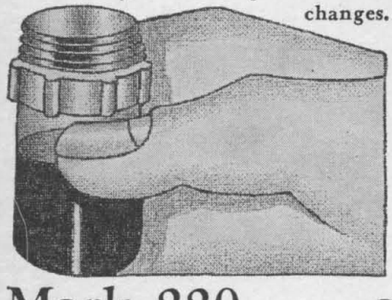
Dimensions: 13.06″ x 9.12″ x 7.56″.

Mark 220 by Brush . . .

a talented new-generation recorder with a 25,000-channel pedigree. Behaves like its famous grand-daddy, the Mark 200, but weighs only 25 pounds. Delivers traces that are unbelievably sharp, 99½ percent accurate. Solid state electronics provide position feedback pen control . . . no springs, no strings. The new Mark 220 has two channels for analog recording, two for events. Maximum sensitivity is one millivolt per chart division, but the recorder is electrically protected from overloads as high as 500 volts. Pressurized writing puts smudge-proof traces into paper, and there's enough ink in the throwaway cartridge to last for about a thousand miles. Less than $1800 will put you in business with this fine instrument . . . and it's light enough to take anywhere. Call for a demonstration of the remarkable Mark 220 . . . and if you wish to keep the unit we'll swap it for a P.O. number. Clevite Corporation, Brush Instruments Div., 37th & Perkins, Cleveland, Ohio 44114.



Patented pressurized-ink writing system.



Throw-away ink cartridge–1000 mi. between changes.

Materials research: playing a new role in idiopathic spinal curvature research.

Medical researchers are examining the incidence of idiopathic scoliosis among school children. A prevailing theory suggests that abnormalities in the components of ligaments may cause this deformity, but the theory has not been proved because of difficulty in measuring viscoelastic properties in human tissue.

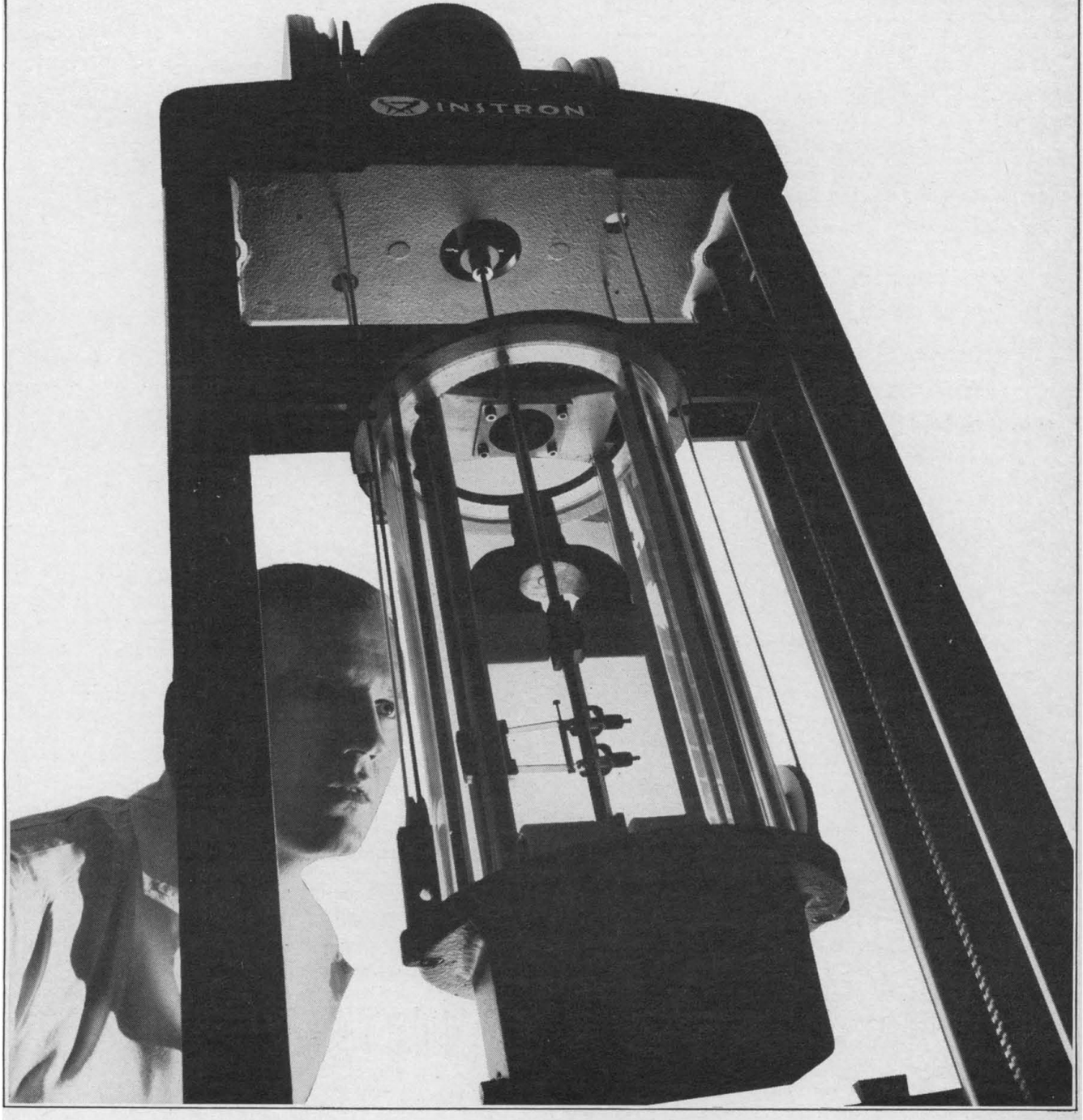
However, today a leading West Coast university is successfully using an Instron tester to stretch and measure effects on interspinous ligaments from patients with idiopathic scoliosis. Tomorrow the theory may be proved.

Spinal curvature research is just one of the areas where Instron testers are now being used in biophysics. Other areas include: establishing accurate profiles of the physical characteristics of tendons; evaluating stress-strain effects on tissue, blood vessels and muscle fibers; exploring chronic degeneration; developing and applying prostheses.

Instron testing equipment provides the precision and versatility necessary for biophysical studies of tensile, compressive and flow behavior including fatigue, resilience and stress-strain energy hysteresis. Full scale recorder deflections — as low as zero to two grams — accommodate small, low modulus samples. And test fixtures fit easily within the loading frame.

If you are interested in technical papers describing programs where such testing played a significant role, ask Instron. Write Instron Corporation, 2500 Washington Street, Department S42, Canton, Massachusetts 02021.

INSTRON



By adding a 5-cell automatic sample changer, a recorder interface, and a quarter percent recorder, we've turned the CARY 16 manual spectrophotometer into the new CARY 16K kinetics spectrophotometer.

It couldn't happen to a better instrument. Because the CARY 16 offers photometric accuracy of 0.00024 abs near zero, 0.001 near one—highest of any spectrophotometer made.

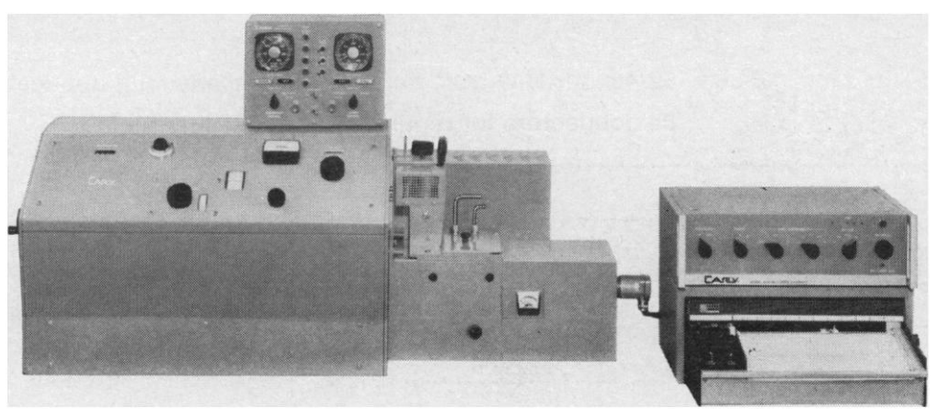
What's more, the 16 has a unique double-beam, double monochromator optical system. The double-beam photometer gives extremely high zero stability (drift is less than 0.00016 abs/hr in the visible range) and continuous, automatic blank compensation. The double monochromator guarantees light purity. Permits measurements at high absorbance, reduces errors, and minimizes sample preparation.

All the basic advantages—high accuracy, light purity, stability—are preserved by the recorder interface to make the new CARY 16K the outstanding instrument for kinetics studies.

For a catalog and price list on the CARY 16K and the CARY 16 (which is ideal for general spectrophotometric tasks), write Cary Instruments, 2724 South Peck Road, Monrovia, California 91016. Ask for Data File E803-58.

CARY® 16K
instruments • a varian subsidiary

We thought you should know that now you can do kinetics with the most accurate manual spectrophotometer ever built.



neither of these agents is necessary. The redwood, given proper growing conditions as previously outlined, has weapons and competitive advantages that enable it to become a climax species as against its competitors in this region —Douglas fir, tan oak, and bay. (Grand fir will not be discussed since it is not a major competitive species in the Eel River basin.)

The bay tree is slow of growth and only partially shade-tolerant. Even when given an equal start on cleared land, it is, in a few decades, shaded out by the redwood and reduced to the status of a scattered understory of weak growth.

The tan oak, like the bay tree, cannot compete with the redwood in height. Although it sprouts from the stump after a fire and is vigorous in reproduction, it has a short life on sites suitable for redwood, and usually succumbs to heart rot. It does, however, compete vigorously with the redwood for a longer period than the bay tree.

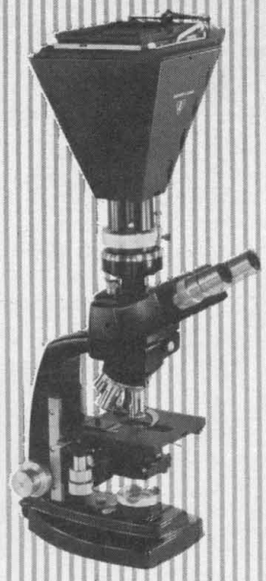
The Douglas fir, if sprouted on cleared land at the same time as the redwood, will live to maturity as a large competing tree, finally yielding to the redwood because of its shorter lifespan. But in an established redwood forest, Douglas fir, because of low shade-tolerance plus vigorous root competition by the redwood, seldom succeeds in reaching the region of sunlight.

It should also be noted that, in a dense climax forest of redwood, the mat of redwood roots in the top 15 cm of soil deprives all seedlings of moisture sufficient to survive the first summer. Floods and resulting silt deposits on alluvial flats do eliminate most of the tan oak and Douglas fir. This favorable factor in the continued survival of mature redwoods is more than outweighed by the three undesirable effects of flooding:

1) The silt deposit produces a new seed bed without a surface mat of redwood roots. For several years, depending on the depth of silt, this deposit is free of competition from redwood roots and permits competing trees to survive beyond the critical initial years.

2) The physical undermining and toppling of several thousand large trees such as occurred during the 1955 and 1964 floods are an intolerable loss.

3) The power of streams to move boulders and large cobbles increases exponentially with the volume of the flow. The Eel River bed in many places was raised a meter or more as a result of these recent floods; the raised bed



BAUSCH & LOMB
SCIENTIFIC INSTRUMENT DIVISION

full fidelity flat field to film

Bausch & Lomb's Dynazoom® Microscope with amplifier and interchangeable camera backs assure you the finest possible photomicrographs. The negative amplifier optical system is tailored to that of the Dynazoom/Flat Field optics to give you truly full fidelity recording of the image detail on the film. Highly resolved, curvature-free images stand out bright and clear. Such performance cannot be matched for anywhere near Bausch & Lomb's price. But, seeing is believing. We can arrange for you to try a Dynazoom Microscope with camera in your own laboratory. **Meanwhile, we will send you the deluxe Laboratory Microscope brochure, 31-185. Just write Bausch & Lomb, 64205 Bausch St., Rochester, New York 14602.**

See inimitable quality in micro-vision . . . See a demonstration of Dynazoom/Flat Field

INSTRUMENTATION

was normally confined to gravel beds adjacent to the alluvial-redwood flats. This resulted in the raising of the water table and the death of many mature redwoods from what is locally known as "sour root."

