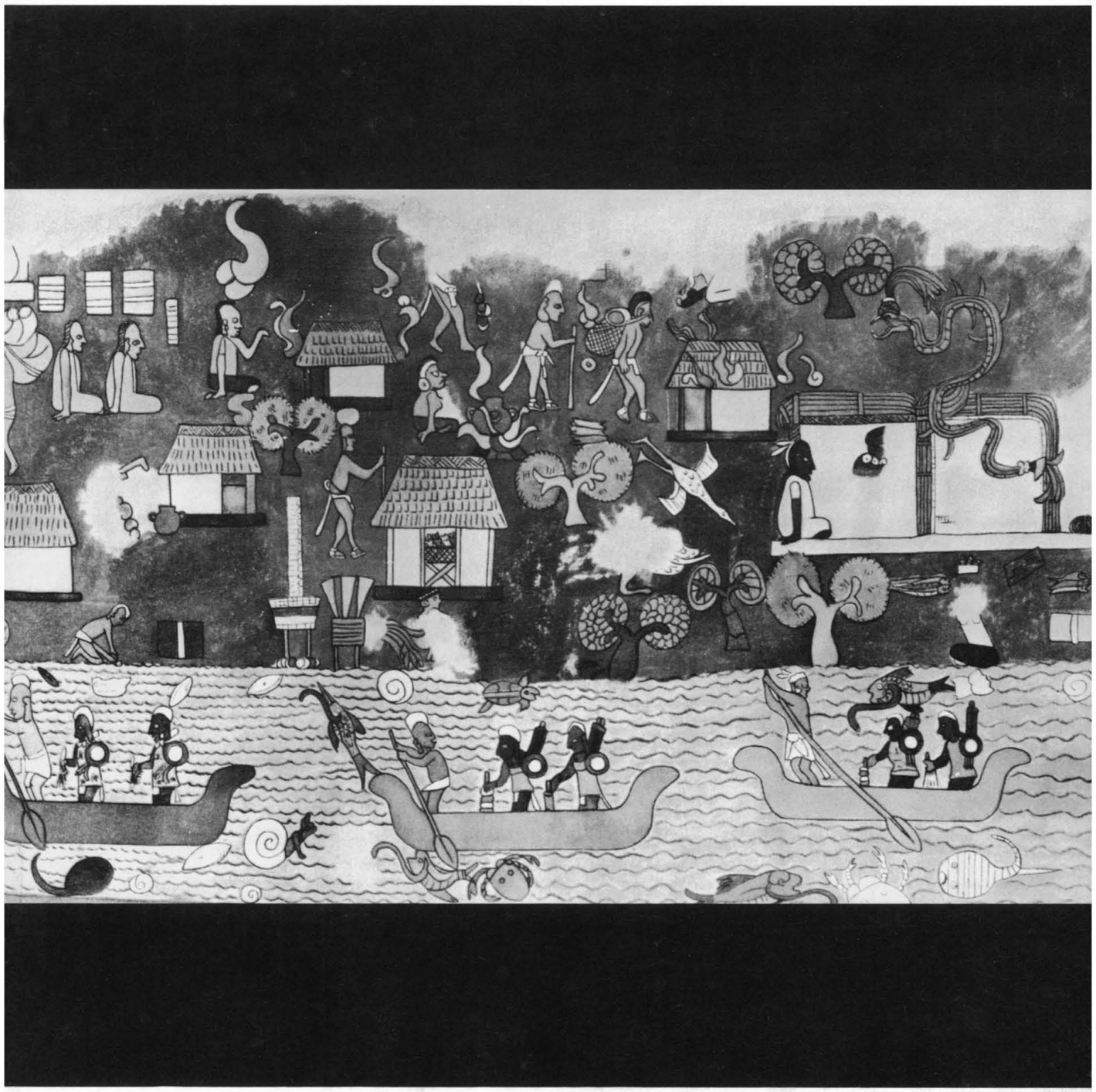
SCIENCE

27 May 1966

Vol. 152, No. 3726

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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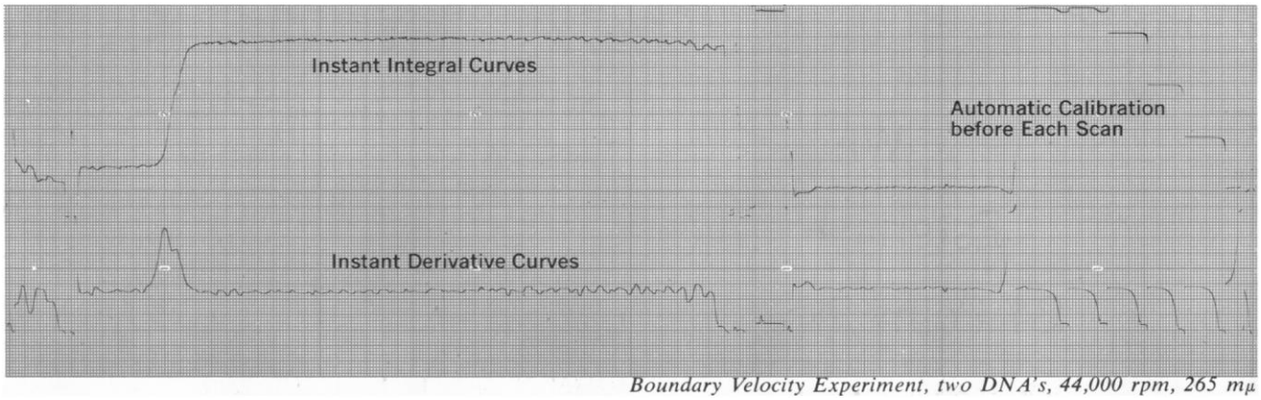
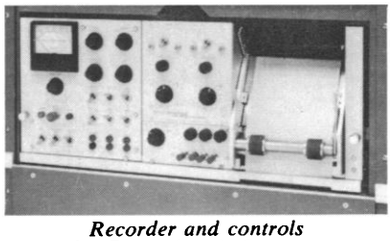


Boundary Velocity Experiment, two DNA's, 44,000 rpm, 265 mμ

Direct Scanning...the new era in analytical ultracentrifugation

The Photoelectric Scanner permits investigators, for the first time, to take full advantage of the highly discriminating absorption optical system of the Model E. It provides split-beam photometry—during centrifugation, at wavelengths selectable at will from 440 mμ down to 236 mμ. You can see what is happening in the cell as it happens because you get an immediate written record, and both integral and derivative curves are recorded simultaneously.



Recorder and controls for Photoelectric Scanner

Thus direct scanning frees you from the tedious procedures associated with the camera; provides "direct viewing" of sedimentation processes, electronic precision and discrimination in scanning the cell, and a variety of wavelengths at which to work. The precision and versatility that this new tool brings to biochemical research will inevitably open new areas of study. Already two investigators working with a scanner have been able to distinguish the catalytic and regulatory protein subunits of an enzyme in an association-dissociation study that augurs well for exciting work ahead.

What that work will be, what more will be accomplished in the era of direct scanning, only time and the ingenuity of investigators will tell.

Inherent advantages of the Scanner

• Because the Scanner utilizes the split-beam principle, two samples in a double sector cell can be subjected to identical experimental conditions—an important factor in studying extremely small differences in sedimentation coefficients, for example. Or sample solution and solvent can be used in the double sector cell, with solvent reading automatically subtracted from the sample solution.

• With the Scanner classical sedimentation equilibrium measurements at extremely low concentrations in the UV are significantly easier to make. And they are more accurate because calibration steps are recorded before each scan.

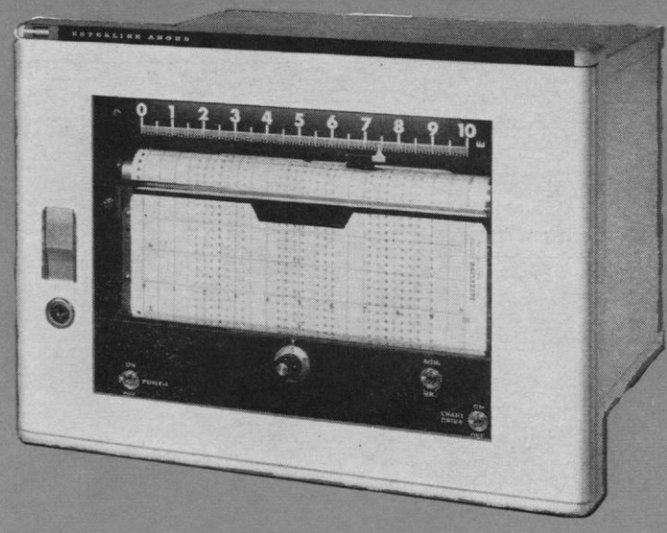
• Having both curves simultaneously is a real advantage. For example: the derivative curve can show the presence of secondary components not readily recognizable from the integral curve; the integral curve can show heterogeneous material not revealed by the derivative curve.

For more information about the Photoelectric Scanner, write to Spinco Division at the address below.

Beckman INSTRUMENTS, INC.
SPINCO DIVISION
PALO ALTO, CALIFORNIA • 94304

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

Why is this Esterline Angus 24 Point Recorder better than other brands?



for 10 good reasons*

X's indicate standard features at no extra cost	Esterline Angus	Brands (Names available on request) A	B	C	D
List price $1450 or lower	X			X	
Solid state amplifier	X		X		
50,000 ohm off balance input impedance or better	X				
Stray rejection: longitudinal 60 cycles AC, 1,000 times span or 120 volts	X		X		
Accuracy ±¼% span or ±3½ microvolts or better	X		X		
Manual point advance. Dial in any point without disturbing synchronization	X				
Permanently sealed slidewire requires no cleaning	X				
5 chart speeds	X				
Choice of 8 print frequencies from 1½ to 60 seconds per point	X				
Tilt out writing platen and chart tear-off bar	X				

*Discover additional reasons for specifying Esterline Angus Multipoint Recorders including optional electrical programmed printing which permits point skipping as fast as ¼ second. Write for Series "E" Catalog.

Esterline Angus Instrument Company, Inc.
Box 24000L • Indianapolis, Indiana 46224

Excellence in instrumentation for over 60 years

ESTERLINE ANGUS

27 May 1966
Vol. 152, No. 3726

SCIENCE

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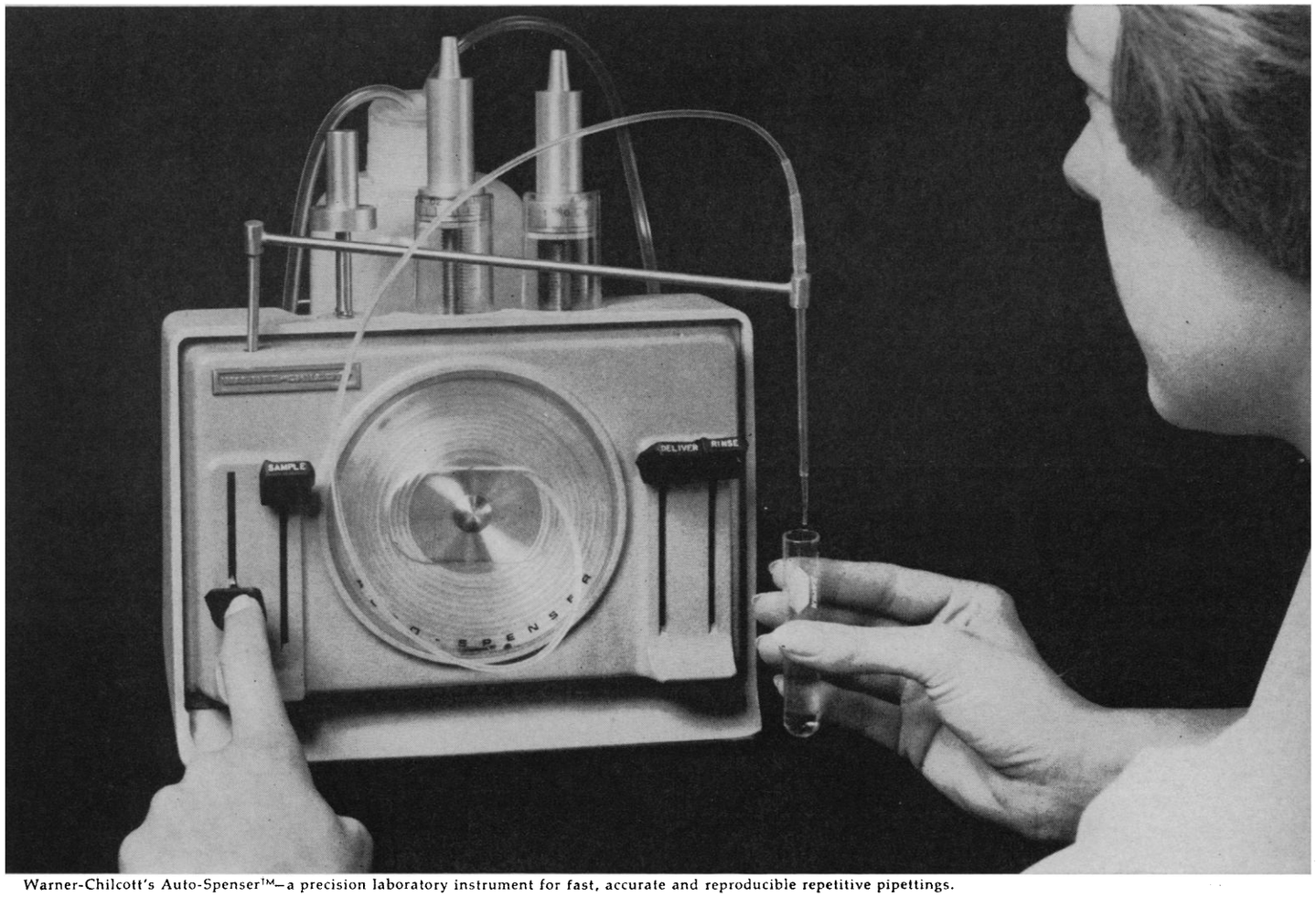
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Portion of a mural from the Temple of the Warriors, Chichen Itza, Yucatan, Mexico. Painted in the 11th or 12th century under the influence of the Mexicanized Toltecs, this mural is one of the few portrayals available from the area of Maya culture of the daily routine in a village. See review of the *Archaeology of Southern Mesoamerica*, page 1230. [Peabody Museum, Harvard University; restoration by Ann Axtell Morris]

It's really a lot faster this way.



Warner-Chilcott's Auto-Spenser™—a precision laboratory instrument for fast, accurate and reproducible repetitive pipettings.

It takes only 15 seconds—or less—to pipette, add a reagent or diluent, and dispense, with Warner-Chilcott's Auto-Spenser.™ It's not only faster and safer than manual methods, but far simpler—you simply depress a lever. No pipettes to wash. You just depress a lever for that, too, and your Auto-Spenser rinses itself. Add to this the high accuracy and reproducibility of the instrument, and you'll see why we feel the Auto-Spenser belongs in every laboratory that performs repetitive pipettings. Time saved will quickly pay for its modest $195 cost!

Versatile, Trouble-Free

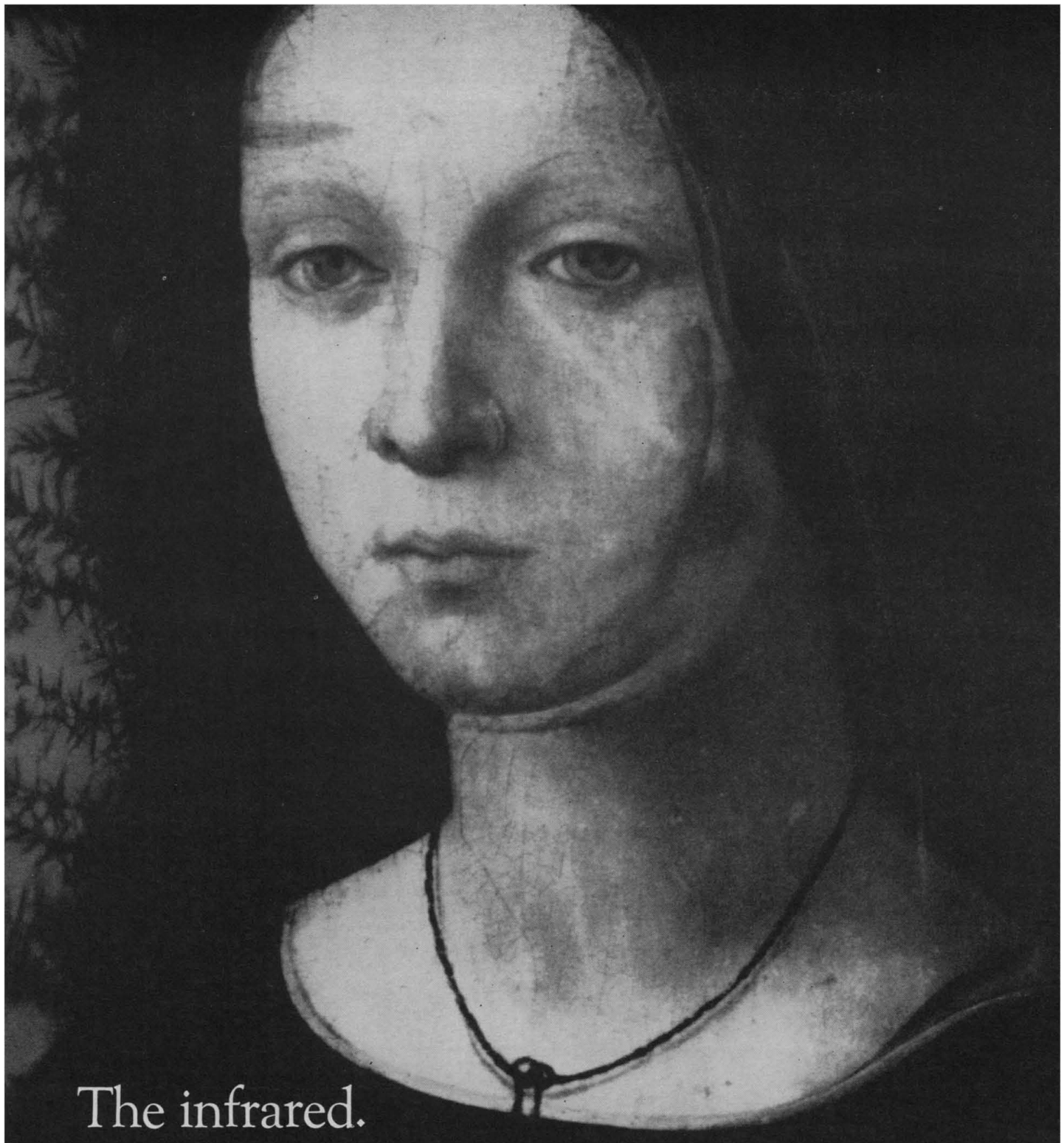
You can use your Auto-Spenser for pipetting, diluting, or dispensing. The self-wash feature lets you change reagents in seconds. Two micrometer-controlled pumps handle a wide range of sample and reagent volumes. It's easy to set and read sample volumes to one-half microliter—with no visual checking of liquid levels. The compact, rugged Auto-Spenser is completely mechanical. There's no electrical power needed, virtually nothing to break or replace, and no way for sample or reagent to enter the mechanism. It's practically foolproof!

Brief Specifications

Practical Volume Ranges: Sample, 20-250 μl; Reagent, 0.5-5.0 ml. Sampling Reproducibility: ± 0.5 μl or $\pm 1\%$, whichever greater. Reagent Delivery Reproducibility: ± 0.005 ml or $\pm 0.5\%$, whichever greater.

Please write for details on Model 26500 Auto-Spenser. Address Warner-Chilcott Laboratories Instruments Division, 200 South Garrard Blvd., Richmond, California 94084.

WARNER-CHILCOTT LABORATORIES
INSTRUMENTS DIVISION
Richmond, California



The infrared.
Polaroid has a film that lets you see what's there in 15 seconds.

The film is Polaroid Type 413 Land Infrared film. Fifteen seconds after you expose it, you get a high-contrast infrared recording like this. (This picture shows the subsurface details of a Renaissance oil by Lorenzo di Credi.* Note the repainting of the eyes and chin.)

Because you get results in 15 seconds, you know immediately if you got the picture you wanted.

Another advantage of Type 413 is its high speed. ASA equivalent is 800 without filters—that's three times as sensitive as the film you're using.

How will you be using it? In spectrographic analysis? Laser research? Materials testing? Let us know so we can send you pertinent information. Write: Technical Sales, Dept. 42, Polaroid Corp., Cambridge, Mass. 02139.

*Courtesy of The Metropolitan Museum of Art, bequest of Richard de Wolfe Brixey, 1943. Polaroid®

new FROM NORTHERN SCIENTIFIC

- Both zero intercept and peak gain stabilization
- Precision pulser included
- Exclusive new passive controlling device
- Exclusive baseline sensing circuit
- Electronic control—not mechanical
- 16-megacycle scaler
- 4096-channel capacity
- Silicon semiconductors
- Integrated circuitry

$2,450 Domestic Price F.O.B. Madison, Wisconsin

Designed to provide zero and gain stabilization to all pulse height analyzers currently in the field, the NS-401 Digital Stabilizer features an exclusive passive device (patent applied for) to control system gain without degrading system linearity.

All adverse slewing effects are virtually eliminated, since the correction rate of the stabilizer is limited only by the pulse height analyzer duty cycle. Stabilizer performance can be easily optimized for any system stability by a simple, front panel control. Front panel indicators are provided for on-line monitoring.

NS-401 digital stabilizer

Guaranteed compatibility with all known pulse-height analyzers.

also ask about

NS-605	NS-610	NS-615
512 Channels	1024 Channels	2048 Channels
$7,400	**$8,900**	**$12,500**
less stabilizer	less stabilizer	less stabilizer

(All units quoted above less digital stabilizer. With stabilizer, add $1,000. All domestic prices, F.O.B. Madison, Wis.)

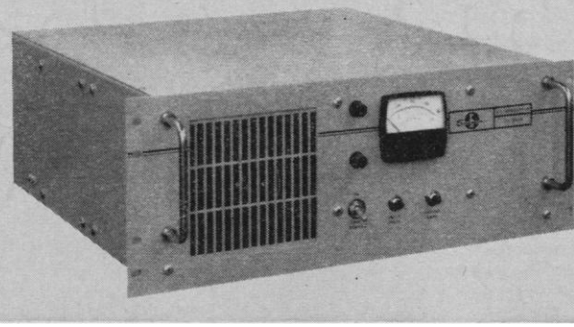
These models complete the family that started with the NS-610. Specifications are essentially the same, except in numbers of channels available.

For additional information please write Northern Scientific today for new Short Form Catalog 66-5.

Delivery in 30 days on all items mentioned.

