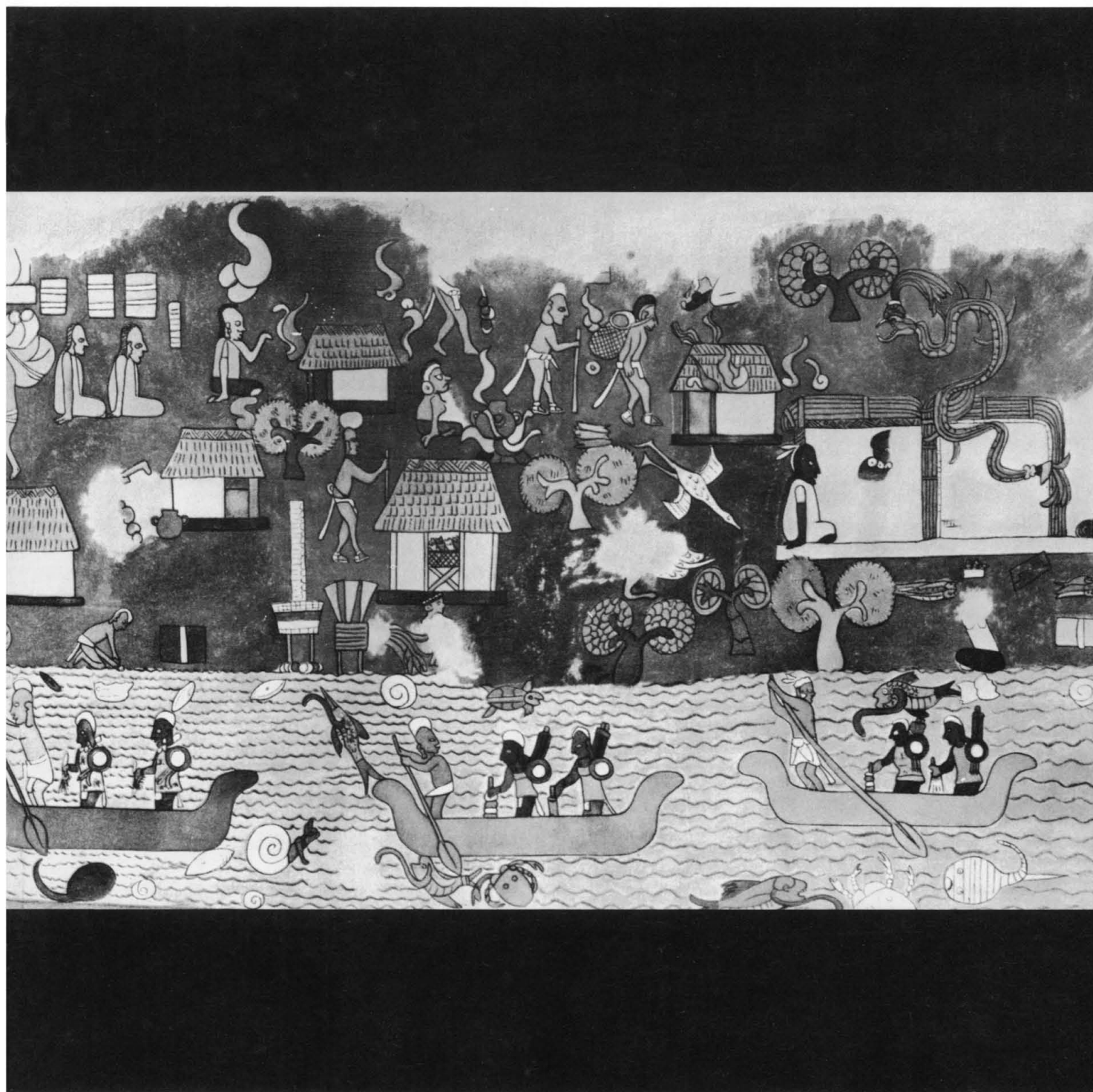


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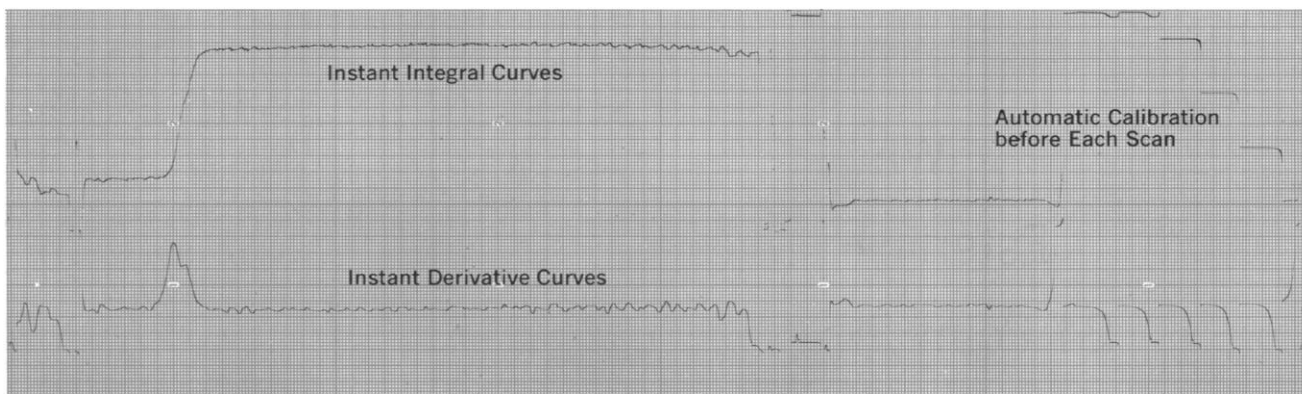
27 May 1966

Vol. 152, No. 3726

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



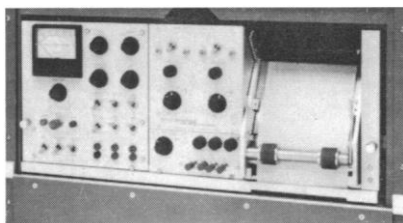
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Recorder and controls for Photoelectric Scanner

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

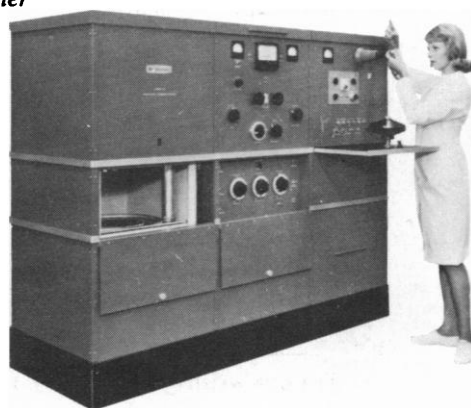
- Because the Scanner utilizes the split-beam principle, two samples in a double sector cell can be subjected to identical experimental conditions—an important factor in studying extremely small differences in sedimentation coefficients, for example. Or sample solution and solvent can be used in the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