If the facts and conclusions stated above are sound, there is only one answer to the basic question. The construction of flood control dams on the Eel River and its tributaries would aid in the preservation of the giant redwood groves on the adjacent alluvial flats.

BESTOR ROBINSON
4420 Bridgeview Drive,
Oakland, California 94602

The greatest threat to the alluvial-flat redwoods may, in the long run, turn out to be the lay conservationists. This is ironical because they were largely responsible for getting these redwoods placed under park protection in the first place. Unfortunately, however, they have failed to fully appreciate the dynamic character of the ecosystem involved. They have focused their attention on preserving the trees now standing, ignoring the rest of the ecosystem which was responsible for these redwoods being present and upon which their replacements must depend. Protection from man, fires, and floods has been their goal. They have attached little importance to the fact that fires and floods were critical elements in the system under which the alluvial-flat redwoods developed and have actively opposed any man-generated substitutes.

It is essentially from this position that Robinson writes today. For 31 years as a director of the Sierra Club and an active conservationist, he is protection-oriented and is a strong advocate of flood control because he wants to keep the alluvial-flat redwoods from being washed away. He has dismissed as insignificant the impact such action might have on the functioning of the alluvial-flat ecosystem of which these redwoods are only part. The crux of his argument is that, because there are big trees on the slopes and benches where flooding does not occur, siltation per se is not necessary in order for the redwood to maintain its competitive position on the alluvial flats; he even goes so far as to suggest that siltation, by creating a competition-free seedbed, aids the survival of competing species and is therefore undesirable. Apparently, he is unaware that he cannot readily extrapolate from one ecosystem to another.

We are fully aware that nearly pure stands of large redwoods exist off the alluvial flats. But the ecology that has contributed to their development is not the same as that which has contributed to the development of the alluvial-flat redwoods. It was the ecology of the alluvial-flat redwood that we considered in the paper to which Robinson takes exception.

Robinson argues that because the potential competitors of redwood are short-lived they could not possibly replace redwood. Obviously he is not familiar with the facts. In the absence of floods and fires, seedlings and saplings of bay, tan oak, and grand fir will actively maintain a suppressed understory on the alluvial flats. Only an opening in the canopy is needed for these species to develop into full-fledged competitors. Thus when a redwood falls —as some do each year—these waiting competitors are on hand ready to take its place. Not always will there be a redwood seedling in the right place at the right time to compete for space when an opening occurs. It is in this way that the alluvial-flat redwoods will eventually be replaced with a mixture of bay, tan oak, and grand fir if flooding and fire are removed from the ecosystem and man fails to actively intervene. It is unimportant how big or for how long redwood can grow when once established on the alluvial flats. The im-

portant fact is that periodically a redwood tree falls and there are competing species ready to take its place.

All the evidence we have been able to collect to date suggests that time is running out for the alluvial-flat redwoods and that flood control could be the final blow unless man actively intervenes with herbicides, the ax, or the chainsaw. Strong support behind a program of active intervention is urgently needed. Our hope is that it will not be too late in coming.

EDWARD C. STONE
RICHARD B. VASEY
School of Forestry and Conservation, University of California, Berkeley 94720

Defeated by Bad Calculus Text

Regarding the article "Shortage of mathematic teachers" (8 Mar., p. 1082), I wonder if the Committee on the Undergraduate Program in Mathematics might not do well to examine the undergraduate curriculum as well as the graduate degree requirements. As a parent, I have watched a budding mathematician nipped and changing her major in her sophomore year as the result of a disastrously planned course in calculus. She had not only been highly interested in mathematics since grammar school, but had scored extremely well in all the standard battery of aptitude tests and was, in fact, placed in an "advanced" math group on the basis of her aptitude and background in math. There seems some evidence that the student was not wholly at fault. Her textbook was new, published, in fact, so recently that hers was the first class to use it. Though it is not my field, I know enough math to recognize that it was poorly conceived for teaching purposes —a number of the signs and processes needed to understand early chapters, for instance, were not explained before the second half of the book.

I was close to this experience but I am also aware of other students, in both high school and college, who are shunted away from a math career by a combination of incomprehensible texts and teachers who, however brilliant they may be at learning math, seem unable to explain the why and how of the more abstract processes. (I have been informed by one expert that "There *are* no good calculus texts.") The student referred to above understood more calculus from a weekend's intensive reading of the article in the *Brittanica* than from 2 months of class work.

Obviously, if fewer students were discouraged from finishing undergraduate majors in math, at least the potential pool for graduate study would be greater.

JAMES H. FLEMING
11325 South Bell Avenue, Chicago, Illinois 60643

Erratic Scores by the Computer

It may be that "The future of scientific journals" (1 Dec., p. 1153) will involve computer selection of information of personal interest to each reader. If such a computer system could act as my alter ego, so that I got a stream of information similar to, but, hopefully, much more complete than, that which I now select in my journeys through the journals, it would be utopian.

The present computer capability for information selection falls far short of this ideal, however. My most recent skirmish with a computer information retrieval system gave the following results: 154 total references listed; 12 references with close connection to my area of interest; 131 references with only distant relation; and 11 references

with no readily perceived connection. In addition, two important references on the subject of interest which I had obtained by the old, more time-consuming (?) method were not listed by the computer.

This listing was obtained in response to a fairly specific request. Imagine the response to a generalized statement of interest covering a wide range of subjects!

EDWARD S. ROGERS

8888 Wolf Road, Hinsdale, Ill. 60521

Survey Synonym

In reporting the results of a survey, Reagan (Letters, 5 April) suggests that scientists live with a "bifurcated tension situation." It sounds like a frightful thing to have around the house. Would it perhaps be less threatening if it were called a "dilemma"?

ARTHUR KOHLENBERG

40 Appleton Street,
Cambridge, Massachusetts 02138

Importance of Being Important

In his article "When is research the answer?" (8 Mar., p. 1079), Pierce does not acknowledge that much of the great science of the past would have failed initially to meet any reasonable criterion of "importance," social or otherwise. Given the philosophical and practical concerns of the respective times, how "important" did it seem to wonder, for example, about the swing of the pendulum, the effect of current flow on magnetic needles, the properties of partial vacuums, and the fauna of the Galapagos? Not very important, it would seem from the historical record, and there is no evidence that we today are any smarter about guessing where the most powerful secrets of nature are hidden than were the contemporaries of Galileo, Faraday, Boyle, or Darwin.

However hard it may be, it seems essential that the scientific community try to distinguish between applied and basic research or between technology and science. The case put by Pierce is fundamental when research is being conducted for the sake of an "organization," but only then. The customer (individual or institutional) has a right to demand fair value for its investment. And if the commodity is useful knowl-

edge, then, as Pierce says, the job is done only when knowledge is put to use. In the context of applied research, appeals to "basic" research often cloak poor quality and inadequate administration and should be viewed with skepticism. But the danger of too great a compliance with Pierce's enjoinders is that science, not for an organization or for useful consumption, but for the more detached and potentially far more creative exploration of nature, might be brought to a halt.

What looks "important" at any time reflects a consensus based upon what is already known. Thus, it should come as no surprise that many potent discoveries arise in the study of the apparently "unimportant," as history shows. The basic researcher may be wise to put considerations of importance out of his mind and attend instead to the inner logic of the subject he is studying. It is he, rather than either the administrators of science or the guardians of the public welfare, who must be trusted to lay out the course of science. It is unsettling to think how much the future of science depends upon society's willingness to place trust (and resources) in the hands of men who promise nothing more than to try to increase our understanding of nature, however unrelated to "important" aims their work may seem at the time.

R. J. HERRNSTEIN
Department of Psychology, Harvard University, Cambridge, Massachusetts 01238

Academe's Window

Although I have not been sympathetic toward "secret research" under government contract on university campuses, I have had a second thought after reading Vice-President Humphrey's statement in "A point of view" (16 Feb., p. 717). If all secret research is removed from university affairs, and is conducted solely in government laboratories, the collective university community may find itself totally ignorant of certain government activities, many of which have already aroused suspicion and regret in the academic world. Who then can protest with "insight?" Who then, from the "outside," can advise the government on the wisdom of its course?

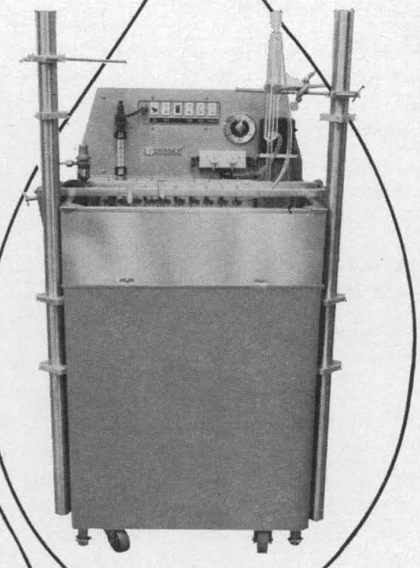
A. D. MCLAREN
Department of Soils and Plant Nutrition, University of California, Berkeley 94720

"LE BAIN A TOUT FAIRE"

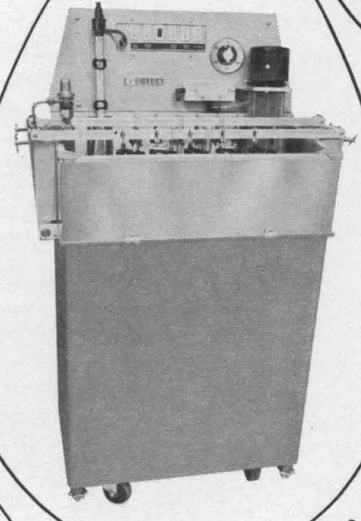
GILSON OMNIBATH

A truly versatile laboratory waterbath

Select *one* model to perform ALL the chores in your lab. Seven different models. Four representative models are pictured.



Floor Model MSRO-2
- Apparatus Masts
- Refrigerated
- Shaking
- Circulating
- Immersion



Floor Model SRO-2
- Refrigerated
- Shaking
- Circulating
- Immersion

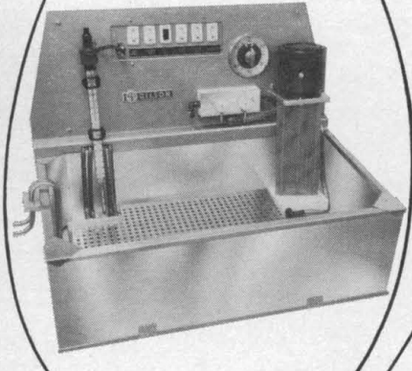


Table-top Model O-1
- Circulating
- Immersion

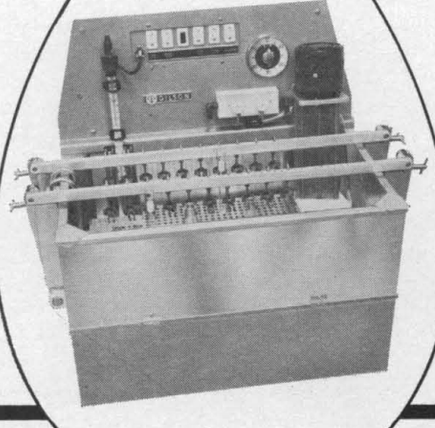


Table-top Model SO-1
- Shaking
- Circulating
- Immersion

ALL MODELS CONTAIN
stirring and circulating pump, bell-sounding timer, perforated platform for uniform bath temperature; mercury column thermoregulator, two valves to control external circulation.