NORTHERN SCIENTIFIC/INC.
P. O. 4247, MADISON, WISCONSIN 53711

1. Fast Response — 50 μs
2. Low Distortion — < 0.25%
3. Isolation — 100 db
4. Precise Regulation — ±0.05%
5. Wide Frequency Range — ±3 c/s



Sorensen High Precision AC Line Regulators

The Sorensen FR Series AC Line Regulators provide pure power for critical circuitry; applications include powering of pulse-type circuits for analog and digital computers where false triggering is not permissible, powering of medical instrumentation, and control of line voltage for spectrographic equipment. Output power is 0 - 1 kVA • Power factor is 0.7 lagging to 0.7 leading • Three switchable input ranges are provided for each model—95-115, 105-125 and 115-135 Vac for FR1000 and FR1020; 190-230, 210-250 and 230-270 Vac for FR1010 and FR1030. Temperature Range 0-55° C. Check the rest of our specifications in the chart below and you'll find that spec for spec, dollar for dollar, the Sorensen FR Series is your best value in precision line regulators. For additional details on the FR Series, or for data on other standard/custom AC line regulators, DC power supplies, high voltage supplies or frequency changers, call your local Sorensen representative, or write: Raytheon Company, Sorensen Operation, Richards Ave., Norwalk, Conn. 06856.

ELECTRICAL SPECIFICATIONS

Model	Output Voltage Vac	Regulation Line & Load Combined	Distortion w/10% Input Harmonics	Response Time μs	Input Frequency c/s	Isolation In/Out db	Price
FR1000	115	± 0.05%	< 0.25%	50	57-63	100	$1425
FR1010	230	± 0.05%	< 0.25%	50	47-53	100	$1650
FR1020	115	± 0.05%	< 1.0%	50	380-420	100	$1525
FR1030	230	± 0.5%	< 0.25%	50	57-63	100	$1650

RAYTHEON

for fast, precise measurement of signals in unfilterable noise.....

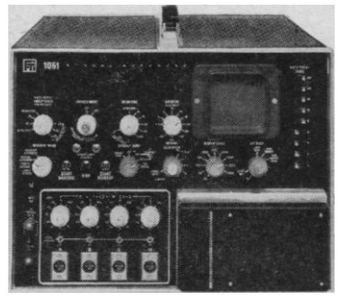
useful in PHYSICS, CHEMISTRY, BIOMEDICINE, PSYCHOLOGY, RADAR ASTRONOMY, GEOPHYSICS.....and many other areas of research

Built-in 10 NEW FEATURES

found only in the

NEW FABRI-TEK 1051

signal averager



The FT-1051 512 word memory averager.
The FT-1052 has a 1024 word memory.

An enormous variety of measurements in the physical sciences are now possible with signal averagers, which are capable of measuring recurring signals obscured by random noise. Useful data, previously unobtainable by any other convenient and economical method, is now quickly and accurately acquired with signal averaging techniques.

Because of the relative "newness" of these instruments, Fabri-Tek has prepared an informative brochure entitled "Signal Averaging and Signal Averagers". Please write for your copy.

Here are 10 reasons why Fabri-Tek's series FT-1050 averagers are the finest available today .....

1 **CONVENIENT SWEEP SPEED SELECTIONS** Easy to find actual times for any coordinate point without a slide rule!

2 **CONVENIENT DATA FORM** Each of the four inputs are calibrated, and the numbers added to the memory are directly equal to the signal voltage in millivolts, *regardless of sweep speed.* This means that the totals are easy to normalize: just divide the totals by the number of signals measured to obtain voltage in millivolts.

3 **AUTOMATIC TIMING** Not only is the sweep counter built in, rather than an accessory, but convenient auto stop points are provided to permit quick normalization of data. Where conditions allow, auto stop at 10, 100, or 1,000 sweeps mean that only decimal point placement is required for data normalizing; the number of signals actually measured is recorded as the first data point in print-out, whether auto stop was used or not, and that number is the normalizing constant.

4 **PRECISE TRIGGER DELAYS** Post-analysis or pre-analysis delays are provided, both quartz crystal oscillator controlled with convenient selection of delay times.

5 **MICROCIRCUIT ELECTRONICS** Individual microcircuits replace up to twenty transistors, twenty resistors, and diodes. The instrument, even with built-in cathode ray tube and printer, is light weight and compact, because of these. But more significant is the saving of thousands of solder joints, better performance, lower cost. Each microcircuit element has a reliability comparable to that of a single transistor.

6 **DIGITAL DISPLAY** Where the actual voltage value for any interesting coordinate point is needed it is available instantly. Just select the desired address, set switch at "View Digital Value" and the ordinate value is displayed on the cathode ray tube screen. If there had been 100 signals measured, the number 5959 would mean 59.59 millivolts.

7 **EXACT TIME IDENTIFICATION** When the accumulated waveform is displayed one point is brightened. The position of the intensified point may be selected by the operator, using slide switches. It is the brightened point whose ordinate value is displayed when viewing the digital value. The exact address number can be obtained by observing the switch settings.

8 **VERSATILE INPUT MONITOR** When monitoring the input, the waveforms displayed are the digitizer's interpretation of the signals, not the signal voltages directly. Of course this is what the operator wants. We decode the digitizer's output, and display that. As a side benefit all four signals, if more than one is in use, are automatically displayed. This is useful both for set-up and for keeping watch over signal quality while the measurement progresses.

9 **FAST QUIET READOUT** The optional plug-in high speed photographic digital printer is great. Quiet, light weight, cable-harness-free, and speedy, this printer finishes printout ten times as fast as a typewriter.

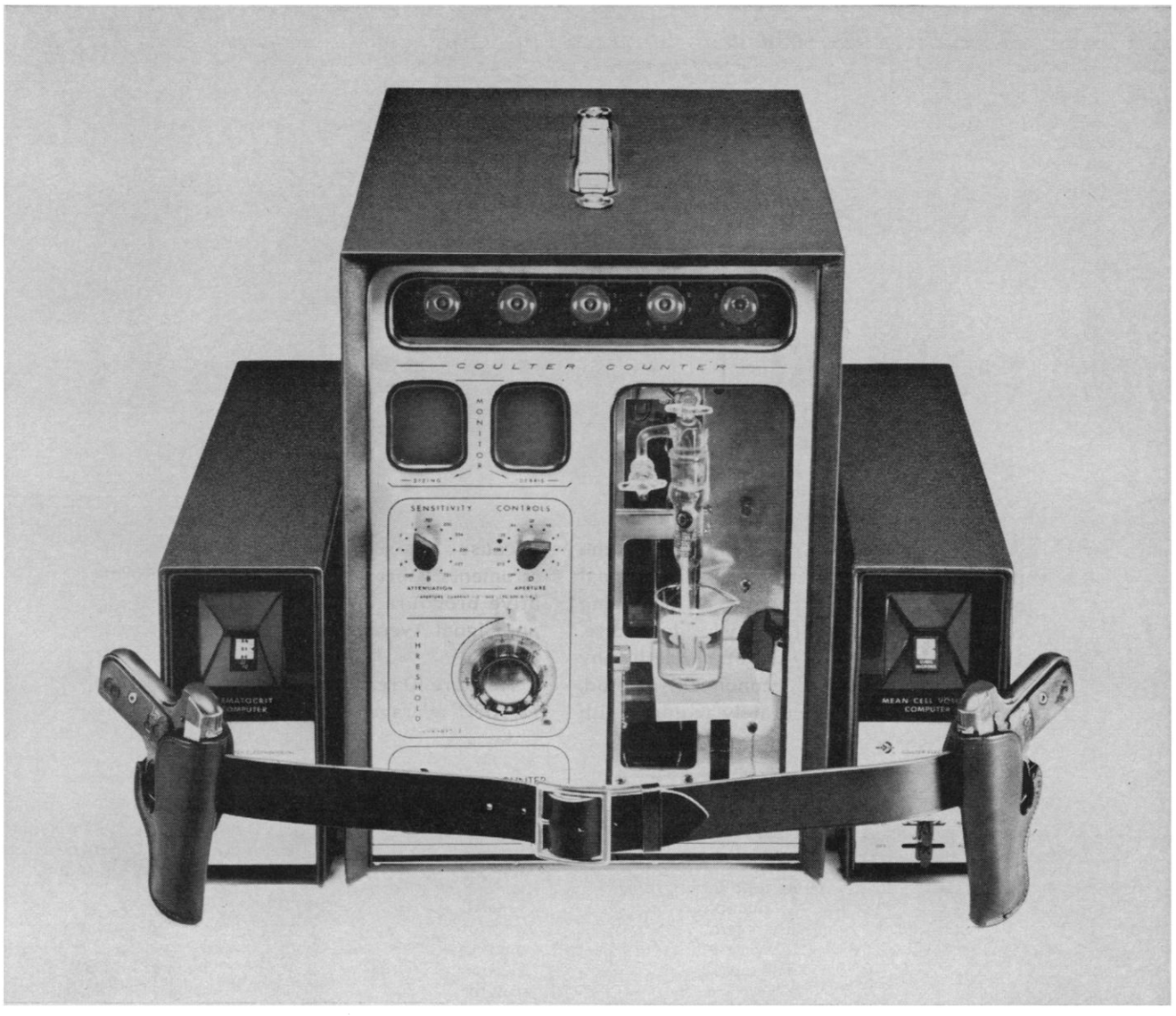
10 **FABRI-TEK QUALITY** Fabri-Tek is today's leader in magnetic memory fabrication and technology. Its dominant position is attributed to its high quality products and strong customer orientation. Fabri-Tek means sound engineering and good service to the user.

The Instrument Division, formed to complement Fabri-Tek's present line of products, is staffed by an engineering group well experienced in signal averaging and radiation analysis instrumentation.

The series FT-1050 averagers are evidence of the outstanding qualities to be found in Fabri-Tek products. We would like to tell you more.

For further information, prices and delivery schedules, kindly write or phone (608-238-8476) Fabri-Tek Incorporated, Instrument Division, P. O. Box 4218, Madison, Wisconsin 53711.

FABRI-TEK
Instrument Division



The Coulter Automatic Cell Counter

fast and accurate, with 2 new automatics

The Coulter Counter® Model F is not only remarkably fast and accurate, it's versatile as well. With accessory equipment now available, you can use it to perform MCV and Hematocrit tests, as well as routine blood cell counting. Completely transistorized, this highly efficient counter performs up to 60 tests in just one hour; and accuracy is ±1% for RBC's, ±3% for WBC's. The Coulter Counter features a continuous twin monitoring system, with an oscilloscope screen display of cell size pattern, while a second screen projects aperture image to detect any debris that might interfere with accuracy counts. And there is direct readout from convenient glow tubes. Because of the patented Coulter principle, the counter measures the volume of the particle rather than the cross section. For speed and accuracy, as well as versatility, nothing on the market can outperform this highly efficient unit that virtually automates your hematology laboratory.

No. B3132 — Coulter Counter® Automatic Blood Cell Counter, Model F, 13½″ w x 19½″ h x 19″ d. Each **$4,125.00**

No. B3143-1 — MCV computer ±1% reproducibility **$1,370.00**

No. B3143-2 — Hematocrit accessory ±1% reproducibility **$860.00**

scientific products

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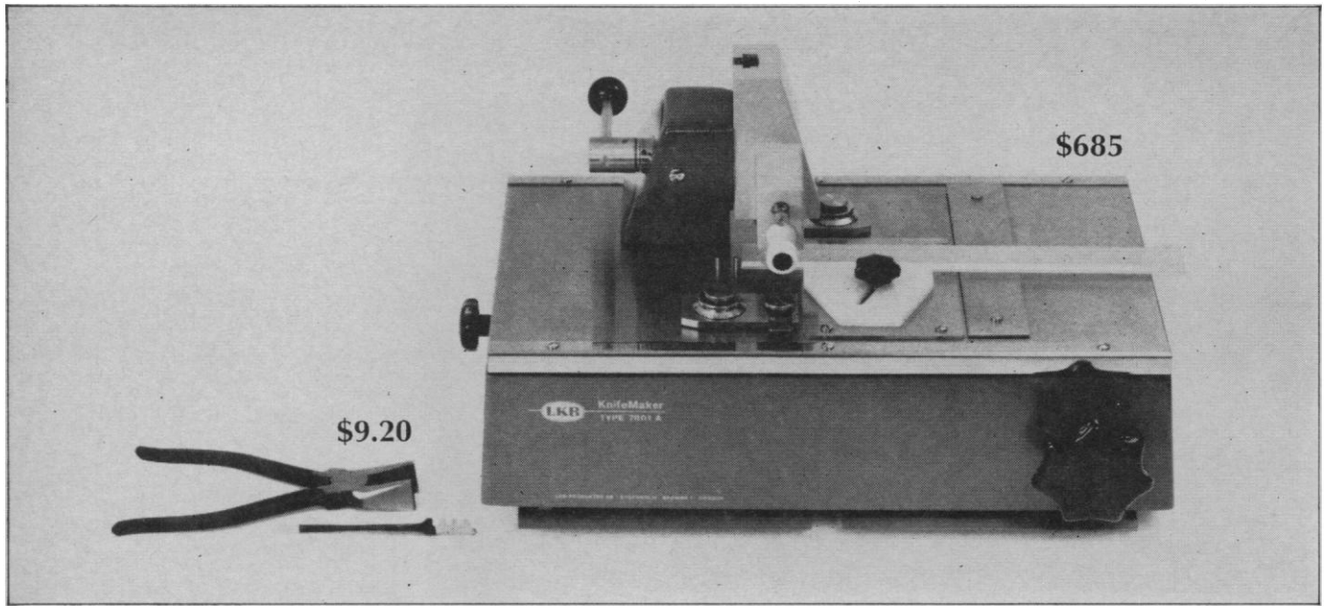


We sell two kinds of equipment for making ultramicrotome knives

(the expensive one is cheaper)

Perfectly good glass knives can be made with the inexpensive equipment shown on the left. *Sometimes.* However, as you well know if you make knives this way, it is not uncommon for an expensive ultramicrotome, an even more expensive electron microscope, several expensive people, and *your* research to stand by immobilized while awaiting a usable knife to be made with these rather primitive, albeit inexpensive, hand tools. Frustrating. And now unnecessary because of the new unit on the right.

This unit on the right—henceforth called the Knifemaker—is the first and only precision instrument for breaking glass knives. The design goals for the Knifemaker were these: to provide a simple, rapid, mechanized technique for making usable knives with highly reproducible (but adjustable) cutting angles without requiring prolonged experience, manual dexterity, or some special "touch". Happily, these goals were achieved. (All of this requiring a most modest sacrifice of bench space on your part. The Knifemaker uses only 19" X 12" X 13½".)

But how long does it take to learn to make usable knives with the Knifemaker? Assume that your new Knifemaker has just been delivered. Since it arrives completely assembled with a supply of glass and an explicitly helpful instruction manual, it will take less than an hour from removal from shipping carton until you make your first usable knife—*even if you've never seen the Knifemaker before.* Subsequently, with modest experience, you will be producing knives having at least ⅓ usable edge perhaps 90% of the time. And about half of this time, you'll get *two* usable knives from each break rather than one. Total time required for scoring and breaking square and then scoring and breaking square into two knives? Less than a minute.

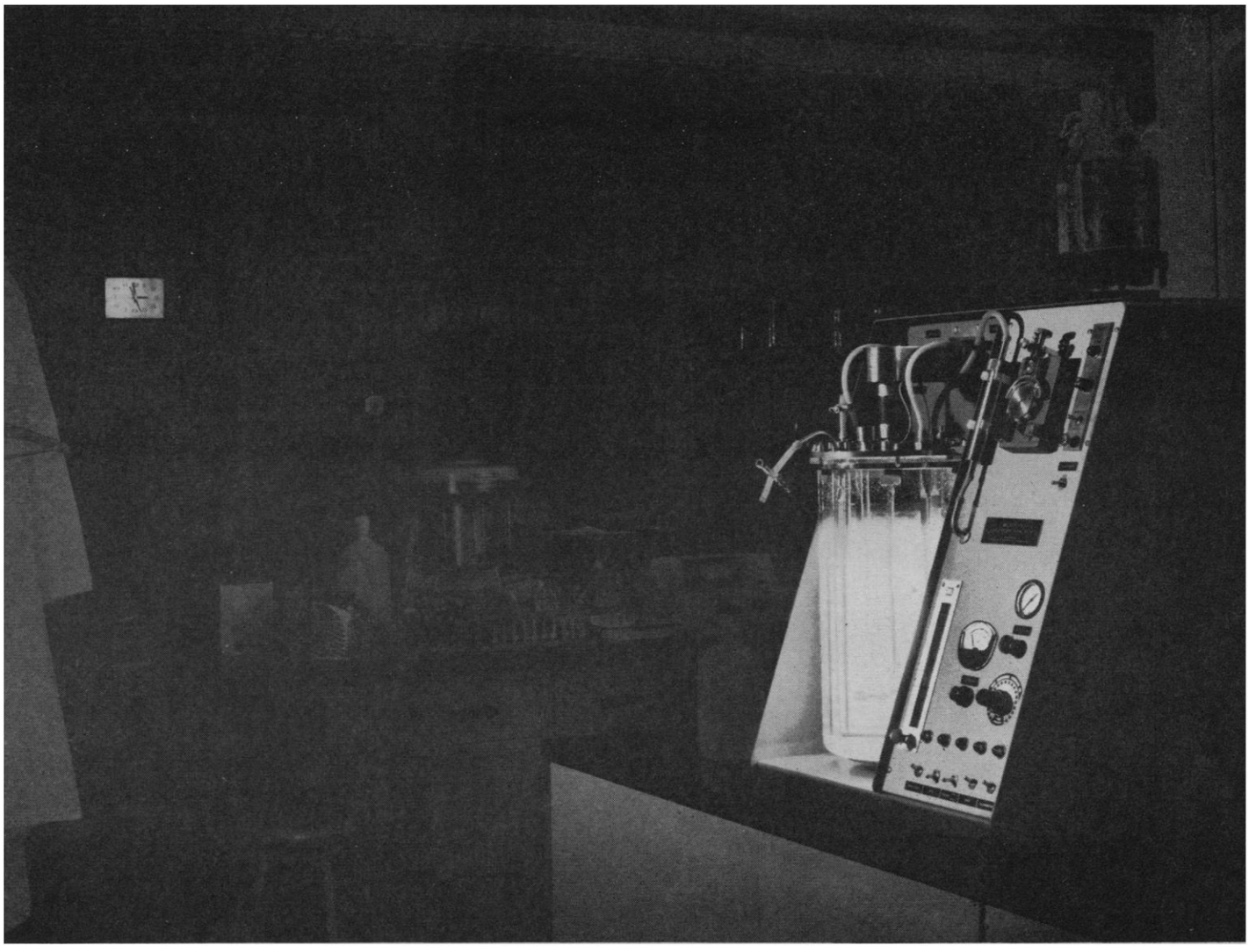
You might wish to consider ordering the Knifemaker from this ad immediately since you now know most of the story and the price. (For prices, etc., outside the United States, please contact our Stockholm address shown below.) If, however, you desire more information, a demonstration, or both, we'll be happy to oblige. Write today and refer to 7800S5.

Incidentally, we also stock and will be pleased to sell to you the inexpensive hand tools shown on the left instead of the Knifemaker. But we respectfully suggest that you can't afford them.

LKB

LKB INSTRUMENTS, INC., 12221 Parklawn Drive, Rockville, Maryland 20852

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



At 3 o'clock in the morning who's minding the spores?

Nobody!

In the dead of night, this new MicroFerm fermentor is alive with productivity, working 24 hours a day, day in, day out, with no laboratory supervision. Simply set the precision controls for the desired growth conditions and this bench-top fermentor takes over. MicroFerm makes over 250 control decisions automatically every hour of the day and night, maintaining temperature and agitation with unusual accuracy and dependability.

Temperature is regulated electronically to within ±0.25°C by a Thermistor controller which allows cool or heated water to circulate on demand through hollow baffles inside the vessel. Rigid control of agitation is assured by a solid state proportional speed controller that adjusts impeller speed to compensate for changes in viscosity and line voltage. Foam problems are eliminated by a new electronic controller that senses and automatically adds defoaming agent as needed.

MicroFerm permits you to conduct realistic pilot studies in the quiet of your own laboratory. Simply connect the unit to water, air and electric outlets for immediate use around the clock.
Accommodates 4 interchangeable fermentors: 2 liters, 5 liters, 7½ liters or 14 liters. Easy to remove. Designed for repeated sterilization in a 20" autoclave.

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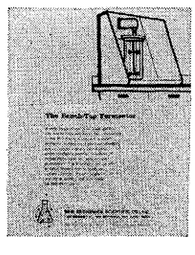

Look into MicroFerm.
Write for
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there are many laboratory animal cages for sale, but...

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If you're looking for a way to reduce cross-contamination and safeguard experiments, now is the time to try the versatile new **ISO**SYSTEM, animal housing system engineered by Bioquest. **ISO**SYSTEM is the only one ready-made to control the spread of airborne infections. And it is compact and easy to use. Overall dimensions with filter cap in place are only 12¾ x 8 x 8 inches.

This new compact **ISO**SYSTEM coordinates: (1) **ISO**CAP*, the disposable efficient filter cap, a fibreglass-plastic web, with clear vinyl end windows; (2) made-to-measure **ISO**LID*, laboratory cage lid of stainless steel or chrome plated with divider separating food and water bottle (lids nest for storage); and (3) **ISO**CAGE*, featuring the narrow molded flange for snug fit of component systems—in clear polycarbonate, opaque polypropylene or clear styrene acrylonitrile (SAN)—design permits nesting 8 cages to one foot, twice the usual number of plastic cages.