WRITE OR PHONE
GILSON MEDICAL ELECTRONICS, INC.
3000 West Beltline Highway
Middleton, Wisconsin 53562
Telephone: 608/836-1551

GILSON

EUROPEAN Manufacturing Branch: Gilson Medical Electronics (FRANCE) 69, Rue Gambetta • 95 — Villiers-Le-Bel, France

24 May 1968, Volume 160, Number 3830

SCIENCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW. Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci. Washington. "Instructions for Contributors" was published 29 March 1968; copies can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Dissent or Disrupt

Frustration breeds aggression. Some part of the recent campus disturbances that have interfered with and halted educational activities constituted aggressive spillover from the frustrated feeling that the universities have failed to give due attention to matters high on the students' priority lists. Apparently also involved have been calculated efforts to create disturbance for political purposes.

Whatever the motivation, the disruption has frustrated and angered many persons on and off campus, and retaliation has now come from Congress. The House of Representatives has voted to deny financial assistance to students and faculty members who participate in campus riots or disruptions. The appropriations bill carrying funds for the National Science Foundation and the bill extending several student aid programs were amended to bar payments of federal funds to any student or faculty member who, in the words of one of the amendments, "wilfully refuses to obey a lawful regulation of the university or college which he is attending or at which he is employed." Both of the bills so amended were then passed and sent to the Senate.

The House action is indicative of strained relations between government and academe. The current Selective Service policies came about in part as an expression of anger over the sometimes real and often only alleged escape of college students from military service. In the prevailing atmosphere of frustration on a variety of issues, relationships are likely to be worsened by the reductions in appropriation bills affecting university work and the uncertainty over possibly greater reductions resulting from prospective tax and spending legislation.

It is essential that the still cool heads do whatever they can to try to defuse the situation. One of the congressional amendments specifically states that it is not intended to limit the freedom of students to express their individual views or opinions. The American Association of University Professors has vigorously espoused the rights of students to express their own views and to dissent from views with which they disagree, and just as vigorously has condemned the forceful occupation of campus buildings, the halting of ordinary campus pursuits, the detention of faculty and administrative officers, and the threats of physical harm that have disrupted a number of campuses in recent weeks. The American College Personnel Association has made the same distinction. And so also have individual administrators, faculty members, and students.

If the activists disregard this distinction, the majority of students and faculty members can still insist upon it. The faculty is in the critical position on this matter. It has the strength and force, and should have the willingness and sense of responsibility to deal with infractions.

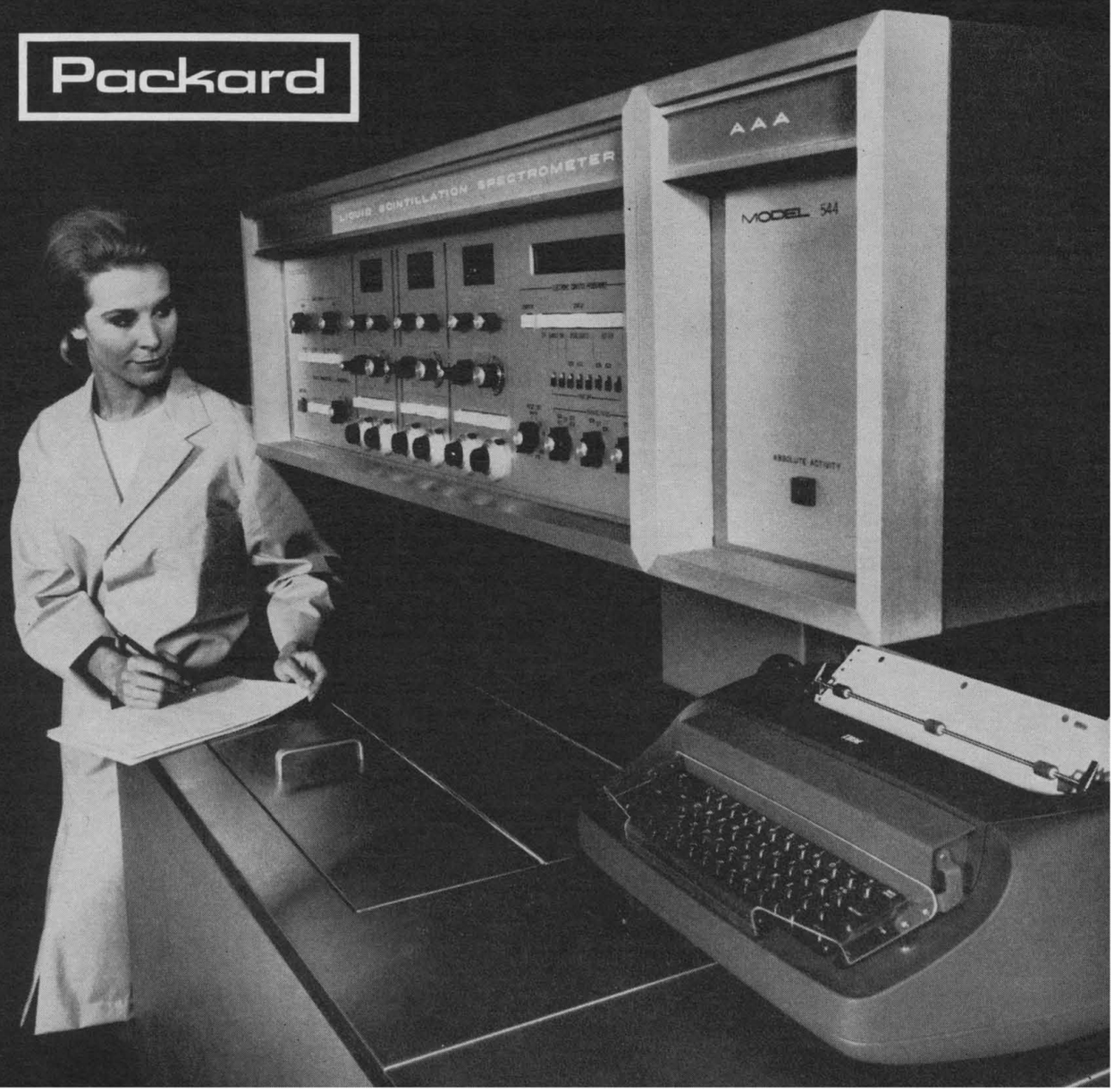
The weapon offered universities by the House of Representatives should be considered in this light. The intent is sound, but the proffered weapon will be damaging to a university if it is used, and damaging if it is available but not used.

The university can better serve its purposes, and better help clarify public attitudes, by insisting that the university is a proper place for free exploration and expression of divergent views on any important issue. If the majority who defend this position cannot control the minority who flout it, the police and the courts are finally available as agencies for dealing with persons who choose to step over the boundary that separates the right of dissent from the lawlessness of disruption.—DAEL WOLFLE

There's only one way to get completely automatic liquid scintillation counting

Install the new Model 3380 Tri-Carb® Spectrometer with optional Absolute Activity Analyzer. ▪ It's the only way to get accurate answers in terms of absolute sample activity without manual computation or complicated transfers of data. Furthermore, results are computed automatically with a precision impossible to achieve either manually or with any other on-line or off-line computer. ▪ It works with *any* samples, single or double-labeled, with *any* type and degree of quenching. Counting conditions are optimized automatically for each sample, and background is held constant for *all* degrees of quenching. You literally put in samples and take out the data you want. Of course, counting performance—whether in terms of E^2/B, tritium efficiency or isotope separation—is unequalled. Call your Packard Sales Engineer for complete details or write for Bulletin 1057U to Packard Instrument Company, Inc., 2200 Warrenville Road, Downers Grove, Illinois 60515; Packard International S.A., Talstrasse 39, 8001 Zurich, Switzerland.

Packard



from Intertechnique...

flexibility, accuracy, speed in liquid scintillation counting

First Fully Computerized Liquid Scintillation Spectrometer

The SL 40 features simplified controls for ease of interpretation and operation. Single switch calls out any of 7 pre-programmed computation modes, another selects preadjusted counting window for single- or dual-isotope samples.

The only instrument that combines all these features:

- ○ Pre-programmed core memory computer for on-line data reduction.
- ○ Automatic computation of *true* disintegrations per minute.
- ○ Dpm quench corrections computed for single- and dual-isotope samples through channels ratio or external standard method.
- ○ Isotope ratios and standard error computed automatically for each count in each channel.
- ○ Alternate operating mode provides constant counting efficiency for variably quenched samples.
- ○ Logarithmic amplification for ease of operation.
- ○ Storage of up to four calibration curves and four constant efficiency values.
- ○ Teletype tape punch and reader for computer input-output.

Intertechnique's new SL 40 not only collects data faster and more accurately—it also provides *complete* on-line data processing.

Basically, the difference lies in the SL 40's built-in core memory computer. Software programming frees the SL 40 from the inherent operating limitations of fixed hard-wire programs. The resulting ability to perform more computations, more rapidly and more accurately, makes the SL 40 the most versatile liquid scintillation spectrometer ever developed.

A 1024-word memory (expandable to 2048 words) stores count data, calibration curves, computation and sample handling programs. Pre-programmed instructions are entered in the memory as a standard part of the system. The computer automatically selects the proper quench correction curve or curves and the correct mathematical expression to be solved from data previously stored in the memory.

By any criterion—counting efficiency, background, figure of merit, instrument stability or operating convenience—the SL 40 offers distinctly superior performance. Why not see for yourself? Contact:

INTERTECHNIQUE

INSTRUMENTS INC.

Randolph Industrial Park/ Dover, New Jersey 07801
TEL (201) 361-5550 • (212) 267-1698
Affiliates in
France, Germany, United Kingdom and Sweden.
Representatives throughout the world.

WORLD'S LARGEST PRODUCER OF MULTICHANNEL ANALYZERS

poor ("most graduates wouldn't know a pneumococcus if it hit them in the eye"). Another panel member said "a pseudomonas is a pseudomonas wherever it is seen and a graduate bacteriologist should at least have seen one and know how to detect it." Pleomorphism may be demonstrated once but usually is illustrated and a student gets the idea that of the several forms a microorganism can take, these occur simultaneously or nearly so. In many schools, the fungi are not even studied in the microbiology courses; a student must wait for a course in botany or plant pathology before he sees them.

Weaver suggested that the lack of emphasis on this basic kind of study in microbiology might be due to the failure of many colleges or universities to recognize that microbiology can or should be considered the most basic of all life sciences. By requiring it at the beginning of a student's program of studies, he could be exposed to most of the life processes usually described in courses of botany, zoology, or protistology.

San Clemente (Michigan State University) said he thought the school should expose each pupil to the basic ideas in the field and that no one curriculum would solve the problems posed. There are multiple objectives for teaching microbiology and each student must have a program tailored for him. Among other things unmentioned so far, each student must learn how and when to make decisions. Of course this means we must understand the student and his modus operandi. Do we? Can we? Now we're talking school psychology, not microbiology!

Murray suggested that training for industry or anywhere else stops at one place for one person and somewhere else for another person. Consequently, curricular programs must be customized as much as possible, taking into account the potential and limitations of each student. He reminded us that a college degree is a statement of education, not a statement of qualification. Commencement means beginning for the graduating student.

One problem which was mentioned frequently and which has gained fresh importance in this age of materialism was that of job satisfaction—satisfactory performance (the employer's concern) and enjoyment of what one is doing (the employee's concern). Too frequently, due to the faddishness of research, newer areas like DNA-RNA or

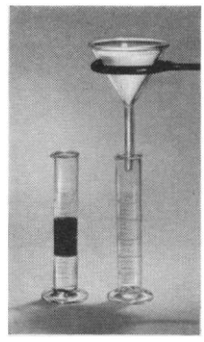
molecular biology ("breaking the genetic code") sound more appealing than the "humdrum" study of water pollution biology. Of course we have heard about this problem before and a big reason for its existence is the pressure on our teachers and their students to make new breakthroughs and to publish. These pressures are usually exerted by administrators, not for the benefit of the classroom but rather to attract the eye of the public. Vera said that a person who does a good job of teaching is of equal or even greater importance to the academic institution than the person primarily concerned with research projects. This philosophy is most important at the undergraduate level where basic principles and practices are learned more by directed observation than discovery. As long as teachers are under pressure to publish or to obtain grants, they will be forced to use the fads to maintain themselves.

All of the foregoing, the agreements and disagreements on what a student's training for industry should be in college remind this reporter of two previous SIM symposia on the subject. The first was held at State College, Pennsylvania, in 1959 and the second was held in Boulder, Colorado, in 1964. Certainly there has been progress since those two earlier meetings. Agreement on the need for laboratory experience by the student was not expressed before, at least not in the context of the way to carry out routine laboratory exercises. Second, the awareness by industrial people of the pressures and demand on teachers is much greater and better understood than it was a few years ago.

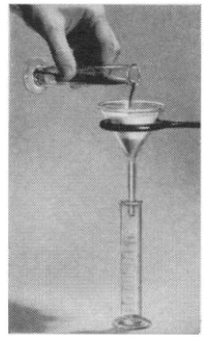
Our panelist from the Canadian universities described a very interesting trial in professional education now beginning in Ontario. Approximately a dozen 2-year technical colleges have been established in those urban centers close to where job opportunities are greatest. The students in these schools will be given specialized training in the work areas which predominate locally; thus, fermentation sciences near distilleries, water sciences near the Great Lakes or working rivers.

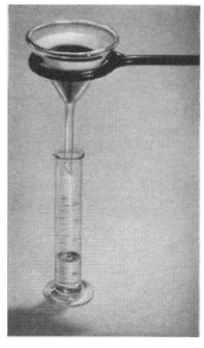
One hopes that the academicians will place greater emphasis on leading their students into the correct fields for their qualifications and that university leaders will recognize that they have a responsibility to train students adequately and correctly for the fields they select. Perhaps we in industry should consider the suggestion of Robert Fuerst (Texas Women's University) that we draw up

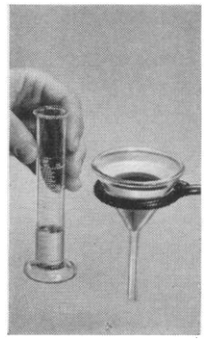
Whatman



PHASE SEPARATING PAPER







The world's first, fast-acting, disposable separatory funnel

Whatman No. 1 PS is a water repellent paper that acts as a phase separator in place of conventional separatory funnels... separates aqueous solutions from water immiscible solutions, quickly and conveniently. Because it's hydrophobic, No. 1 PS retains the aqueous layer while allowing the organic layer to go through... filters out any solid that may be present at the time of filtration... and, because it's paper, *it's disposable.*

No. 1 PS makes prior separation of the phases in a separatory funnel completely unnecessary... saves considerable time and effort in solvent extraction. It gives a complete and rapid quantitative separation of the two liquid phases. There is no loss of materials as with ordinary separatory funnels. Can be used with organic solvents that are lighter or heavier than water.

For further information, send for our free Phase Separating Paper Leaflet.

reeve angel

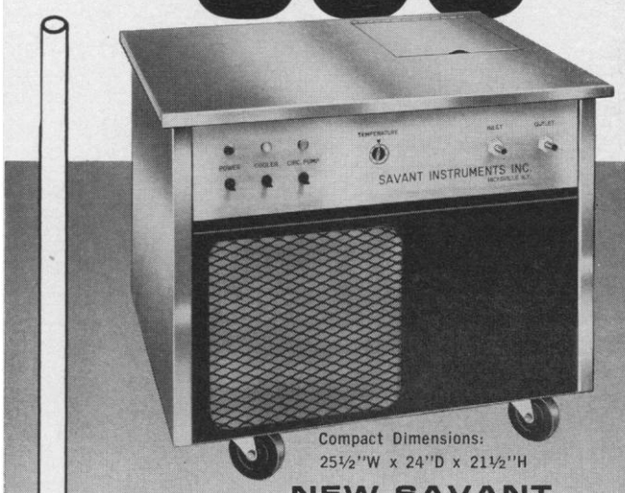
H. Reeve Angel & Co., Inc.—Sole Distributor in North America
9 Bridewell Place, Clifton, New Jersey 07014

H. Reeve Angel & Co., Ltd.—Sole Selling Agents
14 New Bridge Street, London E. C. 4

● WHATMAN is the registered trademark of W & R Balston Ltd., Maidstone, Kent, England

COLD POWER

FOR $990.00



Compact Dimensions:
25½"W x 24"D x 21½"H

NEW SAVANT

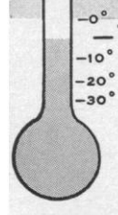
RECIRCULATING WATER COOLER

The Model RWC-50A disposes of your heat easily with a dependable system for circulating liquids at controlled temperatures.
Savant's recirculator is a self-contained commercial type refrigeration system, in a compact, laboratory size package.

Check the following outstanding features:

- ☐ ½ H.P. compressor, removes 3,500 BTU per hour.
- ☐ Self-priming pump.
- ☐ Stainless steel reservoir.
- ☐ Temperature range 20°F to 80°F (—7°C to +20°C)
- ☐ Completely mobile, move where needed.
- ☐ Compact, fits under laboratory bench.

Efficient cooling under the most exacting laboratory conditions for High Voltage Electrophoresis apparatus, Distillation Columns Cooling Jackets, etc.
For complete information on "Cold Power", request literature RWC-50A.



HIGH VOLTAGE ELECTROPHORESIS
LUCITE TANKS and FLAT PLATE SYSTEMS

Savant Instruments, Inc.

221 PARK AVE HICKSVILLE NEW YORK 11801 (516) WE 5-8774

a list of qualifications for those students who will go into industrial employment. These can then be offered to the academicians as a guide for their design of course offerings.

Unfortunately, there does not seem to have been much change in the feeling toward the kind of research done in industry or university. There has not been a recognition that all fields of microbiology are of equal "social-professional" status. Indeed, the glamour of certain research areas seems to have invaded the industrial laboratory too so that jobs in microbiological control or technical service do not hold the same importance as basic research. Whether this problem will ever be resolved resolved remains to be seen. In an aside, one panelist remarked that a change in attitude will take place only after the pressures to solve practical problems become greater and more costly than the pressures to examine new places and new things.

BRINTON M. MILLER
Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey

Calendar of Events

National Meetings

June

2–7. American **Water Works** Assoc., Cleveland, Ohio. (E. F. Johnson, The Association, 2 Park Ave., New York 10016)

3–5. **Aerospace Instrumentation,** 14th natl. symp., Boston, Mass. (K. Foster, EG&G, 160 Brooklin Ave., Boston 02215)

5–9. **Marine Technology** Soc., Miami Beach, Fla. (Conference Coordinator, Div. of Continuing Education, P.O. Box 8005, Univ. of Miami, Coral Gables 33124)

7–9. Society of **Biological Psychiatry,** Washington, D.C. (G. N. Thompson, 2010 Wilshire Blvd., Los Angeles, Calif. 90057)

8–12. American **Therapeutic** Soc., Honolulu, Hawaii. (R. T. Smith, The Society, Norbeth, Pa. 19072)

9–11. American Assoc. of **Neuropathologists,** annual mtg., Atlantic City, N.J. (S. M. Aronson, State Univ. of New York, Downstate Medical Center, 450 Clarkson Ave., Brooklyn, N.Y. 11203)

10–13. American **Proctologic** Soc., Denver, Colo. (J. A. Ferguson, Secretary, 320 W. Lafayette, Detroit, Mich. 48226)

10–13. American **Vacuum** Soc., Beverly Hills, Calif. (L. W. Sink, Bldg. 290, Pratt & Whitney Aircraft, Middletown, Conn.)

10–14. Society of **Photographic Scientists and Engineers,** Boston, Mass. (The Society, 1330 Massachusetts Ave., NW, Washington, D.C. 20005)

12–14. **Disaster Planning,** Chicago, Ill. (American Hospital Assoc., 849 N. Lake Shore Dr., Chicago 60611)

12–14. Application of Newer **Physical Techniques to the Study of Drug Metabolism**, Gaithersburg, Md. (D. Trexler, Drug Research Board, National Research Council, 2101 Constitution Ave., NW, Washington, D.C. 20418)

13–14. American **Chemical** Soc., Great Lakes regional, Milwaukee, Wis. (K. Miller, American Bio-Synthetics Corp., 710 W. National Ave., Milwaukee 53204)

13–15. California Soc. of **Anesthesiologists**, Monterey. (N. R. Catron, California Soc. of Anesthesiologists, 39 N. San Mateo Dr., San Mateo 94401)

13–16. American Assoc. of **Neuropathologists**, Washington, D.C. (S. M. Aronson, Downstate Medical Center, Brooklyn, N.Y. 11203)

13–17. American College of **Chest Physicians**, 34th annual, San Francisco, Calif. (H. L. Kruse, 112 East Chestnut St., Chicago, Ill.)

14–15. American **Rheumatism** Assoc., Seattle, Wash. (M. M. Walsh, 1212 Avenue of the Americas, New York 10036)

14–16. Society for **Biological Psychiatry**, Washington, D.C. (G. N. Thompson, 2010 Wilshire Blvd., Los Angeles, Calif. 90057)

15. Academy of **Tuberculosis Physicians**, San Francisco, Calif. (G. P. Bailey, Secretary, 1295 Clermont, Denver 20, Colo.)

15. American Assoc. for the Study of **Headache**, San Francisco, Calif. (S. Diamond, 5214 N. Western Ave., Chicago, Ill. 60625)

15–16. American **Diabetes** Assoc., San Francisco, Calif. (J. R. Connelly, Executive Director, 18 E. 48 St., New York 10017)

15–16. Society for **Vascular Surgery**, San Francisco, Calif. (W. S. Edwards, Executive Secretary, 919 Seventh Ave., S., Birmingham, Ala. 35205)

15–20. American Soc. of **Radiologic Technologists**, Los Angeles, Calif. (The Society, 537 S. Main St., Fond du Lac, Wis. 54935)

16–20. American Soc. of **Mammalogists**, Fort Collins, Colo. (D. F. Hoffmeister, Univ. of Illinois, Urbana 61801)

16–20. **Environmental Biology**, Madison, Wis. (J. R. Olive, American Inst. of Biological Sciences, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

16–20. American College of **Preventive Medicine**, San Francisco, Calif. (E. A. Piszczek, 6410 N. Leona Ave., Chicago, Ill. 60646)

16–20. American **Medical** Assoc., San Francisco, Calif. (F. J. L. Blasingame, Executive Vice-President, 535 N. Dearborn St., Chicago, Ill. 60610)

16–20. American **Physicians Art** Assoc., San Francisco, Calif. (A. A. Richman, 307 Second Ave., New York 10003)

16–20. Association of **Food and Drug Officials** of the United States, 72nd annual, Hartford, Conn. (E. E. Smith, Connecticut Dept. of Consumer Protection State Office Bldg., 165 Capitol Ave., Hartford)

16–20. **Health Physics** Soc., 13th annual, Denver, Colo. (W. R. Hendee, Dept. of Radiology, Univ. of Colorado Medical Center, 4200 E. 9 St., Denver 80220)

16–20. Society for **Investigative Dermatology**, San Francisco, Calif. (G. W. Ham-

brick, Jr., Executive Secretary, 601 N. Broadway, Baltimore, Md. 21205)

16–21. American Soc. of **Parasitologists**, 43rd annual, Madison, Wis. (G. W. Hunter, Dept. of Microbiology, Univ. of Florida Medical School, Gainesville 32601)

16–21. **Weights and Measures**, 53rd natl. conf., Washington, D.C. (M. W. Jensen, National Bureau of Standards, Washington, D.C. 20234)

17–19. American **Marketing** Assoc., Philadelphia, Pa. (The Association, 230 N. Michigan Ave., Chicago, Ill. 60601)

17–19. American **Neurological** Assoc., Washington, D.C. (M. D. Yarh, 710 W. 168 St., New York 10032)

17–19. **Biomedical Engineering**, San Diego, Calif. (D. L. Franklin, Scripps Clinic and Research Foundation, La Jolla, Calif.)