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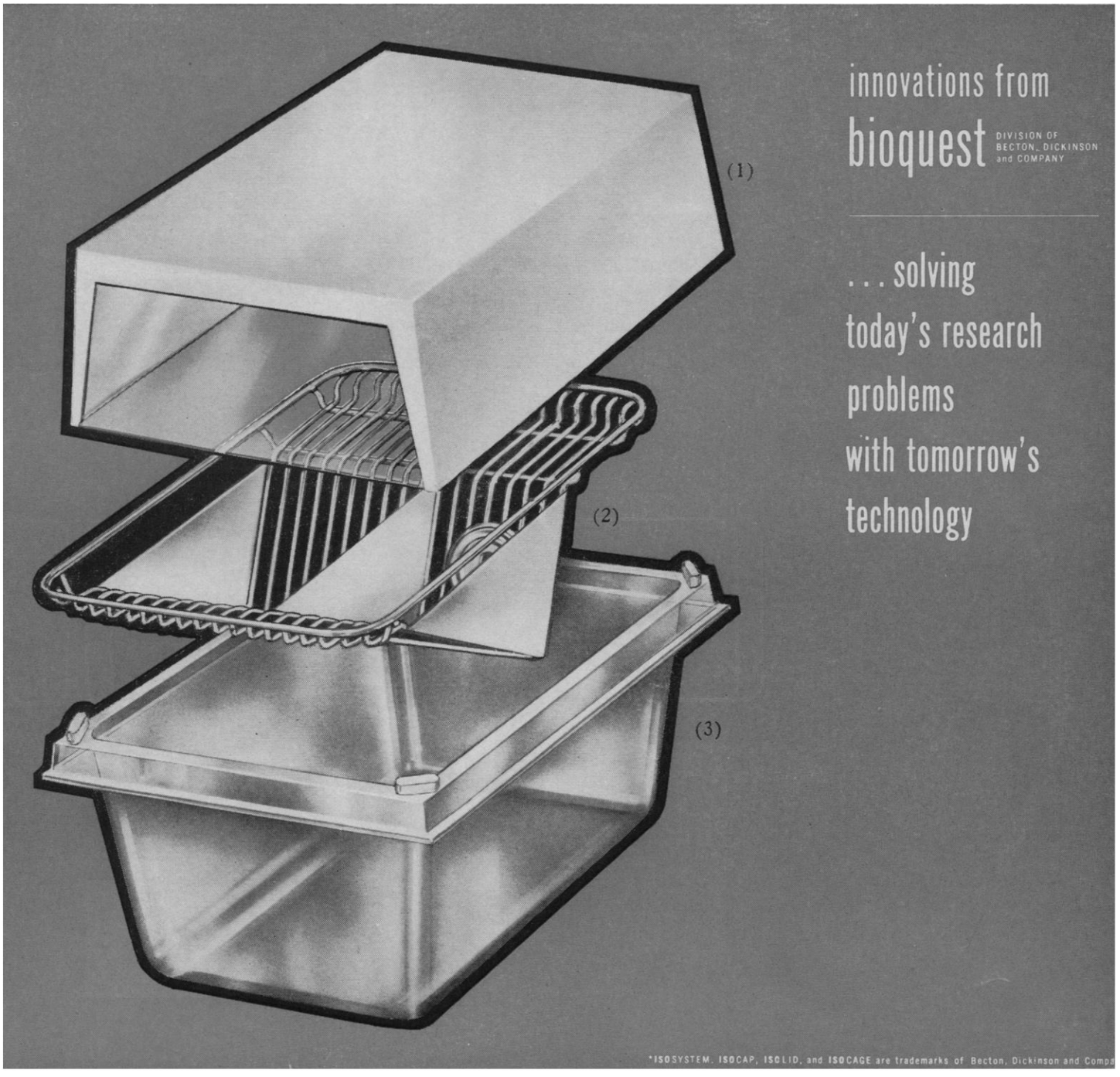
SUBSIDIARY OF BECTON, DICKINSON and COMPANY



Why no derating?

Derating of ultracentrifuge rotors is a necessity brought about by the development of progressive metal fatigue as a consequence of long-continued or repeated stressing under extremely high centrifugal forces. This is usually expressed as successive limitations in permissible top speeds.

A key factor in derating is the original strength of the rotor which is largely determined by the nature of the material used, manufacturing processes and design.

IEC ultracentrifuge aluminum and titanium rotors represent a technological breakthrough in which optimum design was achieved through computer techniques. Our manufacturing processes involve advanced forging techniques, stress relieving, specialized alloys, and custom developed machinery.

As a result, IEC rotors withstand repeated stressing over such a protracted period without impairment, derating is eliminated as a factor to consider in use. That's why we say, **no derating.** You buy one of each type you need and that's it. Many years and thousands of use-cycles later, you can still run these rotors at their top rated speed. Just keep them free from corrosion — IEC guarantees them unconditionally without time limit.

No derating. One more significant reason why, if you work anywhere in the ultracentrifuge spectrum you should be prepared to change basic thinking about equipment. Send for brochures on Models B-35 and B-60.

INTERNATIONAL (IEC) EQUIPMENT CO.

300 SECOND AVENUE, NEEDHAM HEIGHTS, MASSACHUSETTS 02194

There are a lot of pH meters for sale...

but only the Zeromatic® II keeps on selling you after you buy it

The Zeromatic II is more than just the pH meter with the large, 8.2-inch, easy-to-read scale—the convenient push-button controls—the high accuracy (±0.05 pH) and repeatability (±0.015 pH)—the rugged, chemical-resistant case.

When you buy a Zeromatic II pH Meter—or for that matter, any Beckman pH meter—you buy: Sales Engineers to assist you on instrument operation and the selection of accessories and electrodes... Application Engineers to advise you on difficult or unusual applications... Service Engineers to provide you with periodic maintenance or on-the-spot repair... plus, 30 years of experience behind every Beckman pH meter.

Why not call your local Beckman Sales Office and ask for a demonstration of the Zeromatic II? Or request Data File LpH-466.

The Zeromatic II offers more—because it *is* more instrument—with more to back it up. Let it sell you.

Beckman INSTRUMENTS, INC.
SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA • 92634

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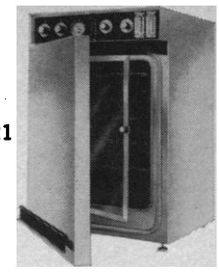

National's Water-Jacketed CO_2 Incubator now comes equipped with a purge-recovery unit.

What is a "purge-recovery" unit? *(We're glad you asked!)*

A purge-recovery unit rapidly replaces the CO_2 that is lost when incubator doors are opened, without having to wait for the normal flow rate to build back to the original concentration.

NATIONAL's purge-recovery unit consists of a timer and a button to release a predetermined amount of gas so that the CO_2 tension is quickly built up to the desired level.

It's another good reason why NATIONAL incubators are the logical choice when efficiency and versatility are demanded. Some of the other reasons are:

- Full water jacket for accurate temperature control
- Built-in CO_2 air-mixing device at no extra cost
- Pre-heater for gas mixture to protect work
- Corrosion-proof construction inside and out
- High humidity without condensation on inner walls
- No-stick-no-click non-magnetic door mechanism

The new purge-recovery unit is a result of the research and development that goes into every NATIONAL product . . . and this is why NATIONAL incubators and other laboratory apparatus continue to lead the field.

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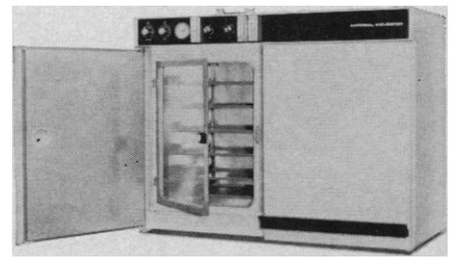


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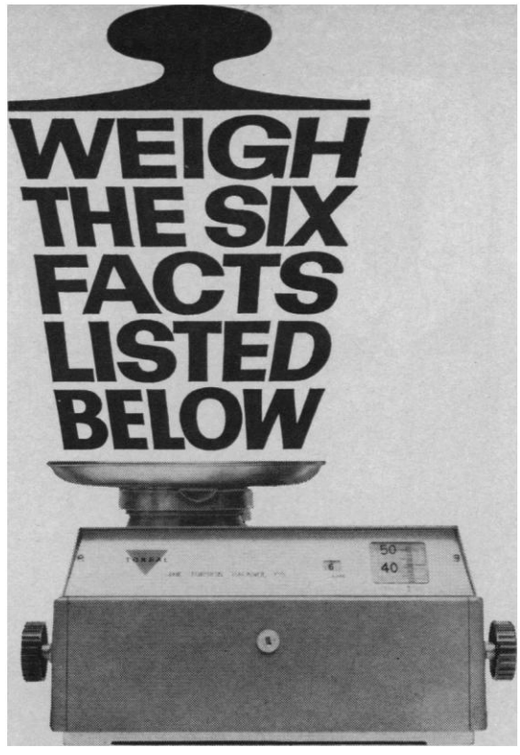

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☐ **Fast, accurate direct read out to ±0.01 grams.** Capacity 800 grams. Also available in 1000g. capacity (PL-1) with direct read out to 0.1 gram, and 2000 gram capacity (PL-2) with direct read out to 1.0g. (0.1g. by estimation).

Model PL-800

☐ **200 gram capacity.** Weight control dial and fine weighing dial with vernier makes possible direct readings from 100 grams to 0.01 grams. 500 gram capacity model also available (DWL-5).

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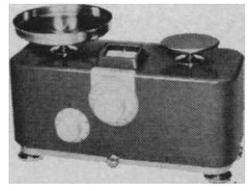
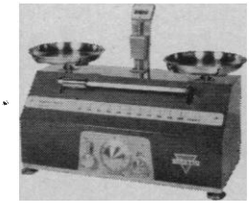


☐ **2000 gram capacity and with 10g. x 0.1g. and notched beam 100g. x 10g. increments.** Available with tare beam instead of notched beam. (DH-2(b)). 4500 gram capacity models (DH-4(a) and DH-4(b)) also available.

Model DH-2 (a)



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Model DWL-2

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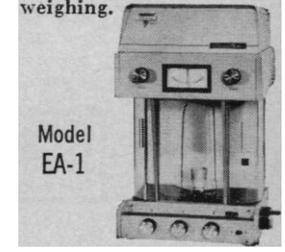
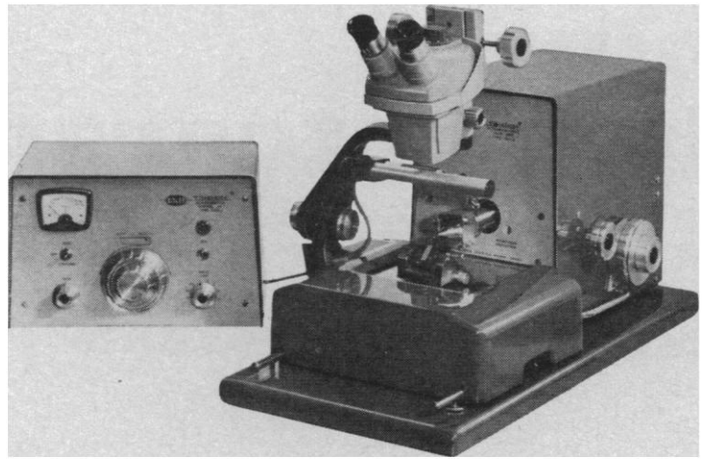


the new Ultrotome III



Is this the *ne plus ultra* ultramicrotome?

Describing our brand-new ultramicrotome as the ultimate, the acme—the *ne plus ultra*—strains credulity when you know well that someday we'll come back to you to describe an even *better* one that we've developed. Nevertheless, for now and the foreseeable future, this new Ultrotome III appears to be about as far as anybody can go within the practical limits of existing technology.

This new Ultrotome III is our third generation instrument. (The second generation Ultrotome is still functioning most effectively in many laboratories, is still a superb design, and is still available from us.) The Ultrotome III however, does things that no previous ultramicrotome could do. For example, and most importantly, it has the widest range of cutting speeds (0.1mm/sec. to 20mm/sec.) of any ultramicrotome now on the market. One obvious implication of this is that all present (as well as future) embedding materials will be efficiently sectioned by the Ultrotome III.

A few of the other distinct advantages of this instrument: improved thermal feed characterized by instant response, broader range and better stability; a unique knife-edge evaluator; a precise manual macro-feed. There are others. The total package represents an ultramicrotome with unusual versatility which permits the solution of the most difficult sectioning problems. All in all, the most sophisticated ultramicrotome yet developed.

But your satisfaction with such an instrument involves a good bit more than your initial purchase of it. It embraces the manufacturer's willingness to teach your people how to use it (we do), his continuing interest in helping you solve problems with it (our internationally recognized applications laboratory in Stockholm exists for this purpose), and his consistent commitment to its dependable functioning (the quality of our Service Engineers evokes accolades). In sum, we do not leave you to your own devices.

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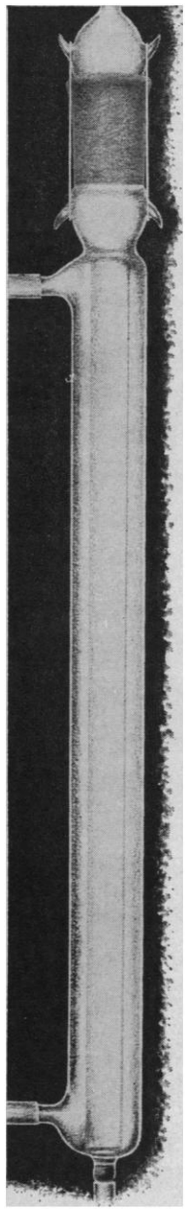

Column Chromatography in Three Easy Lessons*

* Three Easy Prices Too!
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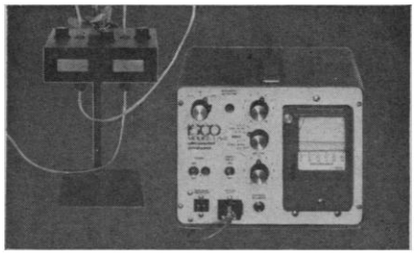
Lesson No.1

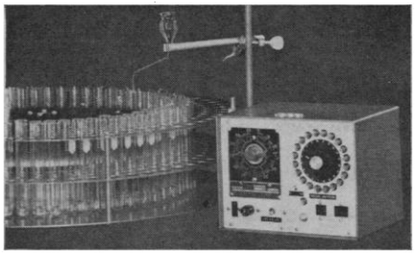
Begin by pumping your solvent into the column in a smooth concentration or pH gradient. ISCO's new programmed gradient pump, the DIALAGRAD, will handle this perfectly. In fact any simple or complex gradient formed by combining two liquids can be dialed directly into the DIALAGRAD. Program duration and pumping rates are easily adjustable over very broad ranges. No more mixing numerous solutions to guessed-at concentrations.

Lesson No.2



Now to identify your fractions. Use an ISCO UA-2 or 222 Ultraviolet Analyzer to get quantitative results with no need for further assay. Select linear absorbance, single or dual-beam monitoring at either 254 or 280 mμ or both. Absorbance recording minimizes need for base-line compensation and allows direct integration of chart record. As each UV absorbing fraction is recorded it is also automatically deposited in a separate collecting tube.

Lesson No.3



Collecting the effluent is then a simple task when ISCO fraction collectors are used. Choose from any of four basic models offering timed or volumetric control. Some have lift-off reels that can be changed as often as they fill, and when not collecting can be used as convenient storage racks. Extras such as drop counters and volumetric dispensers make things even easier. No after-school sessions necessary when you use ISCO equipment.

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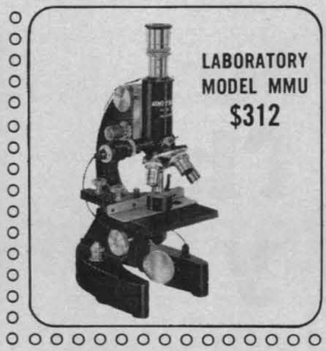

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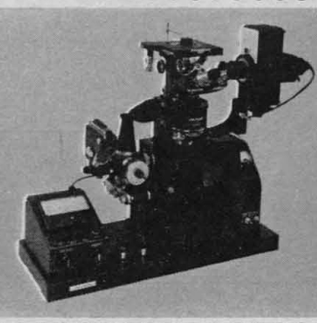

MICROGONIOMETER

Measures orientation of individual grains

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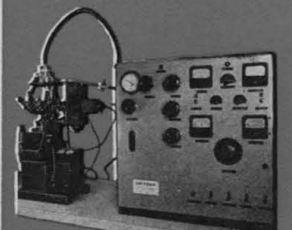

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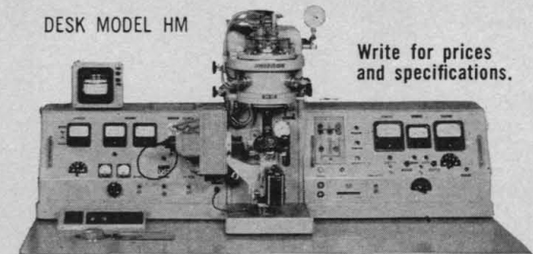

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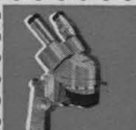

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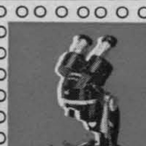

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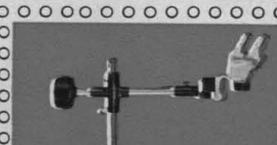

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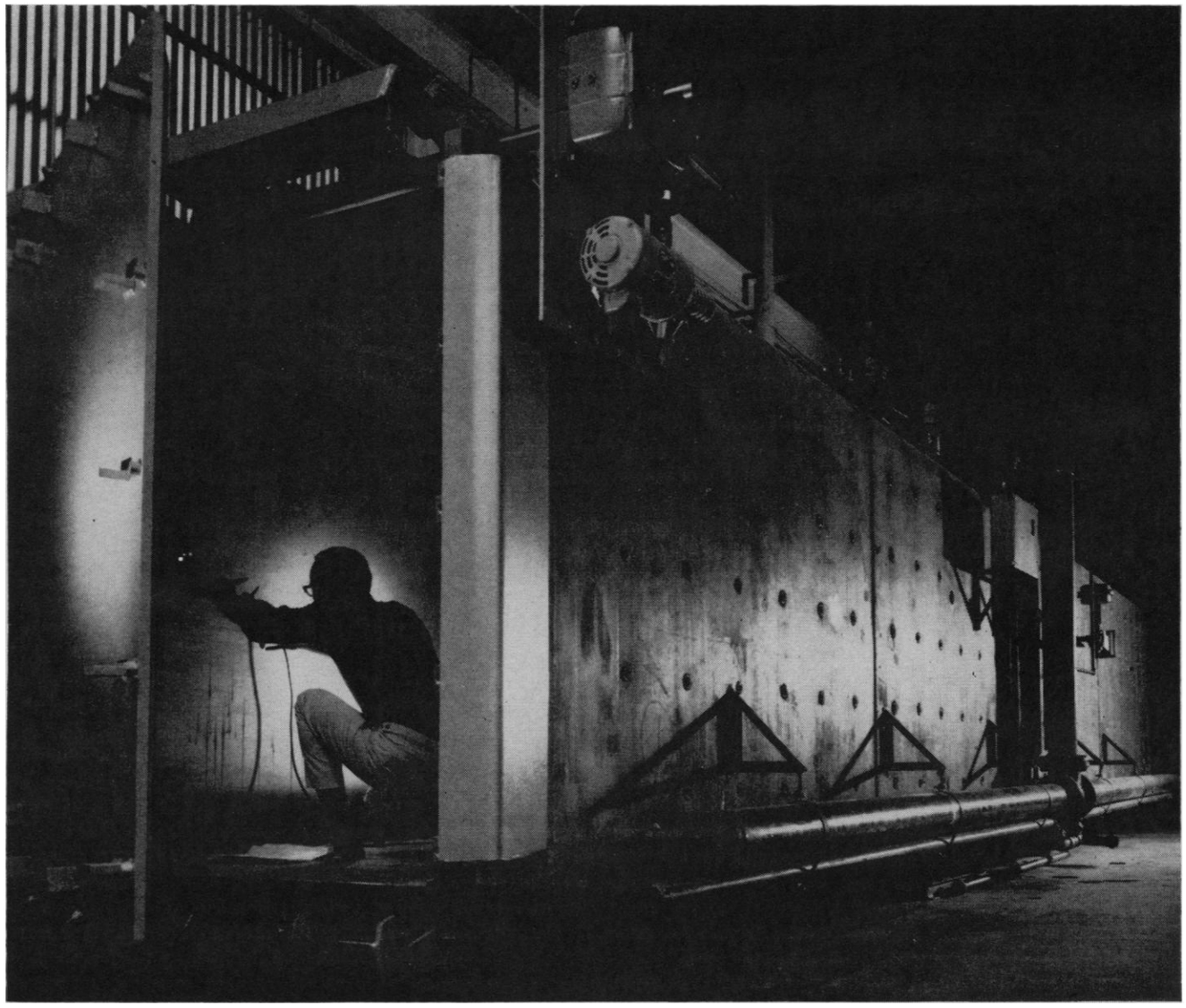

We delivered two of these huge sterilizers (with a chamber size of 33′ x 5′ x 5′) to the C. H. Bard Company of Murray Hill, New Jersey.

They're impressive units all right, but more important to you is the fact that we can engineer almost any size Industrial PowerClave Sterilization System (small, medium, or large) for your application.

The Castle Industrial PowerClave can save time and money through its outstanding flexibility, safety, and ease of operation. There's a wide choice of chamber sizes as well as controls (steam, high vacuum, ethylene oxide, and combinations). Almost any kind of a special can be engineered.

Why not put an Industrial PowerClave to work saving money in your plant. Ask for our descriptive brochure on Industrial PowerClave Sterilization Systems. Wilmot Castle Company, Rochester, New York 14602.

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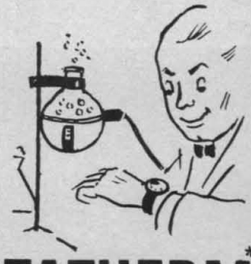
If you hate waiting (and who doesn't) here is **fast heating** you will really appreciate



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INSTATHERM is FAST—here is a sample of INSTATHERM speed: 4 ml of H^2O will boil in a 5 ml flask in 55 seconds, 70 ml in a 100 ml flask will boil in 3 minutes, 287 ml in a 400 ml beaker will boil in 13 minutes.

If you are after **accuracy** to get reproducible results every time - plus quick zeroing in with no fumbling you will rave about

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INSTATHERM is accurate—direct contact facilitates rapid equilibrium, saves time normally spent hunting for the right setting, and once you get the setting, it is accurate. A government chemist reports that he was able for the *first time* to duplicate results in the preparation of certain atropine derivatives.

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If you like to be **safe** - and **save** - you will appreciate the low voltage and operating economy of

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If detaching hot mantles leaves you **too hot** (much) cool off with convenient

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No hot mantle to detach with INSTATHERM! Flasks and beakers up to 250 ml may be supported by snap on contact clamp which also makes a convenient handle with or without power cord attached. No hot mantle to detach at end of heating period.

And that's far from all Instatherm offers you:

Your love affair with INSTATHERM will be long lived! INSTATHERM has a resilient insulation which protects it against mechanical shock, extends average glassware life many times. Tested by 7 major laboratories in the U.S., 6 of the 7 experienced no breakage in three years of use (there's someone with butterfingers in every bunch).