17–19. American **Physical** Soc., Los Alamos, N.M. (W. W. Havens, 528 W. 120 St., New York 10027)

17–20. American **Dairy Science** Assoc., Columbus, Ohio. (C. Cruse, Executive Secretary, 903 Fairview Ave., Urbana, Ill. 61801)

17–21. American Soc. of **Ichthyologists and Herpetologists**, New York, N.Y. (J. A. Peters, Div. of Reptiles, U.S. National Museum, Washington, D.C. 20560)

17–21. **Automating and Miniaturizing Government Records**, Washington, D.C. (Director, Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C. 20006)

18–21. American Soc. of **Agriculture Engineers**, 61st annual, Logan, Utah. (The Society, P.O. Box 229, St. Joseph, Mich. 49085)

19–21. **Analytical Chemistry**, University Park, Pa. (A. T. Winstead, National Meetings and News Div., 1155 16th St., NW, Washington, D.C. 20006)

19–21. **Colloids**, 42nd symp., Chicago, Ill. (P. Becher, Chemical Research Dept., Atlas Chemical Industries, Wilmington, Del. 19899)

23–27. **Air Pollution Control** Assoc., 61st annual, St. Paul, Minn. (A. Arch, Executive Secretary, 4400 Fifth Ave., Pittsburgh, Pa. 15213)

23–27. American Soc. of **Psychosomatic Dentistry and Medicine**, Tamiment, Pa. (H. S. Tobey, 700 Park Ave., Plainfield, N.J.)

23–28. American Inst. of **Homeopathy**, Washington, D.C. (W. O. Baker, 1635 Harvard St., NW, Washington, D.C. 20009)

23–28. American Soc. for **Testing and Materials**, 71st annual, San Francisco, Calif. (T. A. Marshall, Jr., 1916 Race St., Philadelphia, Pa. 19103)

24–26. American Assoc. of **Physics Teachers**, Tempe, Ariz. (S. Ballard, Univ. of Florida, Gainesville 32601)

24–26. **Thermophysics** Conf., American Inst. of Aeronautics and Astronautics, Los Angeles, Calif. (Meetings Secretary, 345 E. 47 St., New York 10017)

24–29. American **Meteorological** Soc., joint with AAAS Pacific Div., Logan, Utah. (The Society, 45 Beacon St., Boston, Mass. 02108)

24–29. Western Soc. of **Soil Science**, Logan, Utah. (J. L. Young, Agricultural Research Service, SWC-NWB, Soils Dept., Oregon State Univ., Corvallis 97331)

25–27. **Precision Electromagnetic Measurements**, Boulder, Colo. (Secretary, 1968 Conf. on Precision Electromagnetic Measurements, National Bureau of Standards, Boulder)

26–27. American **Geriatrics** Soc., New Orleans, La. (E. Henderson, Room 1405, 10 Columbus Circle, New York 10019)

26–28. Biennial **Polymer** Symp., American Chemical Soc., Amherst, Mass. (A. T. Winstead, Natl. Meetings and News Div., 1155 16th St., NW, Washington, D.C. 20006)

26–29. American **Optometric** Assoc. 71st annual congr., Miami Beach, Fla. (AOA Congr., 7000 Chippewa St., St. Louis, Mo. 63119)

26–29. American **College of Surgeons**, Munich, Germany. (Communications Dept., ACS, 55 E. Erie St., Chicago, Ill. 60611)

27–30. Society of **Nuclear Medicine**, St. Louis, Mo. (S. N. Turiel, Executive Director, 333 N. Michigan Ave., Chicago, Ill. 60601)

30–5. American **Physical Therapy** Assoc., Chicago, Ill. (The Association, 1740 Broadway, New York 10019)

July

8–11. **Soil Conservation** Service and Experiment Stations, Clemson, S.C. (G. R. Craddock, Agronomy and Soil Dept., Clemson Univ., Clemson)

9–12. American Soc. of **Pharmacognosy**, Iowa City, Iowa. (D. P. Carew, College of Pharmacy, Univ. of Iowa, Iowa City 52240)

9–13. American **Therapeutic** Soc., Essex House, New York, N.Y. (R. T. Smith, 37 Narbrook Park, Narberth, Pa. 19072)

12. American Assoc. for the Study of **Headache**, New York, N.Y. (S. Diamond, 5214 N. Western Ave., Chicago, Ill. 60625)

13–17. American **Medical** Assoc., New York, N.Y. (F. J. L. Blasingame, 535 N. Dearborn St., Chicago, Ill. 60610)

14–16. American Inst. of **Aeronautics and Astronautics**, San Francisco, Calif. (Meetings Manager, ASME, 345 E. 47 Street, New York 10017)

21–25. American **Veterinary Medical** Assoc., Boston, Mass. (Director, Business Div., 600 S. Michigan Ave., Chicago, Ill. 60605)

22–27. American **Medical Technologists**, Dallas, Tex. (American Medical Technologists, 710 Higgins Rd., Park Ridge, Ill. 60068)

25–30. American **Podiatry** Assoc., Chicago, Ill. (J. Tipton, Convention Manager, 2301 16th St., NW, Washington, D.C. 20010)

International and Foreign Meetings

June

2–5. **Chemical** Inst. of Canada, 51st natl. conf., Vancouver, B.C. (CIC Conf. Committee, Dept. of Chemistry, Univ. of British Columbia, Vancouver 8)

3–5. Canadian Soc. of **Microbiologists**, Windsor, Ont. (C. E. Chaplain, c/o Scientific Information Section, Research Branch, Canada Dept. of Agriculture, Ottawa, Ont.

4–8. International Congr. on Research in **Photosynthesis**, Freudenstadt, Germany. (H. Schenk, Institute Fur Chemische

Pflanzenforschung Auf Dem Schnarrenberg, Tubingen, Germany)

5–7. Canadian Soc. of **Plant Physiologists**, London, Ont. (R. A. Fletcher, Dept. of Botany, Univ. of Guelph, Guelph, Ont.

5–7. Canadian **Psychological** Assoc., Calgary, Alta. (W. R. N. Blair, Dept. of Psychology, Univ. of Calgary, Calgary)

5–7. European Assoc. of **Exploration Geophysicists**, Salzburg, Austria. (B. F. J. Kuns, Radingerstrasse 15, 1020 Vienna, Austria)

6–7. Canadian Council of **Professional Engineers**, St. Johns, Newfoundland. (The Council, 116 Albert St., Ottawa, Ont., Canada)

6–8. Canadian **Neurological** Soc., Vancouver, B.C. (H. J. M. Barnett, 170 St. George St., Toronto 5, Ont.)

6–8. Scandinavian Congr. for **Obstetrics and Gynaecology**, 15th, Stockholm, Sweden. (J. Asplund, St. Eriks Sjukhus, Stockholm K.)

9–13. Canadian **Nuclear** Assoc., Toronto, Ont. (R. F. Gross, 19 Richmond St., Toronto 1)

10–13. Canadian **Ophthalmological** Soc., Ottawa, Ont. (The Society, Suite 8, 825 Coxwell Ave., Toronto 13, Ont.)

10–15. South African **Orthopaedic** Assoc., Pretoria, S.A. (P. van Rooyen, 11 van Riebeeck Medical Bldgs., Schoeman St., Pretoria)

10–15. **Pesticides**, intern. analytical committee, 12th annual, Brunswick, Germany. (T. Horpenden, Ministry of Agriculture, Fisheries, and Food, Plant Pathology Lab., Hutchins Green, Harsinden, Herts, England)

12–14. Canadian **Botanical** Assoc., Port Arthur, Ont. (D. R. Lindsay, Dept. of Biology, Lakehead Univ., Port Arthur)

12–14. Canadian Federation of **Biological** Soc., 11th annual, Kingston, Ont. (K. K. Carroll, Faculty of Medicine, Univ. of Western Ontario, London, Ont.)

14–16. Society of **Obstetricians and Gynecologists** of Canada, Banff, Alta. (J. L. Harkins, Secretary, 537 Medical Arts Bldg., Toronto 5, Ont., Canada)

15–20. Canadian **Anaesthetists** Soc., annual mtg., Montebello, P.Q. (S. M. Campbell, 178 St. George St., Toronto 5, Ont., Canada)

15–22. Canadian **Medical** Assoc., 101st annual, Banff, Alta. (A. D. Kelly, 150 St. George St., Toronto, Ont., Canada)

16–20. Canadian **Thoracic** Soc., scientific mtg., Vancouver, B.C. (Executive Secretary, 343 O'Connor St., Ottawa 4, Ont.)

17–20. Canadian Soc. of **Radiological Technicians**, Saint John, N.B. (The Society, Suite 102, 1587 W. 8th Ave., Vancouver 9, B.C.)

17–22. Canadian Assoc. of **Pathologists**, Regina, Sask. (D. W. Penner, Winnipeg General Hospital, Winnipeg 3, Man., Canada)

17–22. Canadian **Psychiatric** Assoc., Banff, Alta. (W. A. Blair, 225 Lisgar St., Ottawa, Ont.)

17–22. European **Ophthalmological** Soc., 3rd Congr., Amsterdam, Netherlands. (H. E. Henkes, Netherlands Ophthalmological Soc., c/o Holland Organizing Center, 16 Lange Voorhout, The Hague)

17–23. **Continuous Cultivation of Microorganisms**, 3rd intern. symp., Prague, Czechoslovakia. (Z. Fenci, Inst. of Micro-

biology, Budejovicka 1083, Prague 4)

18–20. Symposium on the **Use of Digital Computers** in the Control of Process Systems, Machines, Toronto, Ont., Canada. (Associate Committee on Automatic Control, National Research Council, Ottawa 2, Ont.)

20–6. Canadian **Physiotherapy** Assoc., Calgary, Alta. (A. Way, 208 40th Ave., SW, Calgary)

23–26. **Medicinal Chemistry** Symp., 11th joint with American Chemical Soc., Quebec, P.Q., Canada. (C. R. Engel, Dept. of Chemistry, Laval Univ., Quebec 10)

23–26. Canadian **Pediatric** Soc., Saskatoon, Sask. (W. Kinnear, 213 Canada Bldg., Saskatoon)

23–27. Conference on **Interactions between Sub-Units of Biological Macromolecules**, Cambridge, England. (D. C. Holmes, Lab. of Molecular Biology, Hills Rd., Cambridge)

23–27. Canadian Soc. of **Laboratory Technologists**, 32nd annual, Edmonton, Alta. (The Society, 99 Wentworth St., S., Hamilton, Ont.)

23–29. **Catalysis**, 4th intern. congr., Moscow, U.S.S.R. (B. D. Polkovnikov, Inst. of Organic Chemistry, Leninskii Prospect 47, Moscow B-334)

23–29. **High-Speed Photography**, 8th intern. congr., Stockholm, Sweden. (T. Ramqvist, c/o Research Inst. of National Defense, FAO 2, Stockholm)

23–29. International Union of **Pure and Applied Chemistry**, 4th intern. congr. on catalysis, Moscow, U.S.S.R. (B. D. Polknovnikov, c/o Inst. of Organic Chemistry, 47 Leninskii Prospekt, Moscow B 334)

24–27. Canadian Soc. of **Agronomy**, annual mtg., Hamilton, Ont. (R. Loilelle, Ottawa Research Station, Central Experimental Farm, Ottawa, Ont.)

24–27. Canadian Soc. for **Horticultural** Science, Hamilton, Ont. (E. C. Lougheed, Dept. of Horticulture, Univ. of Guelph, Guelph, Canada)

24–27. Canadian Soc. of **Soil Science**, Hamilton, Ont. (A. R. Mack, Soil Research Inst., Central Experimental Farm, Ottawa, Ont., Canada)

24–27. Structure of **Viruses and Other Micro-Molecules**, Cambridge, England. (J. Kendrew, c/o Laboratory of Molecular Biology, University Postgraduate Medical School, Cambridge)

24–28. **Great Lakes Water Resources**, joint Canadian–U.S. conf., Toronto, Ont., Canada. (W. H. Wisley, United Nations Plaza, 345 E. 47 St., New York 10017)

24–28. **High-Temperature Materials**, 6th intern. Plansee seminar, Reutte, Austria. (F. Benesovsky Metallweek Plansee, A.G., Postfach 74, A-6600 Reutte, Tyrol)

25–28. **Gas Chromatography and Its Exploration**, intern symp., Copenhagen, Denmark. (C. L. A. Harborum, British Petroleum Research Co., Chertsey Rd., Sunbury-on-Thames, Middlesex, England)

25–4. Symposium on **Hill-Land Productivity**, Edinburgh and Aberdeen, Scotland. (Secretary, West of Scotland Agricultural College, Auchincruive, Ayr, Scotland)

26–28. Society of **Photo-Optical Instrumentation Engineers**, Paris, France. (G. Emschwiller, 10 rue Vauquelin 75, Paris 5°)

28–29. **Endocrine** Soc., Mexico City, Mexico. (N. L. Mattox, Executive Secre-

tary, 1211 N. Shartel, Oklahoma City, Okla. 73103)

30–3. **Primatology**, 2nd intern. congr., Atlanta, Ga. (G. H. Bourne, Yerkes Regional Primate Research Center, Emory Univ., Atlanta 30322)

30–6. **Glass**, 6th intern. congr., London, England. (R. Gunther, Intern. Commission on Glass, Badenerstr. 49A, Darlsruhe Durlach, Germany)

30–6. World Problems in **Rehabilitation of the Disabled**, 3rd intern., Brighton, England. (I. R. Henderson, Tavistock House South, Tavistock Sq., London, W.C.1, England)

July

1–6. Conference on **Blood Groups and Protein Polymorphism** in Animals, Warsaw, Poland. (J. Gasparska, Inst. of Experimental Animal Breeding, Polish Acad. of Science, Warsaw)

1–6. **Glass**, 8th intern. congr., London, England. (D. Rider, Glass Manufacturers Federation, 19 Portland Place, London, W.1)

2–5. Engg Problems in **Controlled Thermonuclear Research**, Culham, England. (Technical Administration Office, Culham Laboratory, Room 140, Bldg. E5, Culham, Abingdon, Berks)

3–4. **Vehicle and Road Design for Safety**, Cranfield, England. (Public Relations Officer, Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, S.W.1, England)

3–5. Canadian **Home Economics** Assoc., Regina, Sask. (L. McConnell, Saskatchewan Power Corp., Regina)

4–11. International Union of **Pure and Applied Physics**, Dubna, U.S.S.R. (V. G. Soloviev, Lab. of Theoretical Physics, Joint Inst. for Nuclear Research, P.O. Box 79, Head Post Office, Moscow, U.S.S.R.)

5–6. **Digestive Endoscopy**, 1st European congr., Prague, Czechoslovakia. (Secretary, European Congr. of Digestive Endoscopy, Sokolska 31, Prague 2)

7–13. British Assoc. of **Paediatric Surgeons**, 15th intern. congr., Liverpool, England. (J. Lister, Children's Hospital, Western Bank, Sheffield 10, England)

7–13. Association of National European and Mediterranean Societies of **Gastroenterology**, 8th intern. congr., Prague, Czechoslovakia. (Z. Maratka, Sokolska 31, Prague 2)

8–9. Canadian **Aeronautics and Space** Inst., Montreal, P.Q. (Secretary, CASI, 77 Metcalfe St., Ottawa 4, Ont.)

8–13. **Chemistry of Natural Products**, 5th intern. symp., London, England. (Secretary, % The Chemical Soc., Burlington House, London, W.1)

8–20. International Soc. for **Photogrammetry**, 11th congr., Lausanne, Switzerland. (W. K. Buchmann, % Inst. de Photogrammetrie, 1000 Ave. du Cour, Lausanne)

9–12. **Chemistry of Organic Silicon Compounds**, Bordeaux, France. (R. Calas, Lab. of Organic Chemistry, Univ. of Bordeaux, 20, Cours Pasteur, Bordeaux)

10–12. Commonwealth Conf. on **Plant Pathology**, 8th, Surrey, England. (The Director, Commonwealth Mycological Inst., Ferry Lane, Kew, Surrey)

10–12. **Plant Pathology**, intern. congr., London, England. (R. K. S. Wood, Botany Dept., Imperial College, Prince Consort Rd., London S.W. 7)

BOOKS RECEIVED

(*Continued from page 873*)

Fauna. Eleven Studies. A. H. Weatherley, Ed. Australian National University Press, Canberra, 1967. xvi + 287 pp., illus. $10.50.

Be Expert with Map and Compass. The "Orienteering" Handbook. Bjorn Kjellstrom. Illustrated by Francis J. Rigney. Maps by U.S. Geological Survey. Stackpole Books, Harrisburg, Pa., ed. 2, 1968. viii + 136 pp. $3.95.

The Biological Basis of Freshwater Fish Production. A symposium sponsored by the Sectional Committee on Productivity of Freshwater Communities of the International Biological Programme, Reading, England, September 1966. Shelby D. Gerking, Ed. Wiley, New York, 1967. xiv + 495 pp., illus. $15.

Calculus for Engineering Technology. Walter R. Blakeley. Wiley, New York, 1968. xiv + 441 pp., illus. $8.95.

Carnegie Institution of Washington. Year Book 66, 1966–1967. Carnegie Institution of Washington, D.C., Washington, D.C., 1968. xii + 719 pp., illus. $10.

The Cell Periphery, Metastasis and Other Contact Phenomena. Leonard Weiss. North-Holland, Amsterdam; Wiley, New York, 1967. 388 pp., illus. $17.50. Frontiers of Biology, vol. 7.

Chemical Bonds in Semiconductors and Thermodynamics. N. N. Sirota, Ed. Translated from the Russian edition (Minsk, 1966). Consultants Bureau, New York, 1968. xii + 255 pp., illus. Paper, $27.50.

Civilization. The Past and the Future. Athens meeting, 1966, organized by the Royal National Foundation. Elsevier, New York, 1967. xii + 117 pp., illus. Paper, $5.50.

Cleft Palate and Communication. D. C. Spriestersbach and Dorothy Sherman, Eds. Academic Press, New York, 1968. xviii + 291 pp., illus. $12.

Climatology and the World's Climates. George R. Rumney. Macmillan, New York; Collier-Macmillan, London, 1968. xii + 656 pp., illus. $12.50.

Complex Function Theory. Maurice Heins. Academic Press, New York, 1968. xvi + 416 pp., illus. $9.95. Pure and Applied Mathematics.

La Culture de Tissus. Jean Verne and Simone Hebert. Presses Universitaires de France, Paris, 1967. 136 pp., illus. "Que Sais-je?" No. 1274.

Cytologie. Eine Einführung für Studierende der Naturwissenschaften und Medizin. Jörg Klima. Fischer, Stuttgart, 1967 (distributed in the United States by Abel, Portland, Ore.). xxvi + 342 pp., illus. Paper, $9.50.

The Double Helix. A Personal Account of the Discovery of the Structure of DNA. James D. Watson. Atheneum, New York, 1968. xvi + 226 pp., illus. $5.95.

Electrochemistry. C. W. Davies. Philosophical Library, New York, 1967. xii + 234 pp., illus. $20.

The Electromagnetic Field in Its Engineering Aspects. G. W. Carter. Elsevier, New York, ed. 2, 1967. xvi + 371 pp., illus. $11.

Eskimo Administration: IV Greenland. Diamond Jenness. Arctic Institute of North America, Washington, D.C., 1967.

175 pp., illus. Paper, $4; to members, $3. Arctic Institute of North America Technical Paper No. 19.

Exploration of the Abdomen. John W. Bassett. Thomas, Springfield, Ill., 1967. x + 109 pp., illus. $6.75.

Fiber Spinning and Drawing. American Chemical Society symposium, New York, September 1966. Myron J. Coplan, Ed. Interscience (Wiley), New York, 1967. viii + 181 pp., illus. Paper, $6. Applied Polymer Symposia, No. 6.

Finite-State Models for Logical Machines. Frederick C. Hennie. Wiley, New York, 1968. xiv + 466 pp., illus. $18.50.

Fortran for IBM System/360. A Programmed Instruction Course. S. C. Plumb, with revisions for System/360 by David E. Napper. Science Research Associates, Chicago, ed. 2, 1968. xiv + 274 pp., illus. Binder, $6.50.

Fortschritte der Zoologie. Vol. 18. Hans Bauer, Ed. Fischer, Stuttgart, 1967 (distributed in the United States by Abel, Portland, Ore.). xii + 429 pp., illus. $29.50.

Fortschritte der Zoologie. Vol. 18, supplement 2. Hans Bauer, Ed. Fischer, Stuttgart, 1967 (distributed in the United States by Abel, Portland, Ore.). 129 pp., illus. Paper, $8.85.

Francis Bacon. From Magic to Science. Paolo Rossi. Translated from the Italian edition (Bari, 1957) by Sacha Rabinovitch. University of Chicago Press, Chicago, 1968. xviii + 280 pp. $5.95.

Freedom of Action in a Mechanistic Universe. The 21st Arthur Stanley Eddington Memorial Lecture, Cambridge, November 1967. Donald M. MacKay. 40 pp. Paper, 95¢.

French Phonology and Morphology. Sanford A. Schane. M.I.T. Press, Cambridge, Mass., 1968. xxii + 161 pp., illus. $10. Research Monograph, No. 45.

Fundamentals of Silicon Integrated Device Technology. Vol. 2, Bipolar and Unipolar Transistors. R. M. Burger and R. P. Donovan, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1968. xviii + 480 pp., illus. $15. Solid State Physical Electronics Series.

Das funktionelle System als Grundlage der physiologischen Architektur des Verhaltensaktes. Pjotr Kusmitsch Anochin. Fischer, Jena, 1967. 107 pp., illus. Paper, 16.60 MDN. Brain and Behaviour Research, vol. 1.

Gamma Globulins. Structure and Control of Biosynthesis. Proceedings of the Third Nobel symposium, Stockholm, June 1967. Johan Killander, Ed. Interscience (Wiley), New York; Almquist and Wiksell, Stockholm, 1967. 643 pp., illus. $32.

The German Atomic Bomb. The History of Nuclear Research in Nazi Germany. David Irving. Simon and Schuster, New York, 1968. 329 pp., illus. $6.95.

Graphics. Analysis and Conceptual Design. A. S. Levens. Wiley, New York, ed. 2, 1968. xiv + 771 pp., illus. $10.95.

A Great Society? Bertram M. Gross, Ed. Basic Books, New York, 1968. xxii + 362 pp. $8.50.