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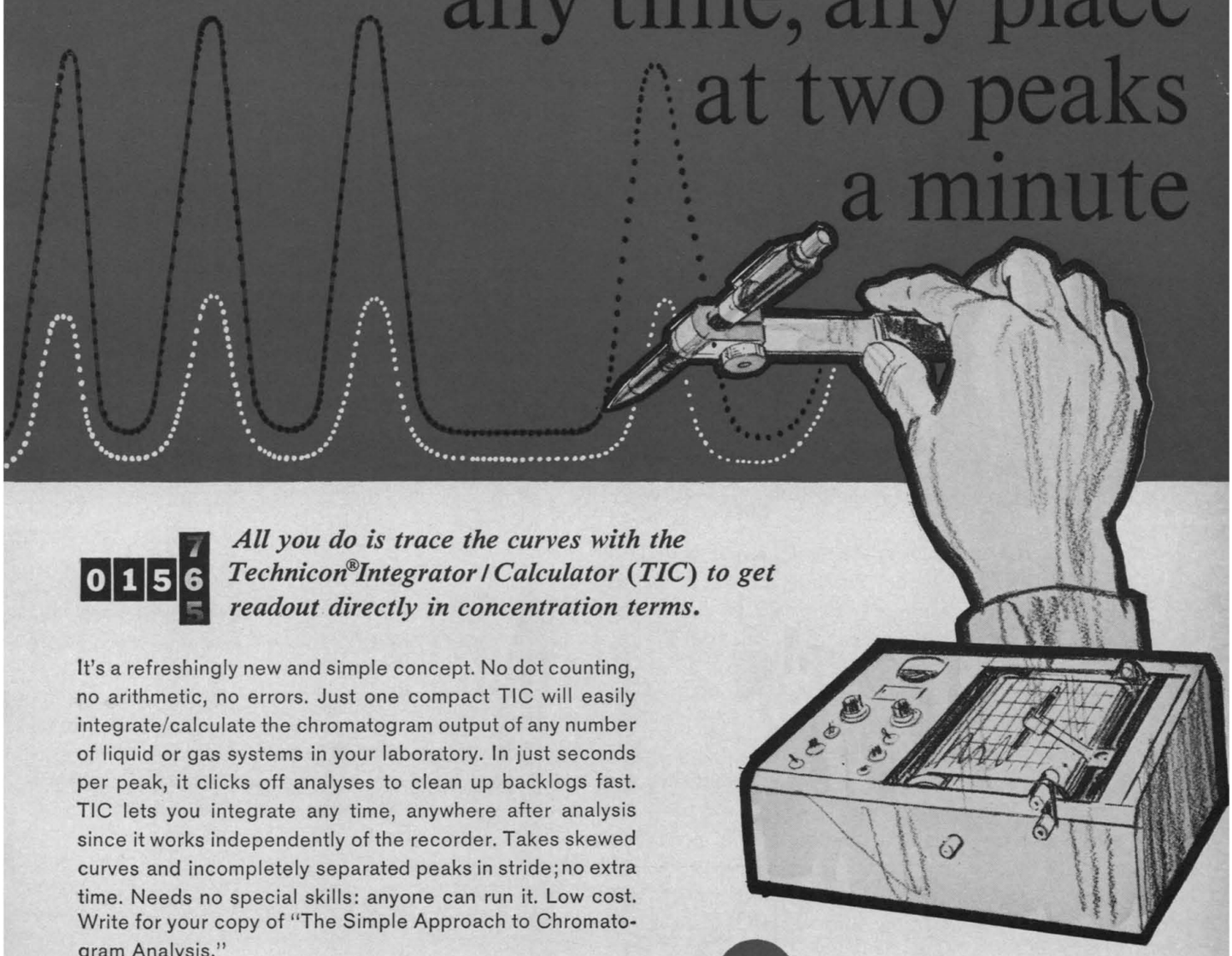
Integrate & calculate any chromatogram- liquid or gas- any time, any place at two peaks a minute



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Appropriate Adjectives: fast, economical, versatile, flexible.

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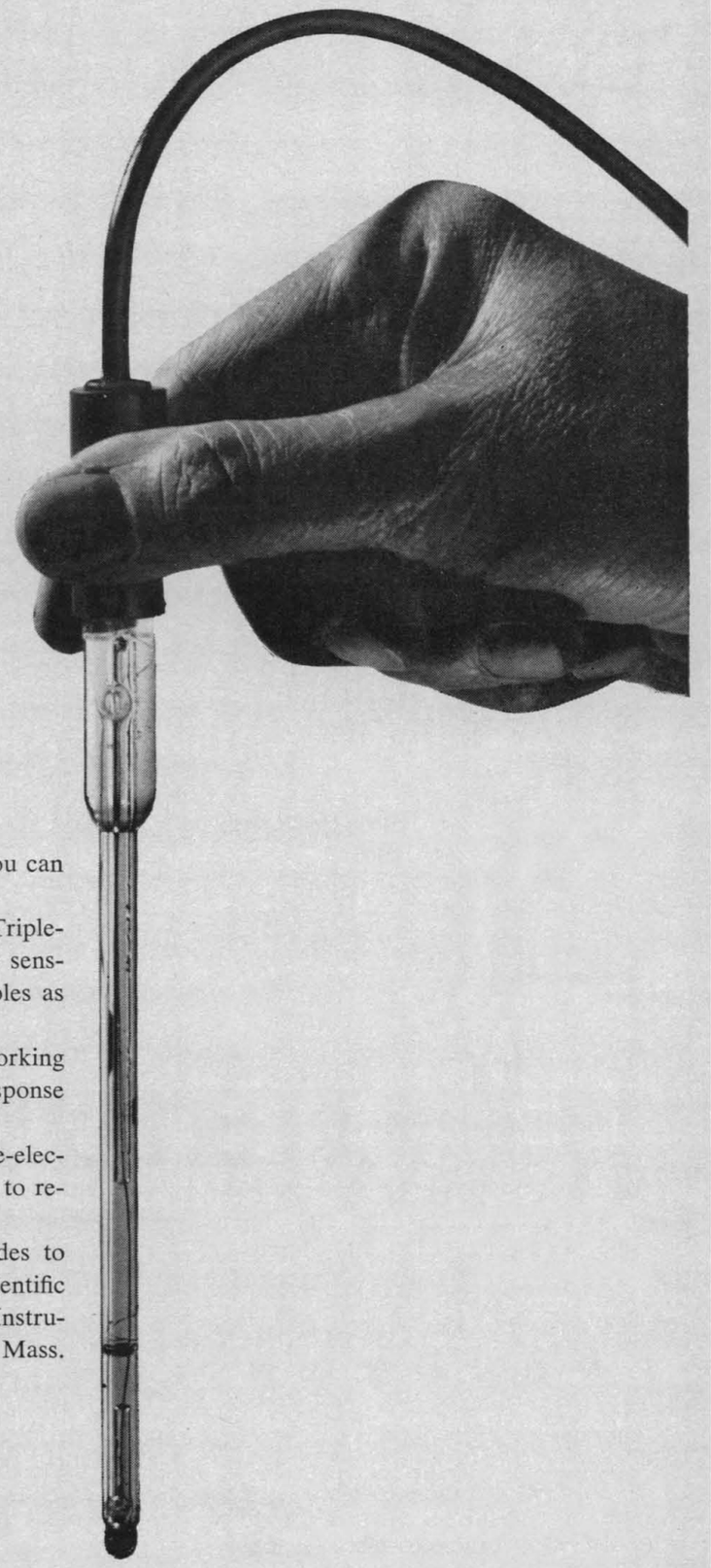
Shouldn't you try the new standard in combination pH electrodes?



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No worries about accuracy, whether you are working in acid or in high-alkali regions. No worries about response in ice water or in boiling water.

That's why we call it a new standard . . . in one-electrode convenience and economy for jobs that used to require three different electrodes.

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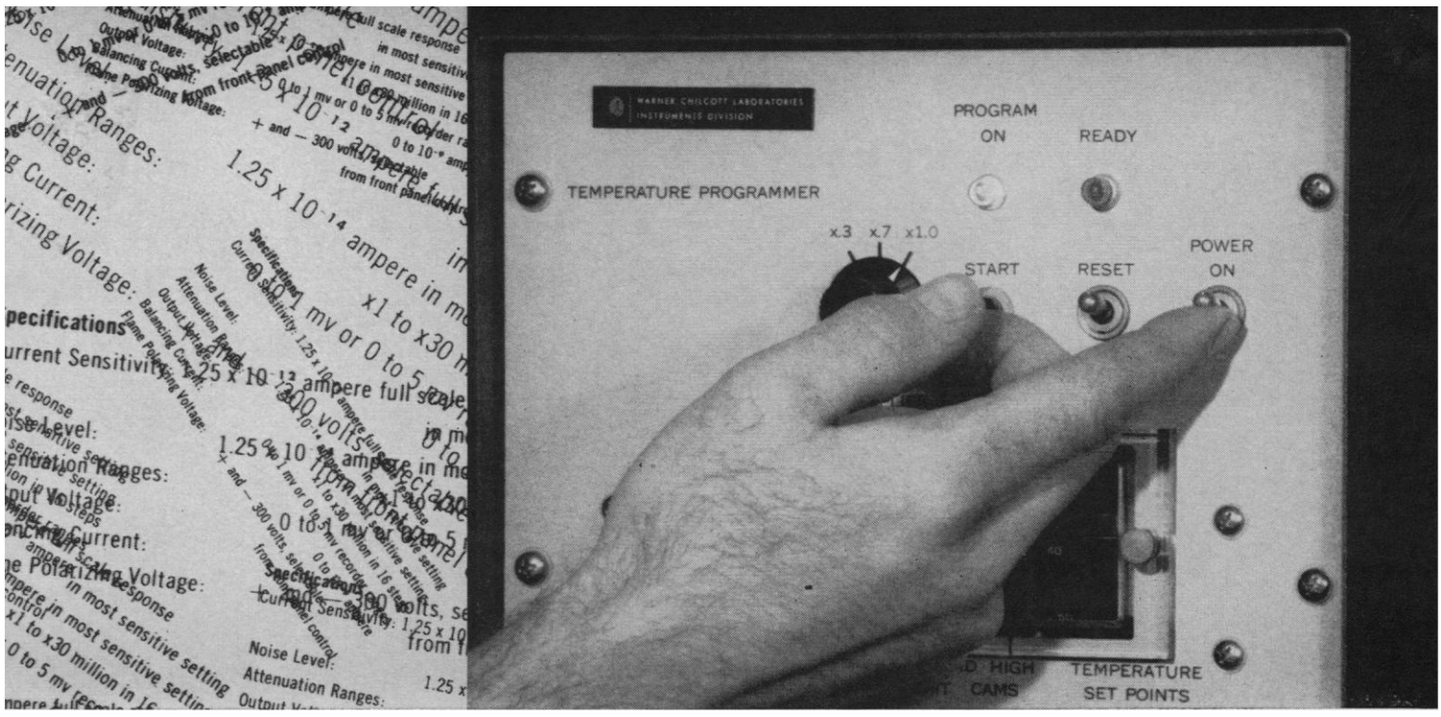

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NEW

THE BIRTH OF LANGUAGE: The Case History of a Nonverbal Child *by* **Shulamith Kastein**, *Columbia Presbyterian Medical Center, New York City, and* **Barbara Trace.** A longitudinal study of a survivor of premature birth with central nervous system deficit and language and behavior disorders. The complexities of differential diagnosis, management and parent counseling, and records of language and psychological tests are presented from a professional point of view. Both method and program of training and education are described. *May '66, 192 pp., 26 il., $6.75*

NEW

SURGICAL APPLICATIONS OF LASER *by* **Paul Edward McGuff**, *Laser Medical Research Foundation, Boston.* Reviews the historical background of various aspects of cancer. *Laser theory and operation and types of laser are discussed.* The current status of laser applications in diverse fields is presented . . . cancer tissue or tumor investigation, photocoagulation of retinal holes and tears, retinal tumor treatment, controlled coagulation and cutting, experimental blood vessel anastomosis, etc. *Jan. '66, 224 pp., 70 il., 56 tables, $10.50*

NEW

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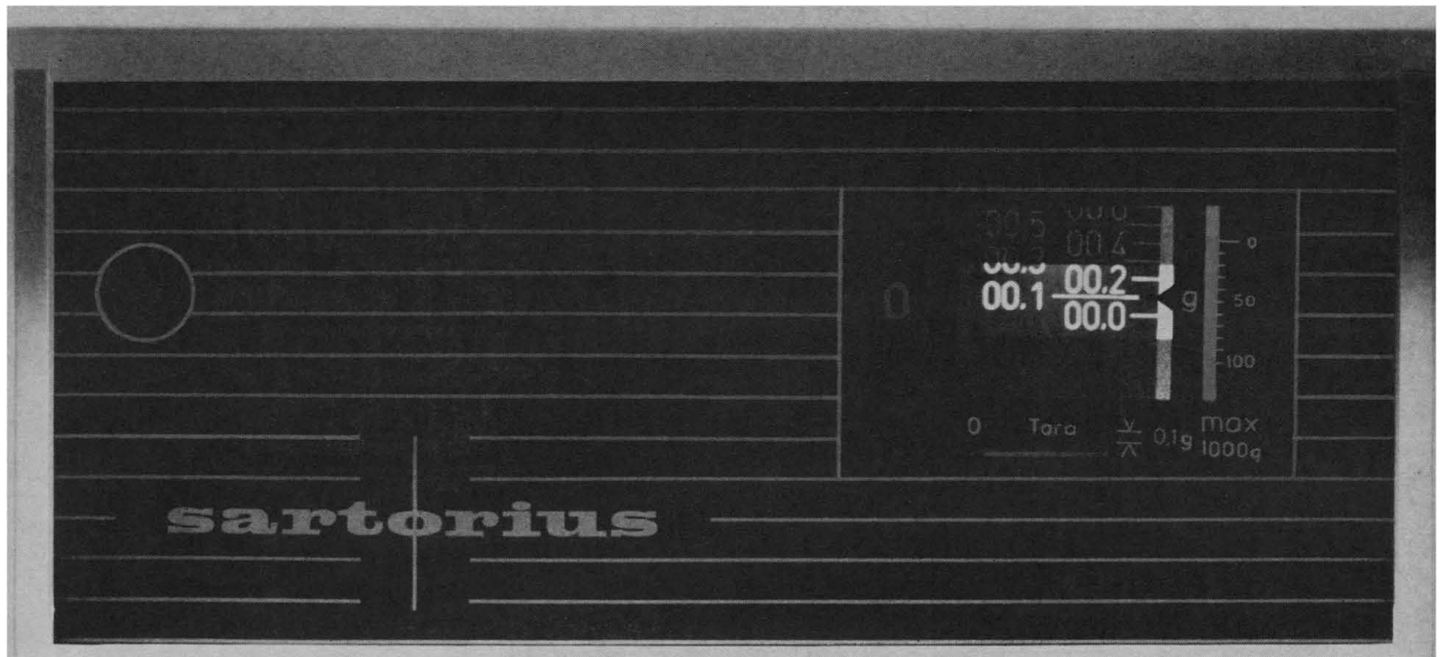

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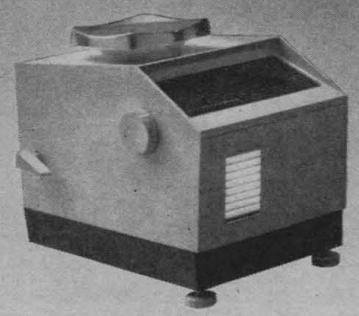

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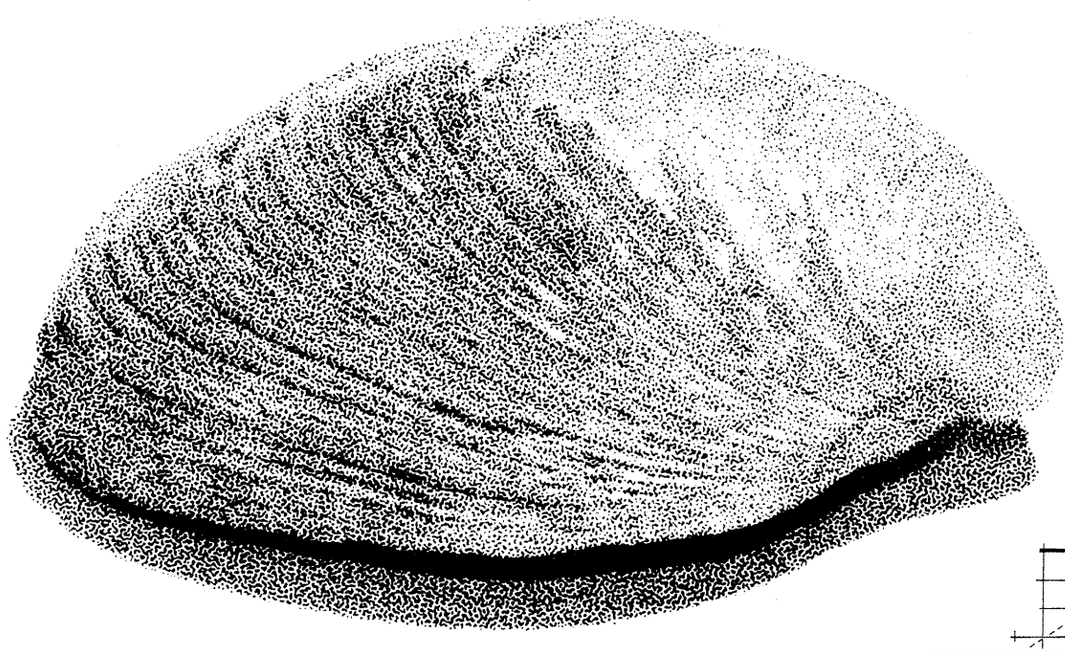

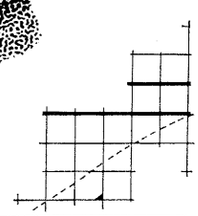

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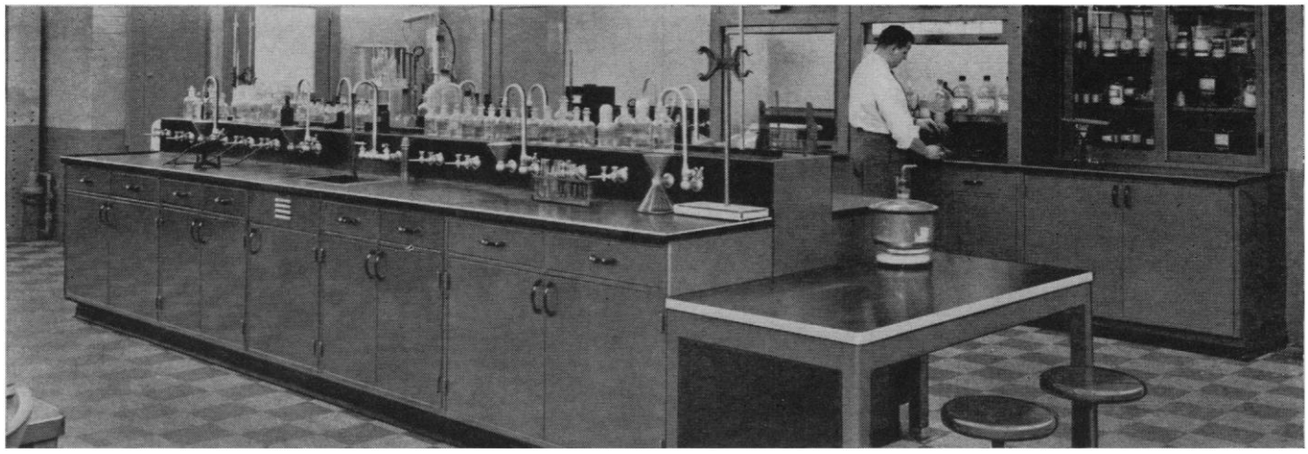

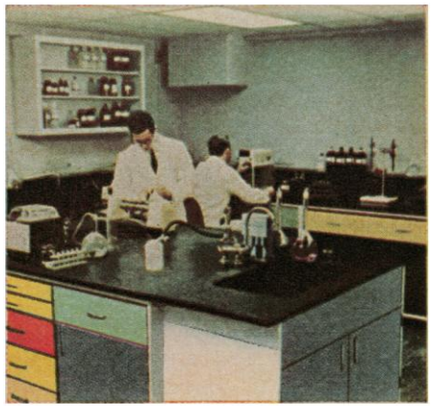

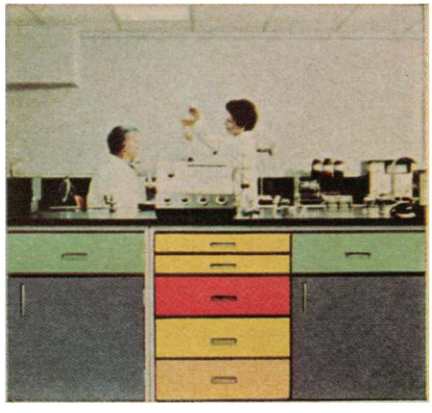

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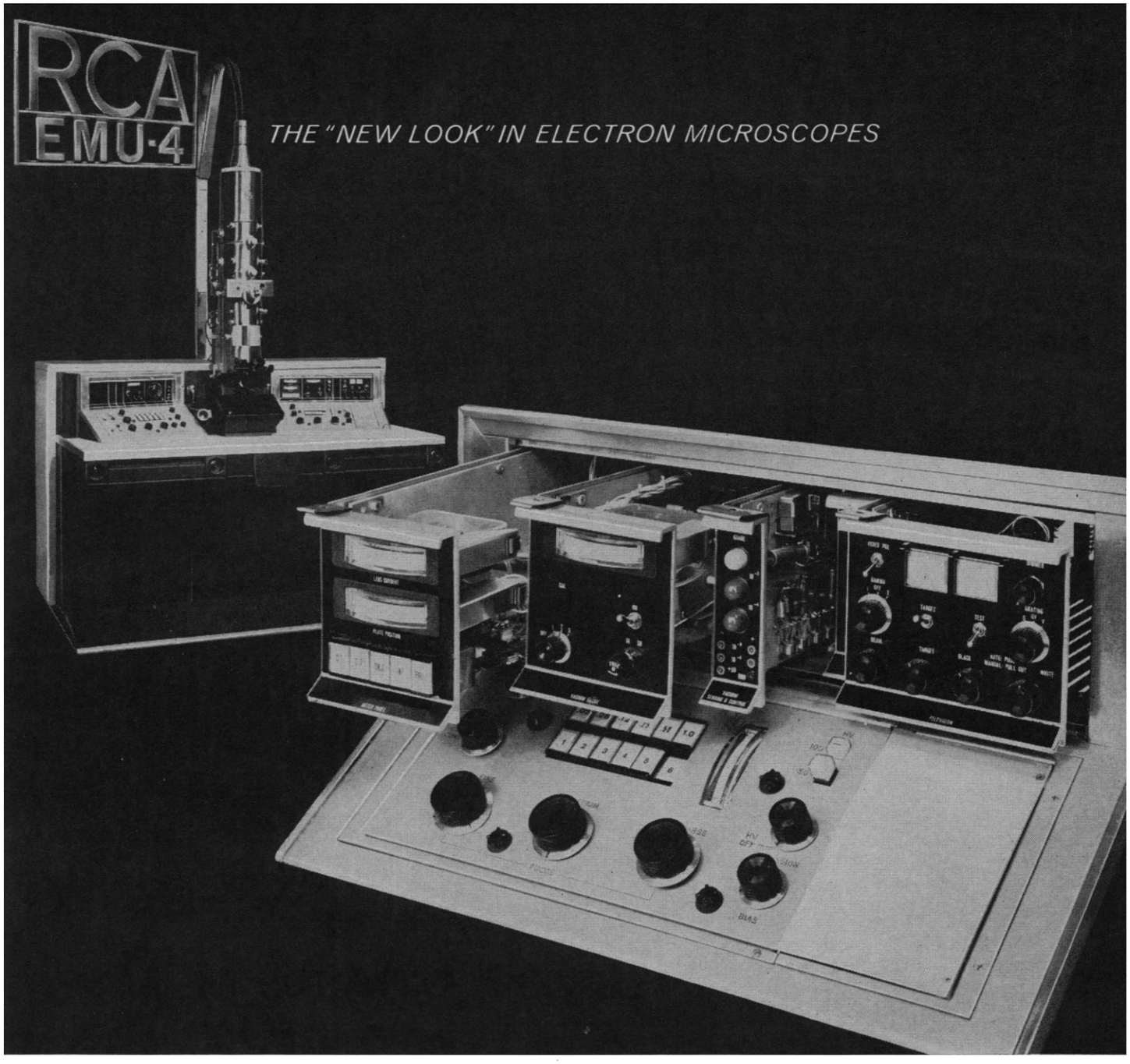

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tain outcomes. Unfortunately, as Altus notes, even thorough documentation of the phenomenon does not suggest "the reasons behind the relations."

ROBERT J. PANOS
American Council on Education, 1785 Massachusetts Avenue, NW, Washington, D.C. 20036

. . . That first-borns, or at least eldest sons, should exceed later-born children in achievement in intellectual activities is paradoxical in view of the fact, reported by Berelson and Steiner (*Human Behavior: An Inventory of Scientific Findings*, Harcourt, Brace, and World, New York, 1964), that eldest children are less intelligent than their siblings. These authors cite a study by Thurstone and Jenkins (*Order of Birth, Parent-Age, and Intelligence*, Univ. of Chicago Press, 1931) of "several hundred children each compared only to his or her own siblings," in which it was established that "within families, there is a consistent increase in average intelligence from first-born to last-born." Some of the findings reported by Altus could be accounted for by the fact that "larger families are more prevalent among groups with lower I.Q.'s in general"—that is, that across the population at large later-born children have lower I.Q.'s. But within a particular family, intelligence increases with birth order. In fact, there seems to be no upper limit on this tendency. A chart in Berelson and Steiner shows an almost uninterrupted increase in I.Q. from the first-born to the last-born in families of eight or more children.

As a first-born child, I find it difficult to accept the conclusion these findings suggest when coupled with Altus's—namely, that we first-borns become more outstanding in intellectual accomplishments than our sibling rivals in spite of the handicap of lower intellectual capacity! . . .

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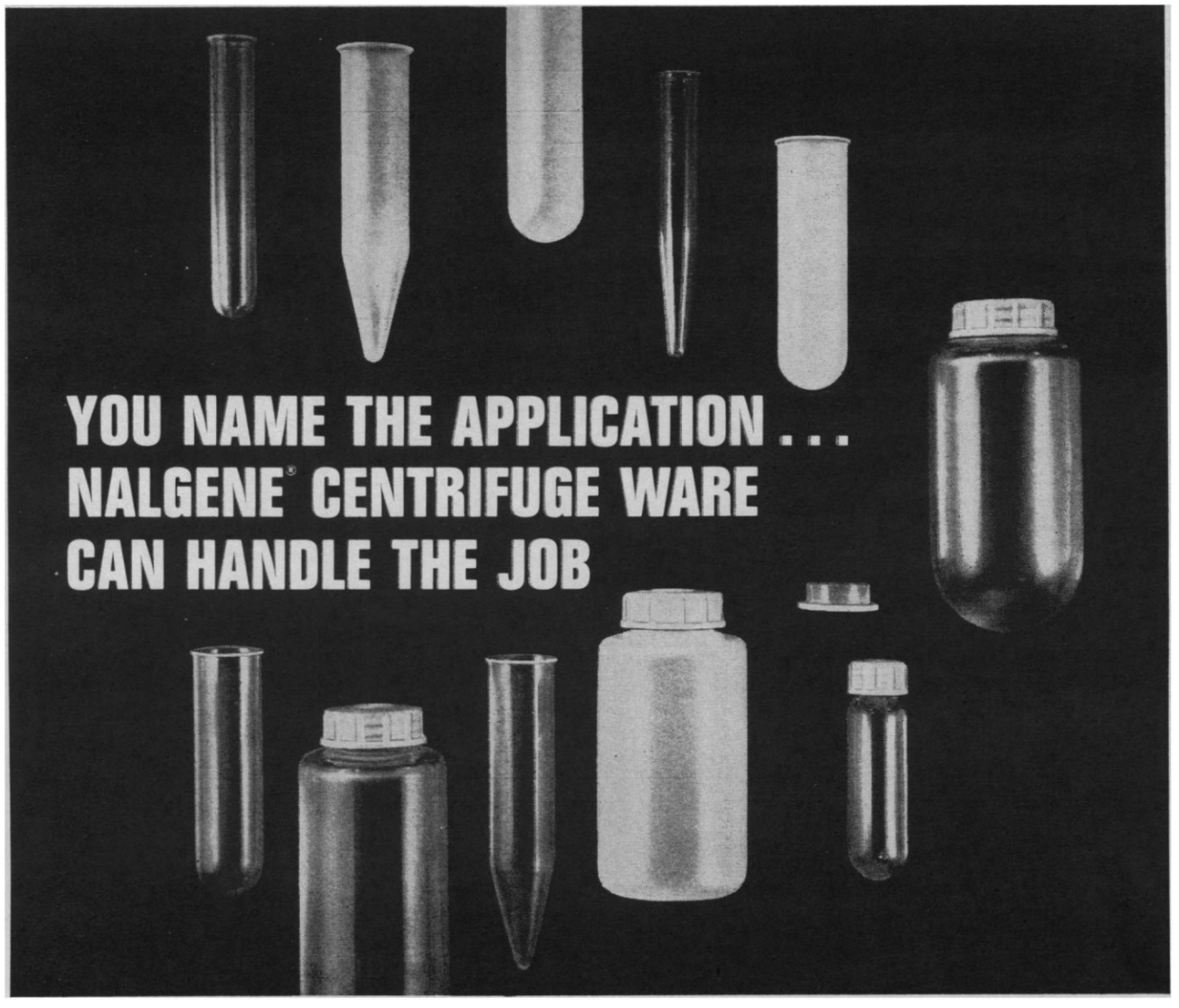
. . . I fail to find justification for Altus's conclusion that "relatively few of the total available first-borns" are affected by the relation of birth order to achievement or that "birth order is effectively linked to aptitude *only at the top level*" (emphasis his). This conclusion seems to me to be based on confusion between measurements of *populations* and measurements of *scores* of those who are in a selected group.

Among the observations cited by Altus in support of his conclusion are that: (i) the *percentage* of first-borns is much higher among National Merit *finalists* (the top 0.5 percent of the general population) than it is in the entire population; and (ii) the *scores* of *all* students who took the first round of National Merit tests do not "appear to be related to birth order." It is premature to conclude from these facts that any effect of birth order on ability is present only at the top level. It may simply be easier to *see* the effect at the top level, by comparing sizes of populations there.

Observations i and ii are consistent with the assumption that every first-born is benefited in some unknown way by a "first-born effect." For convenience, I will phrase a naive model of such an effect in terms of I.Q. scores. Suppose we postulate a first-born effect which shifts the entire intelligence distribution of first-borns upward by ¼ standard deviation (about 4 I.Q. points) relative to the rest of the population. Then the normal curve of error produces consequences which are strikingly similar to observations i and ii: (i) The percentage of first-borns with I.Q. of 140 or more is almost twice as high as the percentage of others with I.Q. of 140 or more, because this I.Q. is only 2¼ standard deviations from the mean for first-borns, but is 2½ standard deviations above the mean for the others; but (ii) in any *selected* group (selected by some criterion related to intelligence), the *mean score* of the first-borns differs very little from the mean score of the others, because the selection process has already produced some uniformity in the group. For example, among all those whose I.Q. is 110 or better, the mean I.Q. of the first-borns exceeds the mean I.Q. of the others by only 1 point. The students who take the National Merit tests are in this sort of selected group. Altus did not indicate whether some such *small* difference between first-borns and others might have been present in this group.

In order to see whether a first-born effect exists in the entire population, it would be helpful to take a closer look at the scores of all National Merit contestants, and to count the relative numbers of first-borns in this and other groups. If an effect is present in the entire population, it would show



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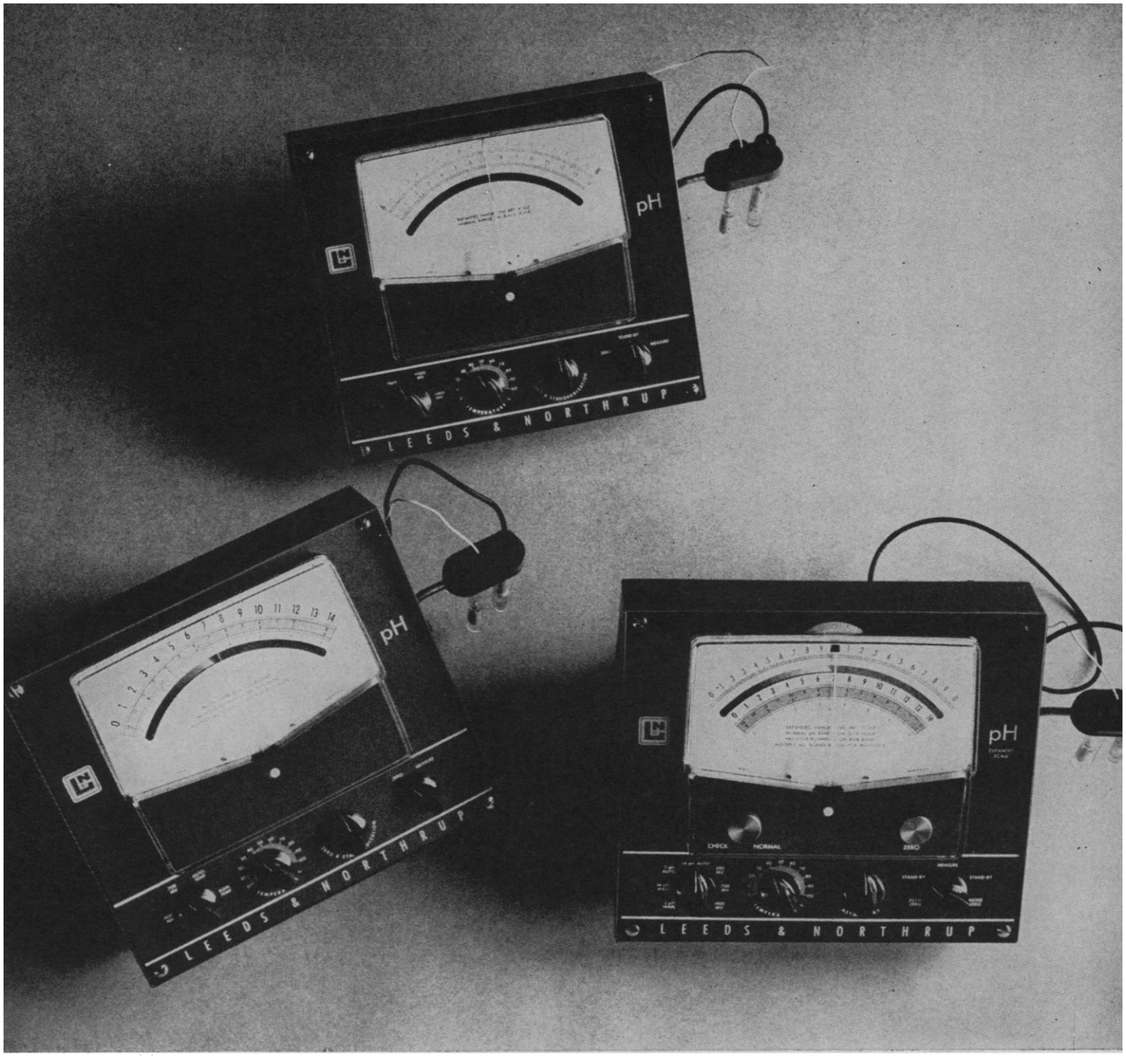

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up just as clearly at the low end of the distribution as at the high end, so it should be interesting to count the number of first-borns among the mentally retarded; the paucity of first-borns in that group should match the abundance of first-borns in the high-ability groups.

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. . . In none of the studies to which Altus refers was the representation of first-borns among eminent men (Fellows of the Royal Society, Rhodes Scholars, and outstanding scientists) compared with their representation among noneminent men in the same profession. As Schachter (*1*) has pointed out, the birth-order effect shown in these reports may be "simply a reflection of the fact that scholars, eminent or not, derive from a college population in which first-borns are in marked surplus. . . ."

In the few studies in which birth-order distributions of eminent and noneminent men in the same profession have been compared, the results are inconsistent. In only one (comparing eminent and less eminent architects) did first-borns tend ($P = .10$) to predominate among the more creative subjects (*2*). In one study, a different relationship was found: among eminent as compared with less eminent chemists, first-sons-but-not-oldest children and middle children were overrepresented; and only, oldest, and youngest children were underrepresented (*3*). Two studies—one of more and less creative industrial research chemists (*4*) and one of more and less eminent psychologists (*3*)—showed no relationship to being first-born. In these studies, comparisons were based on the simple proportions for more and less eminent men rather than on the discrepancy between observed and expected frequencies computed for family size distributions, so variations in family size could obscure otherwise significant tendencies or exaggerate otherwise insignificant differences. If, for example, the eminent chemists tended to come from larger families than did the noneminent chemists, the "overrepresentation" of middle children could be an artifact of the disproportionate opportunity to be a middle child. There are apparently no studies in which eminence is varied and the dependent variable is the excess of first-borns. . . .

A study of intellectually able male entrants in the Westinghouse Science Talent Search (*5*) failed to induce any simple relation between family structure and early scientific attainment as judged by ratings of the projects submitted. While there was some indication of an inhibiting influence on the younger son who is separated from his next oldest sibling by five or more years, for a considerable range of family-size, sibling-sex, sibling-separation, and ordinal-position combinations any "favorable" effects of one ordinal position appeared to be as susceptible to attenuation by other influences as any "unfavorable" effects of another ordinal position. If early scientific attainment may be considered to be on some continuum with subsequent attainment, our results are consistent with Schachter's hypothesis that the so-called relation between eminence and birth order is a methodological artifact.

LOIS-ELLEN DATTA
National Institute of Mental Health,
Bethesda, Maryland

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5. L. Datta, "Birth Order and Early Scientific Attainment" (1965), mimeographed.

Hooke raises the valid point that we do not have satisfactory base rates for the actual proportions of the various ordinal positions in any given age group. He also cites census data showing marked differences from year to year in the proportion of first births. If one averages the percentages of first births from the census data cited by Folger and Bayer for the years 1942–1946, one gets 38.04 as a mean. These 5 years are the birth years of all college matriculants in 1960–1963 who were 17 or 18 years of age on entrance. During this 4-year span, the percentage of first-borns matriculating at the University of California at Santa Barbara (the great majority of whom were 17 or 18) was 61.34. The difference of 23.3 percentage points, if the census data are taken as an approximation of the proportion of suitably aged first-borns in the population, would seem to buttress my

thesis. Ratios of first births may vary considerably year to year, but my data—and Schachter's (*1*)—tend to show an overrepresentation in college of the first-born which is not to be explained simply as derivative from these ratios, varying or constant.

Actually, in a state having such an enormous in-migration as California it would be difficult (if not impossible) to assign with precision any figure for the percentage of first-borns among our citizens of a given age. I did survey the seniors in two local senior high schools in October 1963, and found the percentage of first-borns to be 37.3. Most of these seniors would have been born in 1946, for which year Folger and Bayer cite a national percentage of first births of 39.3. Schachter (*1*) surveyed all students in a Minneapolis high school in 1961 and reported "no birth order effect at all." He found first-borns from families of two, four, and six children to be somewhat underrepresented; from families of three, five, and seven or more children to be slightly overrepresented. Overall, the differences canceled out, as, Schachter points out, he would expect in a school system which enrolls almost everybody who is of high school age. Schachter checked the Minnesota census data on first births for the years when his high school students would have been born. The difference between what obtained in the high school and what the census figures showed was a negligible 0.18 percent. Schachter also cites a study from West Germany which shows the birth orders to be "normally" distributed among an N of 3315. Stewart in a study (*2*) made in 1958 of 7000 children in London secondary schools found a relatively "normal"—that is, almost 50-50—distribution of older and younger from the two-child family; the number of second-born slightly exceeded the number of first-born.

It is clearly true that the percentage of first births varies from year to year and from state to state. It is also true that short of a huge normative sample it will be impossible to answer with precision Hooke's question of base rates. But the evidence in the preceding paragraph—small and parochial as it is—would seem to imply that gross deviation from theoretical expectancy does not appear to be the norm.

It is in college that marked deviation from expectancy comes: I have cited (*3*) studies which show this condition to exist, at least as far back as 1928, on through the 1930's, the 1940's, the 1950's, and, of course, the 1960's. Schachter sampled (*1*) the proportion of first- and second-born from two-child families matriculating at Columbia College for a 20-year span, 1943–1962, and found some variation in the proportions of younger and older, but in all the intervals in his table the first-born exceeded the younger. It does not seem reasonable that trends of the kind just cited running over decades are entirely derivative from the annual crop of first births.

Stewart's study of London secondary schools also shows a marked educational orientation in the first-born. Proportionally more of the first-born were found to have passed the state examination (the "11-plus") the passing of which admits to the grammar school, which is a college-preparatory secondary school. Obviously, more of the second-born go to the secondary school of lesser prestige, called the modern school, a terminal school for most who attend. In both kinds of high school, among those who persisted beyond the age of compulsory attendance twice as many were first-born as second-born. It seems that in the United States, where practically everyone goes to high school, no birth-order effects show short of college; but in England, where universal education, at state expense, is not so much a matter of course, the scholarly predilection of the first-born shows itself as soon as compulsion to attend is dropped, even in the secondary school.

As to the data on eminence, I would point first to its unanimity, regardless of the criterion employed, for nearly 100 years of investigation. Second, I would note that if a first-born in a given family becomes eminent (or, for whatever it is worth, gets into *Who's Who*, say), he continues to be eminent (or remains in *Who's Who*) usually for a decade or so. Now if there is a younger sibling in the eminent one's family, he should attain his eminence before the star of the first-born has set. I would, therefore, accept the data on eminence in the two-child family as more likely to be fairly valid than would Hooke, who thinks that a variation from 50-50 in the two-child family is not so significant an index. I do not think that eminence, like a comet, belongs to a single year; more often it sheds light for

a generation, giving time for the laggards to catch up—if they can. But like Hooke I would feel much more comfortable with an established set of expectancy ratios for our birth orders.

Datta's comment that eminent people show more first-borns simply because they come from a pool of college graduates merely pushes the need for explanation back to the question why the first-born are overrepresented in college. As for the eminent always deriving from a pool of college graduates, I am willing to accept this as true of scientists of today. Almost all eminent scientists in the United States, I suspect, have two or three college degrees, with the doctorate included. I am not so sure that having a college degree was the norm for scientists in 1850, though it may have been. I am even less sure that it is the norm of those who are eminent in fields of artistic endeavor, even today. Of the five male Americans who were Nobel prize winners in literature, only Sinclair Lewis earned a degree.

Of Oberg's strictures based on Thurstone's study, I will say this: Thurstone's study was one of dozens at that period, over a generation back, which attempted to link birth order with IQ. When Harold Jones in 1954 (*4*) summarized all the research—including Thurstone's—on this topic, his conclusion was that "no birth-order differences in intelligence occur in normal samples."

Jones was right, I should think, in so evaluating studies at his disposal when he wrote over a decade ago. But a different opinion may be in order when Robert Nichols publishes his findings (*5*) based upon 800,000 high school students who have taken the National Merit Scholarship qualifying examination. With such a huge number of cases, perhaps we may also have a partial answer to whether the various birth orders follow postulated expectancy ratios.

WILLIAM D. ALTUS

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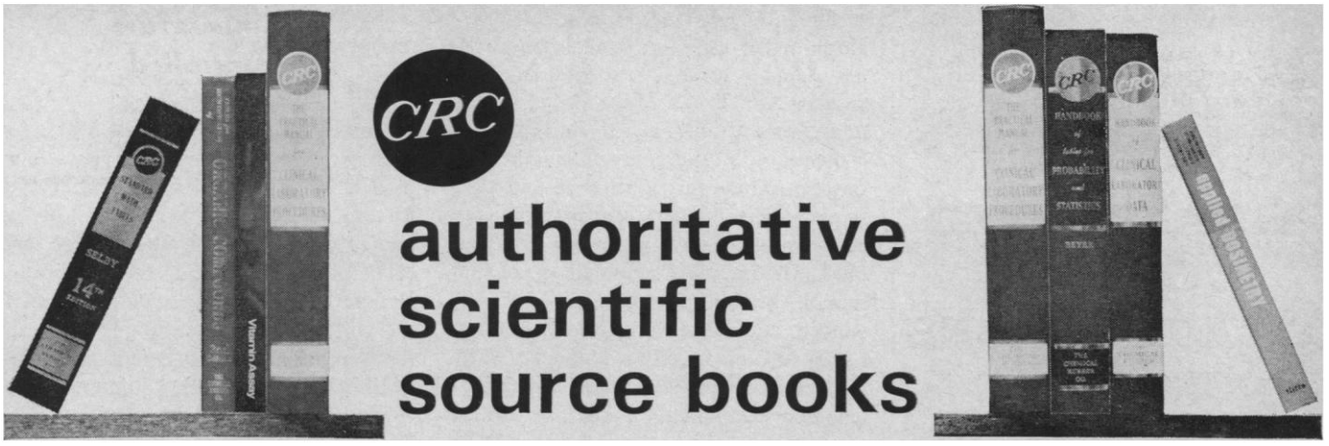

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Engineering Manpower

The Office of Education figures (News and Comment, 11 Feb., p. 667) projecting the number of engineering degrees to be awarded in 1970 and 1975 seem to me to be very unrealistic in view of the actual figures given for 1960 and 1965. The increase in percentage of high school graduates going on for advanced education has resulted in few additional engineering students. (This is even more evident from a table in the February issue of the *Journal of Engineering Education*, which shows the number of bachelor's, master's, and doctor's degrees awarded in 1949–65.) In fact, the gain that would be expected from the general increase has not materialized because more students capable of engineering studies have gone the route of pure science.