Grundriss der Zoogeographie. Gustaf de Lattin. Fischer, Jena, 1967. 602 pp., illus. MDN 68.40. Hochschullehrbücher für Biologie, vol. 12.

Handbook of the Physicochemical Properties of the Elements. G. V. Samsonov,

Ed. Translated from the Russian edition (Kiev, 1965). IFI/Plenum, New York, 1968. xii + 941 pp. $40.

Hetero-Aromatic Nitrogen Compounds. Pyrroles and Pyridines. K. Schofield. Plenum, New York; Butterworths, London, 1967. viii + 434 pp., illus. $24.

High Speed Testing. Vol. 6, The Rheology of Solids. Sixth international symposium, Boston, Mass., March 1967. Rodney D. Andrews, Jr., and Frederick R. Eirich, Co-chairmen. Interscience (Wiley), New York, 1967. viii + 344 pp., illus. Paper, $12.50. Applied Polymer Symposia, No. 5.

The House on College Avenue. The Comptons at Wooster, 1891–1913. James R. Blackwood. M.I.T. Press, Cambridge, Mass., 1968. xxvi + 265 pp., illus. $10.

The Human Brain in Figures and Tables. A Quantitative Handbook. Samuil M. Blinkov and Il'ya I. Glezer. Translated from the Russian edition (Leningrad, 1964) by Basil Haigh. Basic Books, New York; Plenum, New York, 1968. xxxiv + 482 pp., illus. $25.

Human Radiation Cytogenetics. Proceedings of an international symposium, Edinburgh, October 1966. H. J. Evans, W. M. Court Brown, and A. S. McLean, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. viii + 218 pp., illus. $11.50.

Index to Botanical Monographs. A Guide to Monographs and Taxonomic Papers Relating to Phanerogams and Vascular Cryptogams Found Growing Wild in the British Isles. Compiled by Douglas H. Kent. Published for the Botanical Society of the British Isles by Academic Press, New York, 1967. xii + 163 pp. $7.75.

Inorganic Chemistry. An Intermediate Text. C. W. Wood and A. K. Holliday. Plenum, New York; Butterworths, London, ed. 3, 1967. xii + 421 pp., illus. $5.

Insect Photoperiodism. Stanley D. Beck. Academic Press, New York, 1968. viii + 288 pp., illus. $12.50.

Interstitial Alloys. H. J. Goldschmidt. Plenum, New York; Butterworths, London, 1967. viii + 632 pp., illus. $40.

Introduction to Arithmetic. C. B. Piper. Philosophical Library, New York, 1968. viii + 211 pp., illus. $6.

An Introduction to Physical Organic Chemistry. Edward M. Kosower. Wiley, New York, 1968. xvi + 503 pp., illus. $12.95.

An Introduction to Probability Theory and Its Applications. Vol. 1. William Feller. Wiley, New York, ed. 3, 1968. xviii + 509 pp., illus. $10.95. Wiley Series in Probability and Mathematical Statistics.

Introduction to Special Relativity. Robert Resnick. Wiley, New York, 1968. xii + 226 pp., illus. Cloth, $7.95; paper, $3.95.

Lehrbuch der Botanik für Hochschulen. Dietrich von Denffer, Walter Schumacher, Karl Mägdefrau, and Franz Firbas. Fischer, Stuttgart, ed. 29, 1967 (distributed in the United States by Abel, Portland, Ore.). xii + 762 pp., illus. $9.90.

The Life of the Mountains. Maurice Brooks. Published in cooperation with the World Book Encyclopedia by McGraw-Hill, New York, 1967. 232 pp., illus. $4.95. Our Living World of Nature.

The London School of Linguistics. A Study of the Linguistic Theories of B.

Malinowski and J. R. Firth. D. Terence Langendoen. M.I.T. Press, Cambridge, Mass., 1968. xiv + 123 pp., illus. $5.95. Research Monograph, No. 46.

Mammalian Hibernation III. Proceedings of the 3rd International Symposium on Natural Mammalian Hibernation, Toronto, September 1965. Kenneth C. Fisher, Albert R. Dawe, Charles P. Lyman, Eduard Schönbaum, and Frank E. South, Jr., Eds. Elsevier, New York, 1967. xiv + 535 pp., illus. $22.50.

Marine Science in the United Kingdom 1967. A Directory of Scientists, Establishments and Facilities. Compiled on behalf of The Royal Society's British National Committee for Oceanic Research with the co-operation of the Natural Environment Research Council. Royal Society, London, 1967. 216 pp., illus. Paper, $5.

Mathematical Linguistics in Eastern Europe. Ferenc Kiefer. Elsevier, New York, 1968. viii + 180 pp., illus. $12.50. Mathematical Linguistics and Automatic Language Processing.

Methods in Immunology and Immunochemistry. Vol. 1, Preparation of Antigens and Antibodies. Curtis A. Williams and Merrill W. Chase, Ed. Academic Press, New York, 1967. xxii + 479 pp., illus. $22.

Methods in Virology. Vol. 2. Karl Maramorosch and Hilary Koprowski, Eds. Academic Press, New York, 1967. xviii + 682 pp., illus. $28.

Microbial Transformation of Steroids and Alkaloids. Hiroshi Iizuka and Atsushi Naito. University of Tokyo Press, Tokyo; University Park Press, State College, Pa., 1967. xii + 294 pp., illus. $16.50.

Microbial Transformations of Steroids. A Handbook. William Charney and Hershel L. Herzog. Academic Press, New York, 1967. xiv + 728 pp., illus. $21.

Microbiological Methods. C. H. Collins. Plenum, New York; Butterworths, London, ed. 2, 1967. xiv + 404 pp., illus. $12.50. Laboratory Techniques Series.

The Mind of a Mnemonist. A Little Book about a Vast Memory. A. R. Luria. Translated from the Russian by Lynn Solotaroff, with a foreword by Jerome S. Bruner. Basic Books, New York, 1968. xvi + 160 pp., illus. $4.95.

Models of Man. Explorations in the Western Educational Tradition. Paul Nash. Wiley, New York, 1968. xvi + 470 pp. Cloth, $7.95; paper, $4.95.

Modern Aspects of Reflectance Spectroscopy. Proceedings of the American Chemical Society Symposium, Chicago, September 1967. Wesley W. Wendlandt, Ed. Plenum, New York, 1968. x + 254 pp., illus. $12.50.

Modern Fundamentals of Mathematics. Henry Sharp, Jr. Prentice-Hall, Englewood Cliffs, N.J., 1968. x + 390 pp., illus. $8.95.

Modes of Thought. Alfred North Whitehead. Free Press (Macmillan), New York, 1968. x + 179 pp. Paper, $1.95. Reprint of the 1938 edition.

Natural History of Marine Animals. G. E. MacGinitie and Nettie MacGinitie. McGraw-Hill, New York, ed. 2, 1968. xiv + 523 pp., illus. $10.75.

New Methods of Thought and Procedure. Contributions to the symposium on Methodologies, Pasadena, Calif., May 1967. F. Zwicky and A. G. Wilson, Eds.

Springer-Verlag, New York, 1967. viii + 338 pp., illus. $9.50.

NMR Band Handbook. Herman A. Szymanski and Robert E. Yelin. IFI/Plenum, New York-Washington, 1968. xvi + 432 pp., illus. $40.

Nuclear Structure. Based on lectures given at the International Seminar on Low-Energy Nuclear Physics, Dacca, East Pakistan, January 1967. Anwar Hossain, Harun-Ar-Rashid, and Mizanul Islam, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. xiv + 342 pp., illus. $17.

Ökonometrische Untersuchung zum Inflationsproblem unter besonderer Berücksichtigung von Deutschland und Österreich. Peter Richter. Fischer, Stuttgart, 1967 (distributed in the United States by Abel, Portland, Ore.). xii + 124 pp. Paper, $8.60.

Optical and Photographic Reconnaissance Systems. Niels Jensen. Wiley, New York, 1968. xii + 211 pp., illus. $13.95. Photographic Science and Technology and the Graphic Arts Series.

Optical Lasers in Electronics. Earl L. Steele. Wiley, New York, 1968. xiv + 267 pp., illus. $11.95. Pure and Applied Optics Series.

Organometallic Compounds. G. E. Coates, M. L. H. Green, and K. Wade. Vol. 1, The Main Group Elements. G. E. Coates and K. Wade. Methuen, London, ed. 3, 1967 (distributed in the United States by Barnes and Noble, New York). xiv + 573 pp., illus. $19.

Parents Learn Through Discussion. Principles and Practices of Parent Group Education. Aline B. Auerbach. Wiley, New York, 1968. xiv + 358 pp. $7.95.

Physical Acoustics. Principles and Methods. Vol. 4, part B, Applications to Quantum and Solid State Physics. Warren P. Mason, Ed. Academic Press, New York, 1968. xxii + 490 pp., illus. $19.50.

Physical Chemistry. An Intermediate Text. C. W. Wood and A. K. Holliday. Plenum, New York; Butterworths, London, ed. 3, 1967. xii + 351 pp., illus. $5.

Physical Properties of Molecular Crystals, Liquids, and Glasses. A. Bondi. Wiley, New York, 1968. xxii + 502 pp., illus. $18.50. Wiley Series on the Science and Technology of Materials.

Plant Toxicity and Dermatitis. A Manual for Physicians. Kenneth F. Lampe and Rune Fagerström. Illustrated by Gerti Antal. Williams and Wilkins, Baltimore, 1968. x + 231 pp. $9.25.

Pleistocene Extinctions. The Search for a Cause. Vol. 6 of the proceedings of the 7th Congress of the International Association for Quaternary Research, sponsored by the National Academy of Sciences–National Research Council. P. S. Martin and H. E. Wright, Jr., Eds. Yale University Press, New Haven, Conn., 1967. x + 453 pp., illus. $12.50.

Polyhedral Boranes. Earl L. Muetterties and Walter H. Knoth. Dekker, New York, 1968. viii + 197 pp., illus. $13.50.

Porous Carbon Solids. R. L. Bond, Ed. Academic Press, New York, 1967. xii + 311 pp., illus. $14.50.

Presenting Technical Ideas: A Guide to Audience Communication. W. A. Mambert. Wiley, New York, 1968. xvi + 216 pp., illus. $6.95. Wiley Series on Human Communication.

A Primer on Food, Agriculture, and Public Policy. Earl O. Heady. Random House, New York, 1967. x + 177 pp. $4.95. Primer Series.

Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability. Berkeley, June–July 1965 and December–January 1966. Vol. 4, Biology and Problems of Health. Lucien M. Le Cam and Jerzy Neyman, Eds. University of California Press, Berkeley, 1967. xx + 934 pp., illus. $28.50.

Proceedings of the 1967 Institute in Technical and Industrial Communications. Blaine K. McKee, Ed. Colorado State University, Fort Collins, 1967. iv + 136 pp., illus. Paper, $6.

Progress in Brain Research. Vol. 22, Brain Reflexes. Proceedings of the International Conference dedicated to the centenary celebration of the publication of I. M. Sechenov's book *Brain Reflexes,* sponsored by the Academy of Sciences of the U.S.S.R. and the International Brain Research Organization. E. A. Asratyan, Ed. Elsevier, New York, 1968. xvi + 600 pp., illus. $36.

Progress in Experimental Personality Research. Vol. 4. Brendan A. Maher, Ed. Academic Press, New York, 1967. xii + 323 pp., illus. $11.50.

Progress in Mathematics. Vol. 2, Mathematical Analysis. R. V. Gamkredlidze, Ed. Translated from the Russian edition (Moscow, 1966). Plenum, New York, 1968. viii + 161 pp. $15.

Progress in Solid State Chemistry. Vol. 4. H. Reiss, Ed. Pergamon, New York, 1967. xii + 261 pp., illus. $14.

Progress in the Chemistry of Organic Natural Products. Vol. 25. L. Zechmeister, Ed. Springer-Verlag, New York, 1967. viii + 348 pp., illus. $15.