The large gain of 72 percent in M.S. graduates that occurred in engineering between 1960 and 1965 was accomplished with essentially no increase in B.S. graduates. Thus the ratio of one M.S. to three B.S. students represents a saturation ratio; few additional students would be qualified for advanced study. Therefore in the projection for 1970 of a 13,000 increase in B.S. graduates accompanied by a 9500 gain in M.S. graduates, both figures appear unreasonable. The ratio of M.S. to B.S. graduates is projected as 44 percent. This is much too high unless the standards of the M.S. program are lowered significantly or a much better quality of students suddenly appears on the scene. In my opinion neither of these situations is likely. Moreover, the influx of federal funds in the past several years has produced a large change in the number of engineering graduate students that the universities have been able to accommodate mainly because the relative efficiency of the total engineering effort has been significantly improved by utilizing unused capacity and by redirection of efforts toward graduate work. In the future, however, the slope of this curve will be flattened considerably as the total cost of any gains must be fully met with increased funds. In fact it is not at all apparent that, even if the money for such an escalation in graduate enrollment were forthcoming, the engineering departments of the universities would be able to find enough qualified personnel to man the programs, especially those for the Ph.D. . . .

JOHN O. MINGLE
Kansas State University, Manhattan

Elementary Science: "Content" or "Process"?

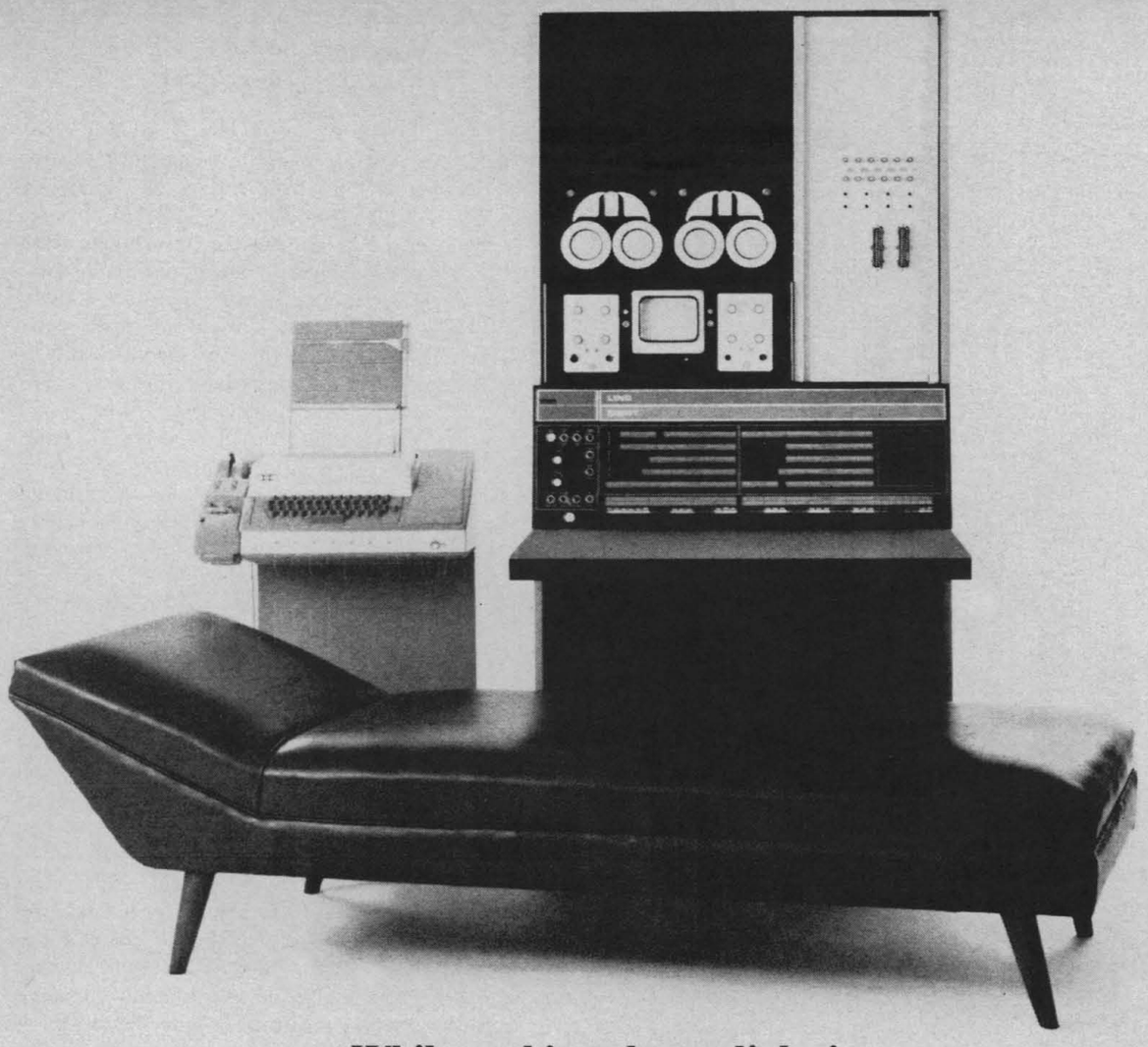
Commenting (Letters, 4 Mar.) on a new program of elementary science instruction described by R. M. Gagné (7 Jan., p. 49), J. M. Atkin, by repeatedly applying the unfortunate term "skills," gives a pejorative coloration to the elements of scientific activity which the program is designed to teach —observation, measurement, classification, interpreting data, inference, and formulating hypotheses. Atkin infers that the educators derived this list from an analysis of science by scientists, and he remarks that scientists are not particularly qualified "to characterize scientific activity." He offers that observation in support of an argument favoring "content" over "process" in grade school teaching of science.

Atkin asserts that while scientists "often measure, and they sometimes hypothesize, and they always make inferences," they don't usually study how to do these things "in some abstract fashion preparatory to conducting research." Why not? Is there reason to believe that a deep and broad understanding of these elements of sciences would not be fruitful to scientists? And what about a meaningful characterization of *cause* and *effect* and *evidence* in science? Obviously such concepts cannot be studied independently of examples, but is it correct to imply that they differ so much from field to field that they can safely be neglected in school?

Atkin claims that a "content" approach will provide children with a few fundamental principles without the risk of mastering "abstracted processes which may not, *on further analysis*, turn out to reflect accurately the nature of scientific inquiry" (italics added). If this point of view underlies the Elementary-School Science Project, which Atkin is presumably defending, I am worried about what may emerge from it.

A few years ago, would not "fundamental principles" have included the conservation of parity and the inability of certain gases to form compounds? Is it not time for the "further analysis" of the nature of scientific inquiry? Perhaps the revamping of secondary school science education should await the outcome.

NORMAN H. GRANT
Wyeth Laboratories, Radnor, Pennsylvania



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27 May 1966, Volume 152, Number 3726 **SCIENCE**

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Academic Quality

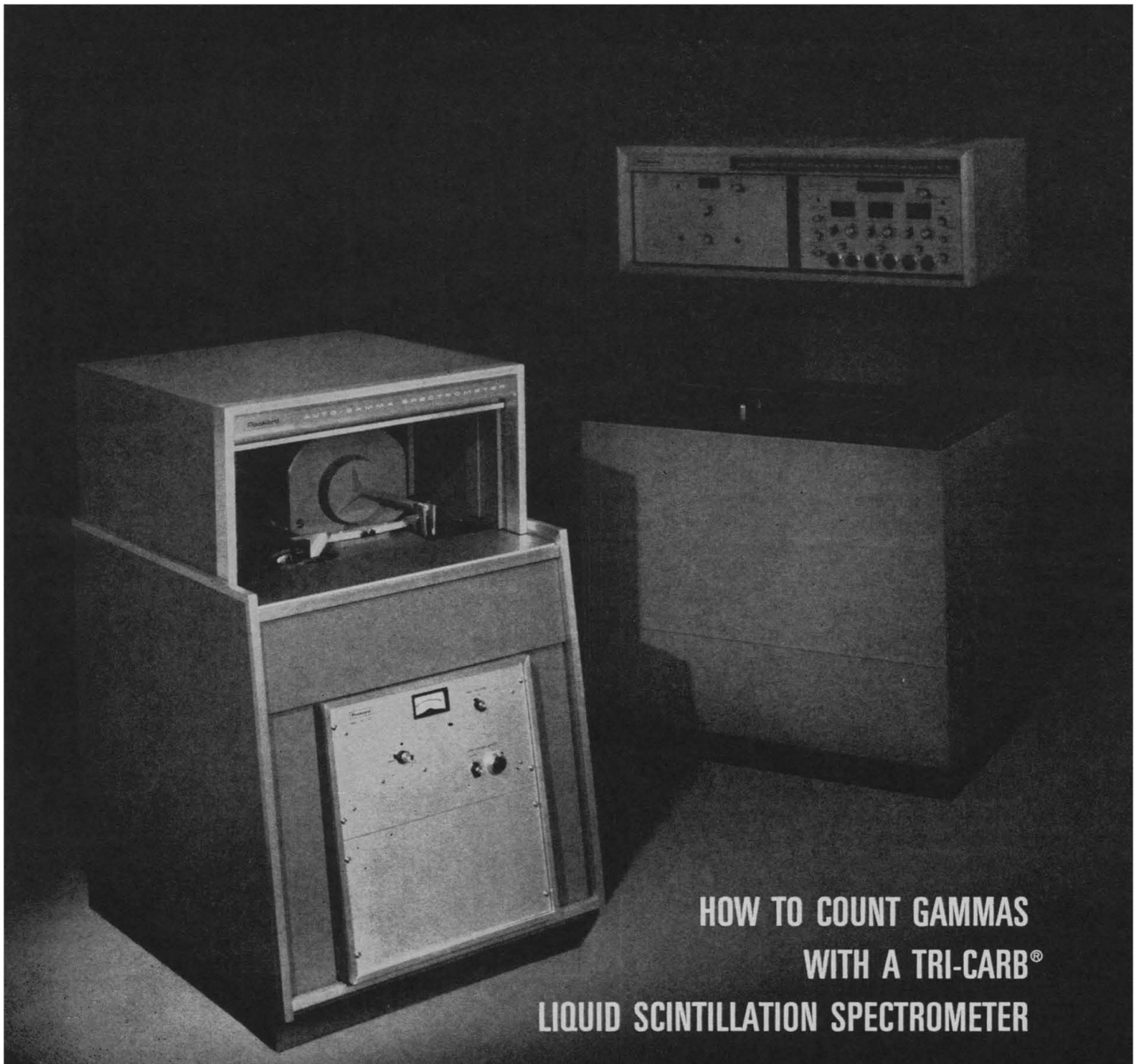
There is frequent occasion to ask, "How good is the department of X at the University of Y?" Answers are now available for 29 academic fields in the 106 universities that award some 95 percent of all Ph.D. degrees in the U.S. Allan M. Cartter, vice president of the American Council on Education, has tabulated the judgments of informed scholars in each field to answer two questions: How good is the quality of the graduate faculty? How effective is the graduate program they offer? (A fuller report of the study appears on page 1226.)

Clearly it is better to have valid and reliable answers to these questions than to depend on estimates of unknown quality. The reliability of the judgments is extremely high (average, .99). Ratings are essentially the same whether made by department heads, senior faculty members, or junior faculty members. There is a bit of disagreement, but still surprisingly good consensus, among judges in different geographic regions and with different past or present relations to the institutions judged. Correlations with other evidence of quality are high. All in all, the ratings are highly dependable statements of the quality of graduate departments as judged by informed peers.

Of the 1663 departments surveyed, in all 29 fields, 140 were rated as distinguished, 405 as strong, 288 as good, 328 as adequate, 451 as marginal, and 51 as insufficient to give satisfactory graduate training. There are, of course, still other departments, of varying quality, in the institutions that award the remaining 5 percent of Ph.D. degrees.

The tabulated departmental ratings can be used as the quality equivalent of a social register, or, to use a different analogy, as a kind of academic handicappers' manual. More seriously, they give any department a solid basis for knowing how far it has to go to get where it wants to be. And on a national scale the quality ratings, taken together with related information concerning salary schedules, budgets, libraries, and other characteristics, are highly relevant to the current effort to increase the number of first-rate institutions and to achieve a wider geographic spread of institutions of excellence. Comparison of this study with several earlier but less detailed ones indicates that some progress is being made. There are institutions (Arizona, Delaware) that have built up one distinguished or strong department, and others that have achieved several. Washington University in St. Louis now has four strong, nine good, and six adequate departments. The University of Washington in Seattle is an even better example of an institution on the move toward distinguished quality. It now has 15 strong, nine good, and one adequate department. Such examples provide welcome evidence that we are increasing the opportunity for graduate work of high quality and making it available on a wider geographic basis.

But the data also provide a sobering reminder that these goals cannot be achieved by any easy method such as a simple change in the geographic distribution of currently available research and fellowship funds. Large institutional grants to selected universities that already have some strong departments, that have salary schedules high enough to attract and retain men of top quality, and that have other advantages and are on the way upward will elevate some good departments to strong ones and some strong departments to distinguished ones. But much work, money, devotion, and sound judgment will be required to increase greatly the number of distinguished and strong departments.—DAEL WOLFLE



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20–22. **Astrophysics**, 14th intern. symp., Liége, Belgium. (P. Ledoux, Inst. d'Astrophysique, Cointe-Sclessin, Belgium)

20–22. **Colloid and Surface Chemistry** Div., American Chemical Soc., 40th natl. symp., Univ. of Wisconsin, Madison. (E. Hutchinson, Dept. of Chemistry, Stanford Univ., Palo Alto, Calif. 94300)

20–22. American **Dairy Science** Assoc., Oregon State Univ., Corvallis. (E. O. Herreid, Station A. Box 250, Champaign, Ill.)

20–22. American **Malacological Union**, Pacific Div., conv., Univ. of Washington, Seattle. (Mrs. E. Marshall, 2237 NE 175 St., Seattle)

20–22. **Organic Scintillators**, symp., Argonne, Ill. (D. L. Horrocks, Chemistry Div., Argonne Natl. Laboratory, 9700 S. Cass Ave., Argonne 60440)

20–22. American **Physical** Soc., Minneapolis, Minn. (R. G. Sachs, P.O. Box 344, Argonne, Ill.)

20–23. American Soc. for **Engineering Education**, 74th annual mtg., Washington State Univ., Pullman. (L. Winner, 152 W. 42 St., New York 10036)

20–24. **Air Pollution Control** Assoc., 59th annual mtg., San Francisco, Calif. (A. H. Batchelder, California Research Corp., 200 Bush St., San Francisco 94120)

20–24. **Crystal Growth**, intern. conf., Boston, Mass. (Secretary, Crystal Growth Conference, 40 Acorn Park, Cambridge, Mass. 02140)

20–24. Determination and Applications of **Radial Velocities**, symp., Toronto, Ont., Canada. (R. M. Petrie, Dominion Astrophysical Observatory, R. R. 7, Victoria, B.C., Canada)

20–25. International Federation of **Automatic Control**, 3rd congr., London, England. (G. Weiss, Dept. of Electrical Engineering, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn, N.Y. 11201)

20–30. Commission for the **Geological Map of the World**, general mtg., Paris, France. (F. Delaney, 12, rue de Bourgogne, Paris 7)

21–22. **High Lysine Corn**, conf., Purdue Univ., Lafayette, Ind. (Div. of Conferences and Continuation Services, Purdue Univ., West Lafayette, Ind. 47907)

21–23. Precision **Electromagnetic Measurements**, 5th biennial conf., Boulder, Colo. (J. Cronland, Bureau of Continuation Education, 328 University Memorial Center, Univ. of Colorado, Boulder 80304)

22–24. **Calorimetry**, 21st conf., Boulder, Colo. (O. J. Kleppa, Inst. for the Study of Metals, Univ. of Chicago, Chicago, Ill. 60637)

22–24. **Heat Transfer and Fluid Mechanics**, inst., Univ. of Santa Clara, Santa Clara, Calif. (J. A. Miller, Dept. of Aeronautics, U.S. Naval Postgraduate School, Monterey, Calif.)

22–24. Germinal Centers of **Lymphatic Tissue**, conf., Bern, Switzerland. (H. Cottier, Inst. of Pathology, Freiburgstr. 30, 3008 Bern)

22–24. **Quantum Optics**, 2nd conf., Univ. of Rochester, Rochester, N.Y. (R. H. Picard, Optical Physics Laboratory, Air Force Cambridge Research Laboratories, Hanscom Field, Bedford, Mass.)

22–24. **Wood Chemistry**, 2nd Canadian symp., Ste. Marguerite, P.Q. (Chemical Inst. of Canada, 48 Rideau St., Ottawa 2)

22–25. **Endocrine** Soc., 48th annual mtg., Chicago, Ill. (The Society, 1200 N. Walker, Oklahoma City, Okla.)

23–25. **Carotinoids Other than Vitamin A**, conf., Trondheim, Norway. (N. A. Sorensen, Norwegian Inst. of Technology, Trondheim)

23–25. **Nuclear Energy**, 11th intern. congr., Rome, Italy. (Secretariat, Comitato Nacionale per l'Energia Nucleare, Via Belisario, 15, Rome)

23–25. National Soc. of **Nuclear Medicine**, 13th annual mtg., Philadelphia, Pa. (The Society, 333 N. Michigan Ave., Chicago, Ill. 60601)

23–25. **Obstetrics and Gynecology**, 14th Scandinavian congr., Oslo, Norway. (K. Björo, University Clinic of Obstetrics and Gynecology, Oslo)

23–26. **Nutritional and Metabolic Maladies**, European congr., Vittel, France. (F. Dumez, Soc. Général des Eaux Minérales de Vittel, 44, avenue George V, Paris 8, France)

23–25. **Biomedical Engineering**, symp., Milwaukee, Wis. (H. S. Geer, 617 N. 13 St., Milwaukee 53233)

24–25. Naturally Occurring **Sulphur Compounds**, conf., Copenhagen, Denmark. (A. Kjaer, Royal Veterinary and Agricultural College, Copenhagen V)

25–26. **Drug Information** Assoc., annual mtg., Chicago, Ill. (E. Conrad, American Medical Assoc., Chicago)

25–2. **Microcirculation**, 4th European conf., Cambridge, England. (P. A. G. Monro, Anatomy School, Univ. of Cambridge, Downing St., Cambridge)

26–28. Society for **Investigative Dermatology**, Chicago, Ill. (G. W. Hambrick, Jr., 3400 Spruce St., Philadelphia, Pa. 19104)

26–29. American Soc. of **Agricultural Engineers**, annual mtg., Univ. of Massachusetts, Amherst. (J. L. Butt, P.O. Box 229, St. Joseph, Mich.)

26–29. European Soc. of **Cardiovascular Surgery**, 15th intern. congr., Amsterdam, Netherlands. (Holland Organizing Centre, 16, Lange Voorhout, The Hague)

26–30. American **Medical** Assoc., 99th annual mtg., Chicago, Ill. (The Association, 535 N. Dearborn St., Chicago, Ill. 60601)

26–30. American **Veterinary Medical** Assoc., 103rd annual mtg., Louisville, Ky. (The Association, 600 S. Michigan Ave., Chicago, Ill.)

26–1. American **Physical Therapy** Assoc., Los Angeles, Calif. (L. Blair, 1790 Broadway, New York 10019)

26–1. American Soc. for **Testing and Materials**, 69th annual mtg., Atlantic City, N.J. (ASTM, 1916 Race St., Philadelphia, Pa.)

26–2. **Chemistry of Natural Products**, 4th intern. symp., Stockholm, Sweden. (G. Aulin-Erdtman, Drottning Kristinas Vag 53, Stockholm O)

26–2. International Assoc. of **Gerontology**, 7th intern. congr., Vienna, Austria. (Mrs. I. Andersons, Austrian Medical Academy, Alserstr. 4, Vienna 9)

26–2. **Radiation Research**, 3rd intern. congr., Cortina d'Ampezzo, Italy. (G. Silini, Casella Postale 2359, Rome, Italy)

26–3. National **Education** Assoc., conv., Miami Beach, Fla. (W. G. Carr, NEA, 1201 16th St., NW, Washington, D.C.)

27–28. **Astronomical** Soc. of the Pacific, annual summer mtg., Seattle, Wash. (P. W. Hodge, Dept. of Astronomy, Univ. of Washington, Seattle 98105)

27–28. **Fluorine Chemistry**, symp., Ann Arbor, Mich. (R. W. Parry, Dept. of Chemistry, Univ. of Michigan, Ann Arbor 48104)

27–29. **Aerospace Sciences**, West Coast mtg., Los Angeles, Calif. (W. J. Brunke, American Institute of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

27–29. American Soc. of **Heating, Refrigerating, and Air-Conditioning Engineers**, Toronto, Ont., Canada. (R. C. Cross, 345 E. 47 St., New York 10017)

27–29. **Marine Technology** Soc., 2nd annual conf., Washington, D.C. (C. W. Covey, Undersea Technology, 617 Lynn Bldg., 1111 N. 19 St., Arlington, Va. 22209)

27–29. Association for **Research in Ophthalmology**, mtg., Chicago, Ill. (H. E. Kaufman, Dept. of Ophthalmology, Univ. of Florida College of Medicine, Gainesville)

27–29. **Transfer of Physical Characteristics in Moving Fluids**, symp., Vienna, Austria. (H. Parkus, Technische Hochschule Wien, Vienna IV)

27–29. **Vacuum Metallurgy** Div., American Vacuum Soc., 9th annual mtg., New York, N.Y. (M. A. Orehoski, U.S. Steel Corp., Applied Research Laboratory, Monroeville, Pa. 15146)

27–30. **Health Physics** Soc., annual mtg., Houston, Tex. (J. G. Terrill, Jr., Div. of Radiological Health, U.S. Public Health Service, Washington, D.C.)

27–30. **Molecular Biology of Viruses**, symp., Univ. of Alberta, Edmonton, Canada. (J. S. Colter, Dept. of Biochemistry, Univ. of Alberta, Edmonton)

27–30. International **Primatological** Soc., congr., Frankfurt, Germany. (Congress Secretary, Anatomical Inst., Ludwig Rehn Str. 14, 6 Frankfurt)

27–1. **Nobel Prize Winners**, 16th mtg., Lindau im Bodensee, West Germany. (H. F. Kiderlen, Standing Working Committee for the Nobel Prize Winner Mtgs., Postfach 11, 899 Lindau im Bodensee)

27–6. **Geophysical Theory and Computers**, symp., Cambridge, England, and Edinburgh, Scotland. (C. H. Smith, Upper Mantle Committee, Geological Survey of Canada, Ottawa, Ont.)