Progressive Politics and Conservation. The Ballinger-Pinchot Affair. James Penick, Jr. University of Chicago Press, Chicago, 1968. xvi + 207 pp. $7.50.

Prostaglandins. U. S. von Euler and Rune Eliasson. Academic Press, New York, 1967. x + 164 pp., illus. $9. Medicinal Chemistry, vol. 8.

Protest: Pacifism and Politics. Some Passionate Views on War and Nonviolence. James Finn. Random House, New York, 1967. xii + 528 pp. Cloth, $8.95; paper, $2.45.

Publications of Goddard Space Flight Center 1964. National Aeronautics and Space Administration, Greenbelt, Md. (available from Superintendent of Documents, Washington, D.C.). Vol. 1, Space Sciences (xii + 1354 pp., illus. $8.50); vol. 2, Space Technology (x + 1184 pp., illus. $7.75).

Quantum Electronics in Lasers and Masers. Vol. 31. Proceedings (Trudy) of the P. N. Lebedev Physics Institute. D. V. Skobel'tsyn, Ed. Translated from the Russian edition (Moscow, 1965). Consultants Bureau, New York, 1968. viii + 161 pp., illus. Paper, $22.50.

Quaternary Paleoecology. Vol. 7 of the proceedings of the 7th Congress of the International Association for Quaternary Research, August–September 1965, sponsored by the National Academy of Sciences–National Research Council. E. J. Cushing and H. E. Wright, Jr., Eds. Yale University Press, New Haven, Conn., 1967. viii + 433 pp., illus. $15.

Radar Astronomy. John V. Evans and Tor Hagfors, Eds. McGraw-Hill, New York, 1968. xx + 620 pp., illus. $19.50.

Radiation Dosimetry. Vol. 1, Fundamentals. Frank H. Attix and William C. Roesch, Eds. Academic Press, New York, ed. 2, 1968. xviii + 405 pp., illus. $19.50.

Radiation Effects in Semiconductor Devices. Frank Larin. Wiley, New York, 1968. xvi + 287 pp., illus. $11.95.

Real-Time Computers. Technique and Applications in the Psychological Sciences. William R. Uttal. Harper and Row, New York, 1968. xiv + 338 pp., illus. $10.

Recent Progress in Applied Mechanics. The Folke Odquist Volume. Bertram Broberg, Jan Hult, and Frithiof Niordson, Eds. Almquist and Wiksell, Stockholm; Wiley, New York, 1967. 586 pp., illus. $15.

The Refounding of the College Board, 1948–1963. An Informal Commentary and Selected Papers. Frank Bowles. College Entrance Examination Board, New York, 1967. xvi + 336 pp. $4.50.

Refractories. F. H. Norton. McGraw-Hill, New York, ed. 4, 1968. xii + 450 pp., illus. $18.50.

Religion and Medicine. Essays on Meaning, Values, and Health. David Belgum, Ed. Iowa State University Press, Ames, 1967. xxiv + 345 pp. $5.95.

Reproduction in the Female Mammal. Proceedings of the 13th Easter School in Agricultural Science, Nottingham, 1966. G. E. Lamming and E. C. Amoroso, Eds. Plenum, New York; Butterworths, London, 1967. xii + 583 pp., illus. $32.

The Reproduction of Colour. R. W. G. Hunt. Wiley, New York, ed. 2, 1967. 500 pp., illus. $16.

Rodd's Chemistry of Carbon Compounds. A Modern Comprehensive Treatise. Vol. 2, part A, Monocarbocyclic Compounds to and Including Five Ring Atoms. S. Coffey, Ed. Elsevier, New York, ed. 2, 1967. xvi + 228 pp., illus. $16.

Die Röhrlinge und Blätterpilze (Agaricales). Basidiomyceten II. Meinhard Moser. Fischer, Stuttgart, ed. 3, 1967 (distributed in the United States by Abel, Portland, Ore.). xii + 443 pp., illus. $9.90. Kleine Kryptogamenflora, vol. 2, part 2.

Sanity and Survival. Psychological Aspects of War and Peace. Jerome D. Frank. Random House, New York, 1967. xii + 330 pp. Cloth, $5.95; paper, $1.95.

The Scheer Campaign. Serge Lang. Benjamin, New York, 1967. xiv + 241 pp., illus. Paper, $3.95.

School Organization and Student Achievement. A Study Based on Achievement in Mathematics in Twelve Countries. Neville Postlethwaite. Wiley, New York, 1967. 146 pp., illus. $8.

Scientific Illustration. Theory and Practice. Charles S. Papp. Brown, Dubuque, Iowa, 1968. xiv + 318 pp., illus. $11.75.

Selected Works: Granites and Migmatites. J. J. Sederholm. Wiley, New York, 1967. vi + 608 pp., illus. $50.

Séries. Jean Kuntzmann. Hermann, Paris, 1967. 160 pp., illus. Paper, 18 F. Collection Méthodes, Série Outils Mathématiques de la Physique et de la Chimie.

Social and Genetic Influences on Life and Death. A symposium held by the Eugenics Society, September 1966. Robert Platt and A. S. Parkes, Eds. Plenum, New York, 1967. x + 222 pp., illus. $12.50.

Social Psychology. Individuals, Groups, Societies. John W. McDavid and Herbert Harari. Harper and Row, New York, 1967. xiv + 479 pp., illus. $10.

The Sociology of Marx. Henri Lefebvre. Translated from the French edition (Paris, 1966) by Norbert Guterman. Pantheon, New York, 1968. v + 214 pp. $5.95.

The Sociology of Max Weber. Julien Freund. Translated from the French edition (Paris, 1966) by Mary Ilford. Pantheon, New York, 1968. x + 310 pp. $6.95.

Solar Activity. Einar Tandberg-Hanssen. Blaisdell (Ginn), Waltham, Mass., 1967. xvi + 464 pp., illus. $16.50. Pure and Applied Sciences Series.

Solar Energy. John Hoke. Watts, New York, 1968. x + 83 pp., illus. $2.65.

Solar Physics. Proceedings of a NATO Advanced Study Institute, Lagonissi, Athens, Greece, September 1965. John N. Xanthakis, Ed. Interscience (Wiley), New York, 1967. xvi + 535 pp., illus. $16.50.

Space-Charge Flow. Peter T. Kirstein, Gordon S. Kino, and William E. Waters. McGraw-Hill, New York, 1967. xxx + 509 pp., illus. $22.50. Physical and Quantum Electronics Series.

Spain and the Abolition of Slavery in Cuba, 1817–1886. Arthur F. Corwin. Published for the Institute of Latin American Studies by the University of Texas Press, Austin, 1967. xx + 373 pp., illus. $7.50. Latin American Monographs, No. 9.

Spectroscopic Techniques for Far Infra-Red, Submillimetre and Millimetre Waves. D. H. Martin, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. x + 389 pp., illus. $18.

Stainless and Heat Resisting Steels. L. Colombier and J. Hochmann. Translated from the second French edition (Paris, 1965) by Scripta Technica. St. Martin's New York, 1968. xx + 532 pp., illus. $22.50.

Statistical Dictionary of Terms and Symbols. Albert K. Kurtz and Harold A. Edgerton. Hafner, New York, 1967. xiv + 191 pp. $7.50. Facsimile reprint of the 1939 edition.

Statistical Mechanical Analogies. Dan McLachlan, Jr. Prentice-Hall, Englewood Cliffs, N.J., 1968. xvi + 155 pp., illus. Cloth, $5.95; paper, $2.95. Prentice-Hall Series in Materials Science.

Statistics for Students. Emery Balint. Plenum, New York; Butterworths, London, 1967. xiv + 190 pp., illus. Paper, $6.

Stereology. Proceedings of the 2nd International Congress, Chicago, April 1967, sponsored by the National Science Foundation and the International Society for Stereology. Hans Elias, Ed. Springer-Verlag, New York, 1967. xx + 337 pp., illus. $10.

Stimulus and Response. John A. Barlow. Harper and Row, New York, 1968. xviii + 199 pp., illus. Paper, $4.75.

Stochastic Models for Social Processes. David J. Bartholomew. Wiley, New York, 1967. xii + 275 pp., illus. $9.50.

Strategy for R&D. Studies in the Microeconomics of Development. Thomas Marschak, Thomas K. Glennan, Jr., and Robert Summers. Springer-Verlag, New York, 1967. xiv + 330 pp., illus. $14.20. Econometrics and Operations Research,

vol. 8. Rand Corporation Research Study.

Strong Water. Nitric Acid: Sources, Methods of Manufacture, and Uses. Thomas H. Chilton. M.I.T. Press, Cambridge, Mass., 1968. x + 170 pp., illus. $7.50.

Succession of Rodent Faunas During the Upper Pleistocene of Israel. Eitan Tchernov. Parey, Hamburg, 1968. 152 pp., illus. Paper, 46 DM. Mammalia Depicta.

Sydney Chapman, Eighty—From His Friends. Syun-Ichi Akasofu, Benson Fogle, and Bernhard Haurwitz, Eds. Sponsored by the University of Alaska, the University of Colorado, and the University Corporation for Atmospheric Research, Boulder (available from the University of Colorado Press, Boulder). xvi + 230 pp., illus. Cloth, $5.95; paper, $2.95.

Symposium on Modern Methods in the Investigation of Protein Structure. Budapest, December 1967. F. B. Straub and P. Friedrich, Eds. Akadémiai Kiadó, Budapest, 1967. 93 pp., illus. $4.90.

Systèmes Différentiels. Jean Kuntzmann. Hermann, Paris, 1967. 154 pp., illus. Paper, 18 F. Collection Méthodes. Série Outils Mathématiques de la Physique et la Chimie.

Tables of the Characteristic Functions of the Eclipse and the Related Delta-Functions for Solution of Light Curves of Eclipsing Binary Systems. Masatoshi Kitamura. University of Tokyo Press, Tokyo; University Park Press, State College, Pa., 1967. x + 341 pp., illus. $35.

The Teaching of Ecology. Proceedings of a symposium of the British Ecological Society, London, April 1966. J. M. Lambert, Ed. Blackwell Scientific Publications, Oxford, 1967 (distributed in the United States by Davis, Philadelphia). xii + 294 pp., illus. $8.50. British Ecological Society, symposium vol. 7.

Techniques in Blood Grouping. Ivor Dunsford and C. Christopher Bowley. Thomas, Springfield, Ill., ed. 2, 1967. Two volumes boxed (xxx + 534 pp., illus.). $15.

Technology, Investment and Growth. B. R. Williams. Chapman and Hall, London; Barnes and Noble, New York, 1967. viii + 206 pp., illus. $6.50.

Ten Economic Studies in the Tradition of Irving Fisher. William Fellner *et al.* Wiley, New York, 1967. viii + 284 pp., illus. $8.95.

Theoretical Mechanics. T. C. Bradbury. Wiley, New York, 1968. xiv + 641 pp., illus. $12.95.

Theory of Crystal Dislocations. F. R. N. Nabarro, Oxford University Press, New York, 1967. xviii + 821 pp., illus. $30.25. International Series of Monographs on Physics.

Theory of Elastic Waves in Crystals. Fedor I. Fedorov. Translated from the Russian edition (Moscow, 1965) by J. E. S. Bradley. Plenum, New York, 1968. xiv + 375 pp., illus. $25.

This Changing Earth. An Introduction to Geology, John Shimer. Illustrated by Genevieve Shimer. Harper and Row, New York, 1968. xvi + 233 pp. $5.95. Harper Modern Science Series.

Thymidine Metabolism and Cell Kinetics. J. E. Cleaver. North-Holland, Amsterdam; Interscience (Wiley), New York 1967. 259 pp., illus. $13.25. Frontiers of Biology, vol. 6.