28–1. **Ferroelectricity**, intern. mtg., Prague, Czechoslovakia. (J. Fousek, Czechoslovak Acad. of Sciences, Inst. of Physics, Lumumbova 1, Prague 8)

28–1. **Surgery**, Czechoslovak congr., Bratislava. (L. Kuzela, Partizanska 2, Bratislava)

29–1. **Chemistry of Sulfides**, conf., Princeton Univ., Princeton, N.J. (J. Sapoch, 306 Nassau Hall, Princeton)

30–2. European Soc. for the Study of **Drug Toxicity**, congr., Prague, Czechoslovakia. (Tschechoslowskische Medizinische Gesellschaft, J. E. Purkyne, Prague)

31–3. **Tissue Culture** Assoc., annual mtg., San Francisco, Calif. (W. A. Nelson-Rees, Naval Biological Laboratory, Naval Supply Center, Oakland, Calif., 94625)

July

1–3. **Radiology of Normal and Pathological** Mammary Structures, European symp., Strasbourg, France. (C. Gros, Service Central de Radiologie, Hôpital Civil, Strasbourg 67)

4–8. **British Medical Assoc.**, Exeter, England. (Secretary, Tavistock Sq., London W.C.1, England)

4–8. **Magnetohydrodynamic Electrical Power Generation**, intern. symp., Salzburg, Austria. (European Nuclear Energy Agency, 38 blvd. Suchet, Paris 16)

4–8. **Mathematical and Computational Methods in Social Sciences**, Rome, Italy. (P. Maranda, Dept. of Anthropology, Peabody Museum, Harvard Univ., Cambridge, Mass. 02138)

4–8. European **Orthodontic** Soc., 42nd congr., Garmisch-Partenkirchen, West Germany. (H. Derichsweiler, Sonnenstr. 27/111, Munich 15)

4–8. **Rarefied Gas Dynamics**, 5th intern. symp., Oxford, England. (C. L. Brundin, Engineering Laboratory, Parks Rd., Oxford)

4–9. **South African Assoc. for the Advancement of Science**, annual congr., Johannesburg. (I. M. Sinclair, The Association, P.O. Box 6894, Johannesburg)

4–15. **Ekistics** and the Future of Human Settlements, intern. seminar, Athens, Greece. (D. Iatridis, 24, Strat. Syndesmou St., Athens 136)

5–8. **Blood Groups of Domestic Animals**, 10th European conf., Paris, France. (J. Bouw, European Soc. for Animal Blood Group Research, 5 Duivendaal, Wageningen, Netherlands)

5–8. **Lens Design** with Large Computers, intern. conf., Rochester, N.Y. (Inst. of Optics, Univ. of Rochester, Rochester 14627)

5–9. Technical and Industrial **Communications**, 9th annual inst., Colorado State Univ., Fort Collins. (B. K. McKee, Inst. in Technical and Industrial Communications, Rm. 322 Liberal Arts, Colorado State Univ., Fort Collins 80521)

5–9. Society for the Study of **Fertility**, annual mtg., Cambridge, England. (D. Casey, 8 Jesus Lane, Cambridge)

5–9. American Soc. of **Pharmacognosy**, 7th annual mtg., Univ. of Minnesota, Minneapolis. (L. C. Schramm, College of Pharmacy, Univ. of Minnesota, Minneapolis 55455)

6–7. **Space Flight Mechanics**, specialist conf., Denver, Colo. (R. S. Novosad, Martin-Marietta Corp., Mail No. A127, Denver 80201)

6–8. Space and Ballistic **Missile Technology**, 11th symp., U.S. Air Force Academy, Colo. (C. T. Morrow, Aerospace Corp., P.O. Box 95083, Los Angeles, Calif. 90045)

6–9. National Soc. of **Professional Engineers**, annual mtg., Minneapolis, Minn. (The Society, 2029 K St., NW, Washington, D.C. 20006)

7–8. **Spectroscopy and Automation**, symp., Inst. of Physics and the Physics Soc., Univ. of Bristol, Bristol, England. (R. Jenkins, M.E.L., Equipment Co., Analytical Laboratory, 207 Kings Cross Rd., London W.C.1)

7–8. Chemically Grown **Surface Films**, conf., Univ. of Strathclyde, Strathclyde,

Scotland. (Meetings Officer, Inst. of Physics and the Physics Soc., 47 Belgrave Sq., London S.W.1)

8–12. **Graph Theory**, seminar, Rome, Italy. (International Computation Centre, Viale Civilta del Lavoro 23, Rome)

9–15. **Medical Women's** Intern. Assoc., 10th congr., Rochester, N.Y., and Niagara Falls, Ont. (The Association, 1790 Broadway, New York 10019)

10–15. **Power**, mtg., Inst. of Electrical and Electronics Engineers, New Orleans, La. (E. C. Day, IEEE, 345 E. 47 St., New York 10017)

10–16. American **Library** Assoc., annual conf., New York, N.Y. (D. H. Clift, 50 E. Huron St., Chicago, Ill. 60611)

11–14. **Aerospace Systems**, conf., Seattle, Wash. (Inst. of Electrical and Electronics Engineers, 345 E. 47 St., New York 10017)

11–15. International Council for **Bird Preservation**, world conf., Cambridge, England. (The Council, c/o British Museum of Natural History, Cromwell Rd., London S.W.7)

11–15. Use of **Isotopes in Milk Technology**, seminar, Munich, West Germany. (Intern. Agency Liaison Branch, Office of the Director General, Food and Argiculture Org., Via delle Termi di Caracalla, Rome, Italy)

11–15. **Weights and Measures**, 51st natl. conf., Denver, Colo. (Executive Secy. of the Conference, National Bureau of Standards, Washington, D.C. 20234)

11–16. **Graphic Design and Visual Communications Technology**, 2nd intern. congr., Bled Yugoslavia. (Intern. Council of Graphic Design Assoc., Herengracht 567, Amsterdam-C, Netherlands)

11–16. **Hydraulics** 2nd Latin American congr., Caracas, Venezuela. (M. Gonzalez, Colegio de Ingenieros de Venezuela, Apartado de Correos 2006, Caracas)

11–16. **Reaction Mechanisms of Inorganic Solids**, intern, symp., Aberdeen, Scotland. (General Secretary, Chemical Soc., Burlington House, London W.1, England)

11–16. **Statistical Mechanics and Thermodynamics**, intern. symp., Copenhagen, Denmark. (T. A. Bak, H. C. Ørsted Inst., Univ. of Copenhagen, Copenhagen)

11–30. **Linguistics**, 2nd seminar, Grenoble, France. (Intern. Assoc. of Applied Linguistics, 9, rue Lhomond, Paris 5)

12–14. **Failure Analysis**, William H. Eisenman conf., New York, N.Y. (J. V. Richard, American Soc. for Metals, Metals Park, Ohio 44073)

12–15. Use of **Radioisotopes and Radiation in Dairy Science** and Technology, seminar, Vienna, Austria. (P. Fent, Div. of Public Information, Intern. Atomic Energy Agency, A-1010, Kärntnerring 11, Vienna)

12–19. International Union of **Crystallography**, 7th general assembly and congr., Moscow, U.S.S.R. (J. Ibers, Chemistry Dept., Northwestern Univ., Evanston, Ill.)

14–16. **Listeriosis**, 3rd intern. symp., Bilthoven, Netherlands. (E. H. Kampelmacher, Natl. Inst. of Public Health, Sterrenbos 1, Utrecht)

14–16. Uses of **Plastics** in the Pacific Northwest, workshop, Richland, Wash. (R. A. V. Raff, College of Engineering, Washington State Univ., Pullman 99163)

15–19. **Tetanus**, intern. conf., Bern, Switzerland. (W. Mamie, Tiefenauspital der Stadt Bern, Bern)

17–21. Canadian **Veterinary Medical** Assoc., annual conv., Voncouver, B.C. (The Association, P.O. Box 416 C.P., Ottawa 2, Ont.)

17–22. **Control Prodecures in Drug Production**, 2nd seminar, Hershey, Pa. (W. L. Blockstein, Extension Services in Pharmacy, Univ. of Wisconsin, Madison 53706)

17–22. American Soc. for **Pharmacology and Experimental Therapeutics**, mtg., Mexico City, Mexico. (E. B. Cook, The Society, 9650 Wisconsin Ave., NW, Washington, D.C. 20014)

17–23. **Animal Venoms**, intern. symp., Saõ Paulo, Brazil. (Conference Secretary, Inst. Butantan, Caixa Postal 65, Saõ Paulo)

18–20. American Inst. of **Aeronautics and Astronautics**, Interagency Chemical **Rocket Propulsion** Group, mtg., Washington, D.C. (Chemical Propulsion Information Agency, 8621 Georgia Ave., Silver Spring, Md.)

18–20. **Aerospace Reliability and Maintainability**, 5th mtg., New York, N.Y. (American Inst. of Aeronautics and Astronomics, 1290 Sixth Ave., New York 10019)

18–22. World Federation for **Mental Health**, 19th mtg., Prague, Czechoslovakia. (J. E. Purkyne Czechoslovak Medical Soc., Sokolska 31, Prague)

18–22. Nuclear and Space **Radiation Effects**, annual conf., Stanford Univ., Palo Alto, Calif. (V. A. J. van Lint, General Atomics, Special Nuclear Effects Laboratory, Box 608, San Diego, Calif. 92112)

18–23. Society of the **Chemical Industry**, annual mtg., Dublin, Ireland. (The Society, 41 Belgrave Sq., London S.W.1, England)

18–24. American Soc. for **Horticultural Science**, 14th Caribbean region mtg., El Salvador, San Salvador. (E. H. Casseres, Calle Londres 40, Mexico 6. D.F.)

19–21. **Alkali Metals**, intern. symp., Nottingham, England. (General Secretary, Chemical Soc., Burlington House, London W.1)

20–21. **Crystal Growth**, symp., Moscow, U.S.S.R. (N. V. Belov, Inst. of Crystallography, Academy of Sciences of the U.S.S.R., Lenin Prospekt 59, Moscow B-333)

21–24. **Data Processing**, intern conf., Chicago, Ill. (Data Processing Management Assoc., 524 Busse Highway, Park Ridge, Ill. 60068)

23–28. **Anatomy**, 1st Pan American congr., Mexico, D.F. (Congress Secretariat, Apt. Postal 25279, Admon. de Correos 70, Mexico 20)

24–30. **Microbiology**, 9th intern. congr., Moscow, U.S.S.R. (N. E. Gibbons, Intern. Assoc. of Microbiological Soc., Div. of Applied Biology, Natl. Research Council, Ottawa 2, Ont., Canada)

24–30. **Ornithology**, 14th intern. congr., Oxford, England. (N. Tinbergen, Dept. of Zoology, Oxford Univ., Oxford)

24–30. **Pharmacology**, intern. congr., Saõ Paulo, Brazil. (M. Roche e Silva, Dept. of Pharmacology, Faculty of Medicine, Univ. of Saõ Paulo, Ribeirao Preto, Saõ Paulo)

25–27. **Data Acquisition and Processing in Biology and Medicine**, conf., Univ. of Rochester, Rochester, N.Y. (Office of

Technical Activities Board, Inst. of Electrical and Electronics Engineers, 345 E. 47 St., New York 10017)

25–29. Interpretation and Therapy of **Cardiac Arrhythmias**, conf., Hahnemann Medical College and Hospital, Philadelphia, Pa. (L. S. Dreifus, Hahnemann Medical College, 230 N. Broad St. Philadelphia)

25–30. **Animal Husbandry**, intern conf., Göttingen, West Germany. (Intern. Agency Liaison Branch, Office of the Director General, Food and Agriculture Organization, Via delle Terme di Caracalla, Rome, Italy)

25–31. **Genetics**, intern, symp., Saõ Paulo, Brazil. (G. Pavan, Dept. of Biology, Univ. of Saõ Paulo, Caixa Postal 8105, Saõ Paulo, Brazil)

26–28. American **Astronomical** Soc., Cornell Univ., Ithaca, N.Y. (G. C. McVittie, Univ. of Illinois Observatory, Urbana 61801)

26–30. **Clinical Chemistry**, 6th intern. congr., Munich, Germany. (O. Wieland, 11. Medizinische Universitätsklinik, Ziemssenstr. 1, 8 Munich)

27–30. **International Primatological Soc.** mtg., Frankfurt-am-Main, Germany. (D. Stark, Ludwig-Rehnstr. 14, Frankfurt)

28–31. **Psychosomatic Medicine in Obstetrics and Gynecology**, 3rd intern. congr., Vienna, Austria. (A. H. Palmrich, Vienna Acad. of Medicine, Alserstr. 4, Vienna 9)

29–30. **Linguistic** Soc. of America, Univ. of California, Los Angeles. (A. A. Hill, Box 8120 University Station, Austin, Tex.

31–4. American Soc. of **Animal Science**,

31–4. American Soc. of **Animal Science,** annual mtg., Rutgers Univ., New Brunswick, N.J. (A. M. Pearson, Dept. of Food Science, Michigan State Univ., East Lansing)

31–5. **Dermatology**, 13th intern. congr., Munich, West Germany. (C. G. Shirren, Frauenlobstr. 9, Munich)

31–6. **Mycology**, 4th European congr., Warsaw, Poland. (Intern. Union of Biological Sciences, General Secretariat, Dept. of Zoology, Univ. of Washington, Seattle 98105)

August

1–3. **Electron Spin Resonance Spectroscopy**, symp., American Chemical Soc. Div. of Physical Chemistry, Michigan State Univ., East Lansing. (M. T. Rogers, Dept. of Chemistry, Michigan State Univ., East Lansing 48823)

1–4. **Psychoanalysis**, 2nd Pan American congr., Buenos Aires, Argentina. (M. Heiman, 1148 Fifth Ave., New York, N.Y. 10028)

1–4. **Toxicology and Occupational Medicine**, 5th inter-American conf., Miami, Fla. (W. B. Deichmann, Univ. of Miami School of Medicine, Coral Gables, Fla. 33134)

1–5. **Instrumentation Science**, 3rd research conf., Instrument Soc. of America, William Smith College, Geneva, N.Y. (K. B. Schnell, ISA, 530 William Penn Pl., Pittsburgh, Pa. 15219)

1–6. **Nuclear Physics,** intern. seminar, Joensuu, Finland. (Research Inst. for Theoretical Physics, Univ. of Helsinki, Helsinki, Finland)

NEW BOOKS

(Continued from page 1234)

Angular Scattering Functions for Spheres. Harry H. Denman, Wilfried Heller, and William J. Pangonis. Wayne State Univ. Press, Detroit, 1966. 314 pp. $12.

Applications of Mass Spectrometry to Organic Chemistry. R. I. Reed. Academic Press, New York, 1966. 266 pp. Illus. 63s.

Applications of Spectroscopy to Organic Chemistry. J. C. D. Brand and G. Eglinton. Oldbourne Press, London; Davey, New York, 1966. 242 pp. Illus. $12. Oldbourne Chemistry Series.

Applied Optics and Optical Engineering. vol. 3, *Optical Components.* Rudolf Kingslake, Ed. Academic Press, New York, 1965. 388 pp. Illus. $15. Nine chapters, by James R. Benford, G. H. Cook, Georg Hass, R. E. Hopkins, Rudolf Kingslake, Irving B. Lueck, Seymour Rosin, R. M. Scott, and R. R. Shannon.

Atmospheric Reentry. An introduction to its science and engineering. John J. Martin. Prentice-Hall, Englewood Cliffs, N.J., 1966. 288 pp. Illus. $14.50. Prentice-Hall International Series in Space Technology, edited by C. W. Besserer and Floyd E. Nixon.

Atomic and Nuclear Physics. Derek L. Livesey. Blaisdell (Ginn), Waltham, Mass., 1966. 539 pp. Illus. $10.50.

Book of ASTM Standards: With Related Material. Pt. 7, *Nonferrous Metals and Alloys (Including Corrosion Tests); Die-Cast Metals; Electrodeposited Metallic Coatings; Metal Powders; Nonferrous Filler Metal* (892 pp. $14; members, $9.80); pt. 11, *Bituminous Materials for Highway Construction, Waterproofing, and Roofing; Soils; Skid Resistance* (846 pp. $13; members, $9.10); pt. 12, *Chemical-Resistant Mortars, Plastic Structures; Clay and Concrete Pipe and Tile; Masonry Units; Asbestos-Cement Products; Building Stone* (488 pp. $9; members, $6.30); pt. 15, *Paper; Packaging; Cellulose; Casein; Flexible Barrier Materials; Leather* (896 pp. $13; members, $9.10); pt. 19, *Gaseous Fuels; Coal and Coke* (484 pp. $8, members, $5.60); pt. 22, *Sorptive Mineral Materials; Soap; Engine Antifreezes; Wax Polishes; Halogenated Organic Solvents; Activated Carbon* (472 pp. $8; members, $5.60); pt. 29, *Electrical Insulating Materials* (1180 pp. $19; members, $13.30). American Soc. for Testing and Materials, Philadelphia, 1966. Illus.

Cahiers de Synthèse Organique: Méthodes et tableaux d'application. vol. 12. Jean Mathieu and André Allais. Masson, Paris, 1966. 297 pp. Illus. F. 120.

Chemical Principles in the Laboratory. Harper W. Frantz and Lloyd E. Malm. Freeman, San Francisco, Calif., 1966. 382 pp. Illus. Paper, $4.25.

Chemistry: Principles and Properties. Michell J. Sienko and Robert A. Plane. McGraw-Hill, New York, 1966. 633 pp. Illus. $8.95.

College Algebra. M. Richardson. Prentice-Hall, Englewood Cliffs, N.J., ed. 3, 1966. 623 pp. Illus. $8.50.

College Chemistry. J. Nelson Shaw. Merrill, Columbus, Ohio, 1966. 511 pp. Illus. $8.25. The Merrill Physical and Inorganic Chemistry Series, edited by Theodore L. Brown.

Combinatorial Group Theory: Presentations of Groups in Terms of Generators and Relations. Whilhelm Magnus, Abraham Karrass, and Donald Solitar. Interscience (Wiley), New York, 1966. 456 pp. Illus. $15. Pure and Applied Mathematics Series, edited by R. Courant, L. Bers, and J. J. Stoker.

The Concepts of Classical Thermodynamics. H. A. Buchdahl. Cambridge Univ. Press, New York, 1966. 235 pp. Illus. $8.50.

La conversion des énergies. Régis David. Presses Universitaires de France, Paris, 1966. 128 pp. Illus. Paper.

Correlation Equations for Statistical Computations. Aristarkh Konstantinovich Mitropol'skii. Translated from the Russian by Edwin S. Spiegelthal. Consultants Bureau, New York, 1966. 111 pp. Illus. $9.50. The Russian text for this translation was prepared by the author in 1965 and is based on chapter 7 of his book *Tekhnika Statisticheskikh Vychislenii* (Moscow, 1961).

Dipole Radiation in the Presence of a Conducting Half-Space. Alfredo Baños, Jr. Pergamon, New York, 1966. 263 pp. Illus. $11. International Series of Monographs in Electromagnetic Waves, vol. 9, edited by A. L. Cullen, V. A. Fock, and J. R. Wait.

Differential Equations: Stability, Oscillations, Time Lags. A. Halanay. Translated from the Rumanian edition (Bucharest, 1963). R. Bellman, Translation Ed. Academic Press, New York, 1966. 542 pp. Illus. 156s. Mathematics in Science and Engineering Series.

Direct Methods of Qualitative Spectral Analysis of Singular Differential Operators. I. M. Glazman. Translated from the Russian edition (Moscow, 1963) by IPST Staff. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 244 pp. Illus. $14.

Einstein's Unified Field Theory. M. A. Tonnelat. Translated from the French edition (Paris, 1955) by Richard Akerib. Gordon and Breach, New York, 1966. 198 pp. Illus. $10.

Elements of Steelmaking Practice. John D. Sharp. Pergamon, New York, 1966. 256 pp. Illus. Paper, $3.95. The Commonwealth and International Library.

A First Course in Abstract Algebra. Hiram Paley and Paul M. Weichsel. Holt, Rinehart, and Winston, New York, 1966. 350 pp. Illus. $8.50.

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Fluorocarbons and Their Derivatives. R. E. Banks. Oldbourne Press, London; Davey, New York, 1966. 167 pp. Illus. $6. Oldbourne Chemistry Series.

Fundamentals of Chemistry: A Modern Introduction. Frank Brescia, John Arents, Herbert Meislich, and Amos Turk. Academic Press, New York, 1966. 832 pp. Illus. 70s. 9d.

Fundamentals of Display Systems. Harry H. Poole. Spartan Books, Washington, D.C., 1966. 413 pp. Illus. $20.

Gaussian Quadrature Formulas. A. H. Stroud and Don Secrest. Prentice-Hall, Englewood Cliffs, N.J., 1966. 384 pp. Illus. $14.95.

General Chemistry. John Arrend Timm. McGraw-Hill, New York, ed. 4, 1966. 655 pp. Illus. $8.95.

General Climatology. Howard J. Critchfield. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1966. 432 pp. Illus. $11.95.

Geochemistry of Beryllium: And Genetic Types of Beryllium Deposits. A. A. Beus. Translated from the Russian edition (Moscow, 1960) by F. Lachman. Lincoln R. Page, Ed. Freeman, San Francisco, Calif., 1966. 411 pp. Illus. $15.

Growth of Crystals. vol. 4. A. V. Shubnikov and N. N. Sheftal', Eds. Translated from the Russian (Moscow, 1964). Consultants Bureau, New York, 1966. 214 pp. Illus. $20. Forty-two papers on the following topics: Experimental Studies (15 papers); Growth of Monocrystals and Auxiliary Studies (15 papers); Survey Work and Growth Methods (5 papers); Reviews (4 papers); Miscellaneous (2 papers) and Diary (1 paper).

Handbook of Generalized Gas Dynamics. Robert P. Benedict and William G. Steltz. Plenum Press Data Division, New York, 1966. 253 pp. Illus. $12.50.

Handbook of Thermionic Properties. Electronic work functions and Richardson constants of elements and compounds. V. S. Fomenko. G. V. Samsonov, Ed. Translated from the Russian. Plenum Press, New York, 1966. 159 pp. Illus. $12.50.

Handbook of Vacuum Physics. vol. 1, *Gases and Vacua.* Pts. 4 to 6; pt. 4 by E. Thomas; pt. 5 by J. D. Swift; pt. 6 by H. G. Nöller. A. H. Beck, Ed. Pergamon, New York, 1966. 221 pp. Illus. Paper, $7.25.

Heat and Mass Transfer in Capillary-porous Bodies. A. V. Luikov. Translated from the Russian edition (Minsk, 1961) by P. W. B. Harrison. W. M. Pun, Translation Ed. Pergamon, New York, 1966. 535 pp. Illus. $20.

Homotopy Theory and Duality. Peter Hilton. Gordon and Breach, New York, 1966. 234 pp. Illus. Paper, $5.95; cloth, $11. Notes on Mathematics and its Applications Series.

An Introduction to Coherent Optics and Holography. George W. Stroke, Academic Press, New York, 1966. 284 pp. Illus. 80s.

Infrared Band Handbook. Suppls. 3 and 4. Herman A. Szymanski, Ed. Plenum Press, New York, 1966. 277 pp. Illus. $15.

Introduction to Laser Physics. Bela A. Lengyel. Wiley, New York, 1966. 327 pp. Illus. $8.95. Wiley Series in Pure and Applied Optics.

An Introduction to Probability Theory and Its Applications. vol. 2. William Feller. Wiley, New York, 1966. 646 pp. Illus. $12.

Introduction to the Theory of Differential Equations with Deviating Arguments. L. E. El'sgol'ts. Translated from the Russian edition (Moscow, 1964) by Robert J. McLaughlin. Holden-Day, San Francisco, 1966. 119 pp. Illus. $6.95.

Lectures on Matter and Equilibrium. Terrell L. Hill. Benjamin, New York, 1966. 318 pp. Illus. Paper, $3.95; cloth, $9.

Ligand Substitution Processes. Cooper H. Langford and Harry B. Gray. Benjamin, New York, 1965. 119 pp. Illus.

$8.50. Frontiers in Chemistry, edited by Ronald Breslow and Martin Karplus.

Methods of Quantum Chemistry. M. G. Veselov. Translated from the Russian edition (Leningrad, 1963) by Scripta Technica. S. Chomet, Translation Ed. Academic Press, New York, 1965. 193 pp. Illus. $7.50.

Molecules, Crystals, and Quantum Statistics. Enrico Fermi. Translated from the Italian edition (Bologna, 1934) by M. Ferro-Luzzi. Lloyd Motz, Ed. Benjamin, New York, 1966. 314 pp. Illus. $12.50.

Nondestructive Testing. Warren J. McGonnagle. Gordon and Breach, New York, ed. 2, 1966. 467 pp. Illus. $25.

Nouveau Traité de Chimie Minérale. vol. 2, pt. 1, *Lithium, Sodium*. A. Chretein, R. Kohlmuller, P. Pascal and A.-P. Rollet. Masson, Paris, 1966. 1086 pp. Illus. Paper, F. 185; cloth, F. 197.

Nuclear Forces. D. M. Brink. Pergamon, New York, 1965. 242 pp. Illus. Paper, $2.95. The Commonwealth and International Library.

OMNITAB: A Computer Program for Statistical and Numerical Analysis. Joseph Hilsenrath, Guy G. Ziegler, Carla G. Messina, Philip J. Walsh, and Robert J. Herbold. Natl. Bureau of Standards, Washington, D.C., 1966 (order from Superintendent of Documents, Washington, D.C.). 264 pp. Illus. $3.

Optimal Control Systems. A. A. Fel'dbaum. Translated from the Russian edition (Moscow, 1963) by A. Kraiman. Academic Press, New York, 1965. 462 pp. Illus. $16. Mathematics in Science and Engineering, edited by Richard Bellman.

Physical Geography. Michael P. McIntyre. Ronald, New York, 1966. 459 pp. Illus. $6.50.

Physique de l'atmosphère. vol. 3, *Phénomènes d'absorption et de diffusion dans l'atmosphère*. Étienne Vassy. Gauthier-Villars, Paris, 1966. 295 pp. Illus. Paper, F. 45.

The Precambrian. vol. 2. Kalervo Rankama, Ed. Interscience (Wiley), New York, 1965. 462 pp. Illus. $15. Four papers: "The Precambrian of Spitsbergen and Bjørnøya" by Thore S. Winsnes; "The Precambrian of the British Isles" by J. G. C. Anderson; "The Precambrian of Greenland" by Asger Berthelsen and Arne Noe-Nygaard; and "The Precambrian of Canada: The Canadian Shield" by M. E. Wilson.

Principles of Physical Chemistry. William H. Hamill, Russell R. Williams, Jr., and Colin MacKay. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1966. 592 pp. Illus. $13.25.

Problems in Calculus and Related Topics. C. R. Jones. Butterworth, Washington, D.C., 1965. 200 pp. Illus. Paper, $2.50.

Reaction Mechanisms in Organic Chemistry. Bianca Tchoubar. Translated from the second French edition (Paris, 1964) by Scripta Technica. Iliffe, London; Elsevier, New York, 1966. 197 pp. Illus. $8.75.

Spectroscopic Analysis of Gas Mixtures. O. P. Bochkova and E. Ya. Shreyder. S. E. Frisch, Ed. Translated from the second Russian edition (Moscow, 1963) by Scripta Technica. Charles P. Poole, Jr., Translation Ed. Academic Press, New York, 1965. 325 pp. Illus. $14.50.

The Structures of Alloys of Iron: An Elementary Introduction. W. Hume-Rothery. Pergamon, New York, 1966. 360 pp. Illus. Paper, $4.95. The Commonwealth and International Library.

Superconductivity. M. Tinkham. Gordon and Breach, New York, 1965. 92 pp. Illus. Paper, $2.50; cloth, $4.50. Documents on Modern Physics Series, edited by Elliott W. Montroll, George H. Vineyard, and Maurice Levy.

The Theory of Beta Radioactivity. E. J. Konopinski. Oxford Univ. Press, New York, 1966. 413 pp. Illus. $12. The International Series of Monographs on Physics.

The Theory of Quantum Liquids. vol. 1, *Normal Fermi Liquid*. David Pines and Philippe Nozières. Benjamin, New York, 1966. 367 pp. Illus. $15.

Theory of Thermally Induced Gas Phase Reactions. E. E. Nikitin. Translated from the Russian edition (Moscow, 1964) by Scripta Technica. E. W. Schlag, Translation Ed. Indiana Univ. Press, Bloomington, 1966. 167 pp. Illus. $5.

Thermal Properties of Matter. vol 1, *Kinetic Theory of Gasses*. Walter Kauzmann. Benjamin, New York, 1966. 262 pp. Illus. Paper, $3.95; cloth, $8.50. Physical Chemistry Monograph Series, edited by Walter Kauzmann.

Traité de Paléontologie. pt. 4, *L'origine des Vértébres. Leur expansion dans les eaux douces et le milieu marin*. vol. 3, *Actinopterygiens, Crossopterygiens, Dipneustes*. Jean-Pierre Lehman, Hans L. Jessen, and Emilienne Genet-Varcin. Masson, Paris. 1966. 450 pp. Illus. F. 150.

Treatise on Irreversible and Statistical Thermophysics. An introduction to nonclassical thermodynamics. Wolfgang Yourgrau, Alwyn van der Merwe, and Gough Raw. Macmillan, New York, 1966. 288 pp. Illus. $9.95.

Tropospheric Radiowave Propagation beyond the Horizon. Francois du Castel. Translated from the French edition (Paris, 1961) by E. Sofaer. Pergamon, New York, 1966. 248 pp. Illus. $11.50. International Series of Monographs in Electromagnetic Waves, vol. 8, edited by A. L. Cullen, V. A. Fock, and J. R. Wait.

University Algebra. Richard E. Johnson, Prentice-Hall, Englewood Cliffs, N.J., 1966. 285 pp. Illus. $10.60. Prentice-Hall Mathematics Series.

Velocity of Light. J. H. Sanders, Pergamon, New York, 1965. 154 pp. Illus. Paper, $2.95. The Commonwealth and International Library.

Zone Melting. William G. Pfann. Wiley, New York, ed. 2, 1966. 326 pp. Illus. $11.75. Wiley Series on the Science and Technology of Materials.

Conference and Symposium Reports

Advances in Biomedical Computer Applications. (*Ann. N.Y. Acad. Sci. 128*). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1966. 297 pp. Illus. Paper, $8. Thirty-one papers presented at a conference held in June 1965.

Advances in Hepatology. Transactions, International Symposium of the International Association for the Study of the Liver (Brussels and Louvain), June 1964.

J. Vandenbroucke, J. De Groote, and L. O. Standaert, Eds. Williams and Wilkins, Baltimore, 1965. 400 pp. Illus. $22. Fifty papers on the following topics: Chronic Hepatitis (6 papers); Biliary Cirrhosis and Cholestasis (8 papers); Electron Microscopy of the Liver (4 papers); Bilirubin Metabolism (4 papers); Enzyme Studies (4 papers); Viral Hepatitis (4 papers); Cirrhosis (3 papers); Toxic Hepatitis, Alcohol Intoxication (5 papers); Portal Circulation, Portacaval Shunt, Oesophageal Varices (6 papers); and Chronic Liver Disease, and Other Subjects (6 papers).

Advances in Water Pollution. Proceedings, Second International Conference (Tokyo), August 1964. vol. 1 (16 papers, 403 pp.), edited by O. Jaag; vol. 2 (16 papers, 383 pp.), edited by J. K. Baars; vol. 3 (16 papers, 377 pp.), edited by E. A. Pearson. Pergamon, New York, 1965. Illus. $45 set.

Analysis Instrumentation, 1965. Proceedings, eleventh annual symposium (Montreal, Canada), May 1965. L. Fowler, R. G. Harmon, and D. K. Roe, Eds. Plenum Press, New York, 1966. 248 pp. Illus. $12.50. Twenty-one papers on the following topics: Laboratory Chromatography (3 papers); Sample Handling (3 papers); Laboratory Instrumentation (1 paper); Process Chromatography (3 papers); Radiation Methods (2 papers); Electrochemical Methods (3 papers); Optical Methods (4 papers); and Chemical Methods (2 papers).

Arithmetical Algebraic Geometry. Proceedings of a conference organized by the Purdue University Division of Mathematical Sciences (Lafayette, Ind.), December 1963. O. F. G. Schilling, Ed. Harper and Row, New York, 1966. 208 pp. Illus. $6.50. Harper's Series in Modern Mathematics, edited by I. N. Herstein and Gian-Carlo Rota; Nine papers: "On the arithmetical theory of the classical groups" by André Weil; "On the orbit spaces of arithmetic groups" by Walter L. Baily, Jr.; "On discrete subgroups of p-adic algebraic groups" by Tsuneo Tamagawa; "Analytic theory of the zeta function of algebraic varieties" by Bernard M. Dwork; "Picard groups of moduli problems" by David Mumford; "Zeta and L functions" by Jean-Pierre Serre; "Algebraic cycles and poles of zeta functions" by John T. Tate; "Resolution of singularities of arithmetical surfaces" by Shreeram S. Abhyankar; and "On the equivalence of singularities, I" by Heisuke Hironaka.

Aspects of Insect Biochemistry. Biochemical Society Symposium (London), April 1965. T. W. Goodwin, Ed. Academic Press, New York, 1965. 119 pp. Illus. $6. Seven papers: "Active transport in insects" by J. E. Treherne; "Formation of the specific structural and enzymic pattern of the insect flight muscle" by Th. Bücher; "Some distinctive features of insect metabolism" by F. P. W. Winteringham; "Intermediary metabolism and the insect fat body" by B. A. Kilby; "The metabolism of aromatic compounds" by P. C. J. Brunet; "Hormones controlling growth and development in insects" by V. B. Wigglesworth; and "Skeletal structure in insects" by K. M. Rudall.

Cold Spring Harbor Symposia on Quantitative Biology. vol 30, *Sensory Re-*

ceptors. Biological Laboratory, Long Island Biological Assoc., Cold Spring Harbor, N.Y., 1965. 663 pp. Illus. $15. Fifty-five papers on the following topics: General Physiology (4 papers); Mechanoreceptors (5 papers); Hearing (6 papers); Olfactory Receptors (4 papers); Electrical and Chemical Receptors (7 papers); Photoreceptors (24 papers); and Data Processing (5 papers).

Colloque sur le Crétacé inférieur (Lyon), September 1963. Bureau de Recherches Géologiques et Minières, Paris, 1965. 862 pp. Illus. Paper, Mémoires du B.R.G.M., No. 34.

Control of Energy Metabolism. A colloquium on metabolic control and a symposium on control of energy metabolism (Philadelphia), May 1965. Britton Chance, Ronald W. Estabrook, and John R. Williamson, Eds. Academic Press, New York, 1965. 453 pp. Illus. $10.50. Thirty-nine papers.

Data Acquisition and Processing in Biology and Medicine. vol. 4. Proceedings of a conference (Rochester, N.Y.), 1964. Kurt Enslein and John F. Kinslow, Eds. Pergamon, New York, 1966. 260 pp. Illus. $14.50. Eighteen papers.

Determination of Nonmetallic Compounds in Steel. A symposium (Lafayette, Ind.), June 1965. American Soc. for Testing and Materials, Philadelphia, 1966. 102 pp. Illus. Paper, $4.75; members, $3.50. Five papers: "The isolation, separation, and identification of microconstituents in steels" by K. W. Andrews and H. Hughes; "Application of differential thermal analysis–effluent gas analysis to the determination of nonmetallic compounds in steel" by W. R. Bandi, W. A. Straub, H. S. Karp, and L. M. Melnick; "Identification of inclusions with the electron probe microanalyzer" by K. F. J. Heinrich; "Studies on the determination of stable oxides in low-alloy steels using a combination of chemical separations" by J. P. McKaveney, W. J. Raber, G. L. Vassilaros, and J. M. Snook; and "Isolation of oxide inclusions from carbon steels using bromine-methyl acetate" by R. M. Raybeck and L. C. Pasztor.

Developmental and Metabolic Control Mechanisms and Neoplasia. A collection of papers presented at the Nineteenth Annual Symposium on Fundamental Cancer Research, 1965. Published for the Univ. of Texas M. D. Anderson Hospital and Tumor Institute. Williams and Wilkins, Baltimore, 1965. 526 pp. $16. Twenty-four papers on the following topics: Biosynthesis and Control Mechanisms (8 papers); Molecular Basis of Early Development (8 papers); Molecular Basis of Later Development and Control (3 papers); and Comparative Studies of Control Mechanisms in Normal and Neoplastic Tissues (5 papers); and the Bertner Foundation Award Lecture "On some of the biological consequences of the base-pairing in the nucleic acids" by Erwin Chargaff.

Ecological Research in Humid Tropics Vegetation. A symposium (Kuching, Sarawak), July 1963. A. J. G. H. Kostermans and F. R. Fosberg, Eds. UNESCO Science Cooperation Office for Southeast Asia, Bangkok, Thailand, 1965. 386 pp. Illus. Paper. Thirty-one papers given at

a symposium sponsored by the Government of Sarawak and UNESCO Science Cooperation Office for Southeast Asia.

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Fuel Cells: Their Electrochemical Kinetics. V. S. Bagotskii and Yu. B. Vasil'ev, Eds. Translated from the Russian edition (Moscow, 1964). Consultants Bureau, New York, 1966. 129 pp. Illus. Paper, $15. Ten papers presented at the Second Fuel Cell Conference (Moscow).

Function Algebras. Proceedings of an international symposium (New Orleans, La.), April 1965. Frank T. Birtel, Ed. Scott, Foresman, Chicago, 1966. 367 pp. Illus. $12.95. Forty-four papers on the following topics: Uniform Algebras (18 papers); Several Complex Variables (5 papers); Harmonic Analysis (12 papers); and Miscellaneous (9 papers).

Fundamental Phenomena in the Materials Sciences. vol. 2, *Surface Phenomena.* Proceedings, second symposium (Boston, Mass.), January 1964. L. J. Bonis and H. H. Hausner, Eds. Plenum Press, New York, 1966. 220 pp. Illus. $12.50. Ten papers: "The structure and electronic configuration of crystalline surfaces" by Harry C. Gatos; "Present and proposed uses of low-energy electron diffraction in studying surfaces" by Lester H. Germer; "The effects of oxide and organic films on sliding friction" by P. M. Ku; "The deformational and geometrical aspect of surfaces in sliding contact" by F. F. Ling; "Effect of surface energy on lubrication" by Ernest Rabinowicz; "Problems of producing a clean surface by outgassing in ultrahigh vacuum" by Imre Farkass; "Physical adsorption by homogeneous and heterogeneous solid surfaces" by Sydney Ross; "The relation of the attractive forces at interfaces to wetting, spreading, adsorption, and long-range attractive forces" by Frederick M. Fowkes; "Solid-to-solid ad-

hesion" by J. J. Bikerman; and "Spreading, penetration, and capillary flow in metallic systems" by C. M. Adams, Jr.

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The Low Achiever in Mathematics. Report of a conference (Washington, D.C.), March 1964, sponsored by U.S. Office of Education and the National Council of Teachers of Mathematics. Lauren G. Woodby, Ed. U.S. Office of Education, Washington, D.C., 1965 (order from Superintendent of Documents, Washington, D.C.). 102 pp. Paper, 35¢.

Molecular and Cellular Basis of Antibody Formation. Proceedings of a symposium (Prague), June 1964. J. Sterzl, Ed. Czechoslovak Acad. of Sciences, Prague; Academic Press, New York, 1965. 683 pp. Illus. $20. Forty-seven papers given at a symposium organized by the Immunological Department, Institute of Microbiology, Czechoslovak Academy of Sciences.

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Pre-School Child Malnutrition: Primary Deterrent to Human Progress. An international conference (Washington, D.C.), December 1964. Natl. Acad. Sciences–Natl. Research Council, Washington, D.C., 1966. 369 pp. Illus. $7.50. Thirty-seven papers given at a conference organized by the Committee on Protein Malnutrition and the Committee on Child Nutrition, Food and Nutrition Board, Natl. Acad. of Sciences–Natl. Research Council.

Primary Sedimentary Structures and Their Hydrodynamic Interpretation. A symposium (Toronto, Canada), May 1964. Gerard V. Middleton, Ed. Soc. of Economic Paleontologists and Mineralogists, Tulsa, Okla., 1965. 271 pp. Illus. Paper, $8; members, $6. Fourteen papers and an introduction by G. V. Middleton.

Rare Earth Research. Proceedings, Fourth Conference (Pheonix, Ariz.), April 1964. LeRoy Eyring, Ed. Gordon and Breach, New York, 1966. 769 pp. Illus. $19.50. Forty-six papers on the following topics: Magnetic and Electrical Properties of Rare Earth Compounds (9 papers); The Properties of Rare Earth Metals and Alloys (10 papers); The Optical Properties and Solution Chemistry of Rare Earth Materials (8 papers); Solid State Chemistry of Rare Earth Materials, A (9 papers); and Solid State Chemistry of Rare Earth Materials, B (10 papers).

Special Ceramics 1964. Proceedings of a symposium held by the British Ceramic Research Association (Stoke-on-Trent), July 1964. P. Popper, Ed. Academic Press, New York, 1965. 353 pp. Illus. $14.50. Twenty-two papers.

Structure and Properties of Polymers. Based on a Princeton University conference (Princeton, N.J.), January 1965. Arthur V. Tobolsky, Ed. Interscience (Wiley), New York, 1966. 199 pp. Illus. Paper, $8. *Journal of Polymer Science*, No. 9, pt. C, Polymer Symposia. Eight papers: "Polymers in material science" by H. F. Mark; "Polymer flow in concentrated solutions and melts" by T. G. Fox; "Morphological foundations of plastics processing" by Bryce Maxwell; "Crystalline character in polymers" by A. Peterlin; "Morphological foundations of fiber properties" by Ludwig Rebenfeld; "Properties and structure of elastomers" by Joginder Lal and Kenneth W. Scott; "Colloidal macromolecular phenomena" by O. A. Battista; and "Some viewpoints on polymer physics" by Arthur V. Tobolsky.

The Upper Mantle Symposium (New Delhi), December 1964. Charles H. Smith and Theodor Sorgenfrei, Ed. Det Berlingske Bogtrykkeri, Copenhagen, 1965. 188 pp. Illus. Paper, D.Kr. 28.30. Twenty-one papers on the following topics: Physical Processes in the Upper Mantle and Their Influence on the Crust (5 papers); Tectonics (8 papers); and Petrology and Volcanism (8 papers).

The Use of Induced Mutations in Plant Breeding. Report of the FAO/IAEA Technical Meeting (Rome), May–June 1964. 842 pp. Illus. $45. Sixty-five papers on the following topics: Effects of Mutagens, Sensitivity to Mutagens and Control of Mutation Process (20 papers); Diplontic Selection (2 papers); Characteristics and Genetics of Induced Mutants (8 papers); Induced Mutations and Breeding Methods in Sexually-Propagated Species (21 papers); Induced Mutations and Breeding Methods in Vegetatively Propagated Species (9 papers); and Induced Chromosome Changes and Special Techniques (5 papers).

Whales, Dolphins, and Porpoises. Based on a symposium (Washington, D.C.), August 1963. Kenneth S. Norris, Ed. Univ. of California Press, Berkeley, 1966. 805 pp. Illus. $15. Thirty-eight papers presented at the First International Symposium on Cetacean Research; the topics considered were Systematics, Distribution, and Natural History (11 papers); Anatomy, Physiology, and Sea Animal Propulsion (8 papers); Underwater Observation and Recording (7 papers); Communication (5 papers); Echolocation and Recognition (3 papers); Behavior (4 papers); and a round table discussion on Practical Problems.

Miscellaneous Publications

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American Philosophical Society. *Transactions*, vol. 55, pt. 6, "The Pyramid of the Sun at Teotihuacán: 1959 investigations," René Millon, Bruce Drewitt, and James A. Bennyhoff (1965, 93 pp., $3); vol. 56, pt. 1, "Plant colonization studies on black wastes from anthracite mining in Pennsylvania," J. R. Schramm (1966, 194 pp., $6). American Philosophical Soc., Philadelphia, Pa.

Association of Pacific Coast Geographers, *Yearbook*. vol. 27. John F. Gaines, Ed. Oregon State Univ. Press, Corvallis, 1965. 110 pp., $2.

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orchids of Guatemala and British Honduras," by Donovan S. Correll ($2.50); *Geology*, vol. 13, pp. 477–509, "Catalogue of type specimens in Chicago Natural History Museum: Porifera," Matthew H. Nitecki ($1); vol. 15, pp. 99–170, "The mammalian genera, *Arctoryctes and Cryptoryctes*, from the Oligocene and Miocene of North America," Charles A. Reed and William D. Turnbull ($3.50); vol. 15, pp. 175–319, "Catalog of the collection of meteorites in Chicago Natural History Museum," Henry Horback and Edward J. Olsen ($3); *Zoology*, vol. 44, pp. 227–230, "A new species of mole (genus *Talpa*) from Kurdistan Province, Western Iran," Douglas M. Lay (25¢); vol. 49, pp. 1–304, "The systematics and evolution of the Oriental colubrid snakes of the genus *Calamaria*," Robert F. Inger and Hymen Marx ($10). Chicago Natural History Museum, Chicago, 1965.

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