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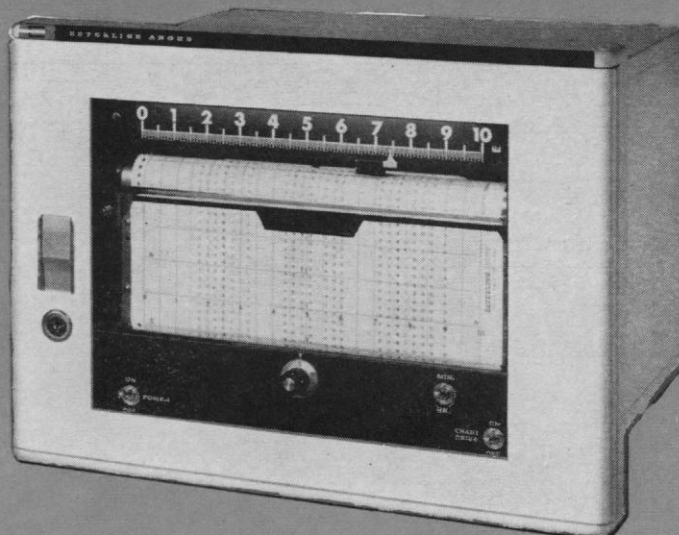
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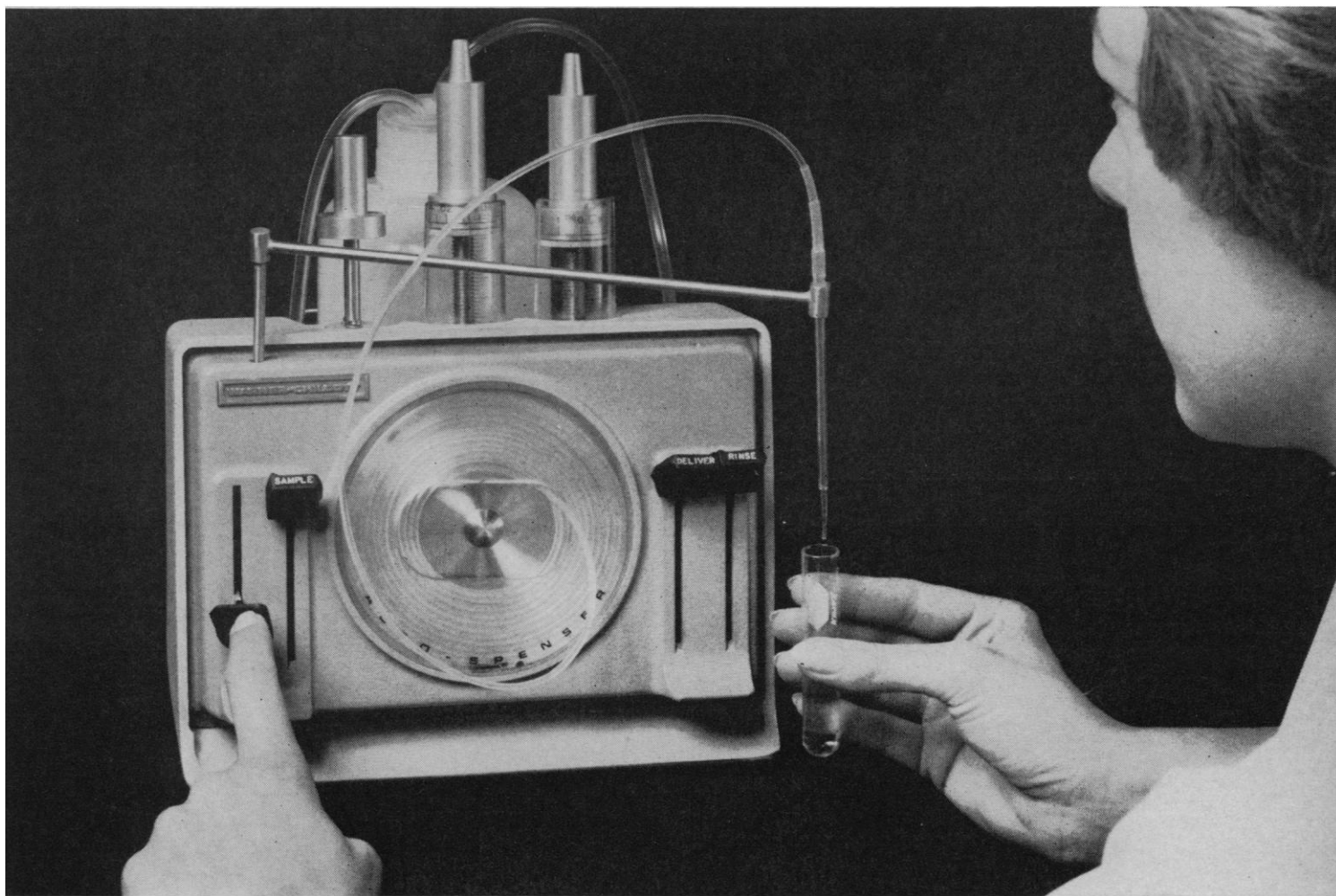
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COVER

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]



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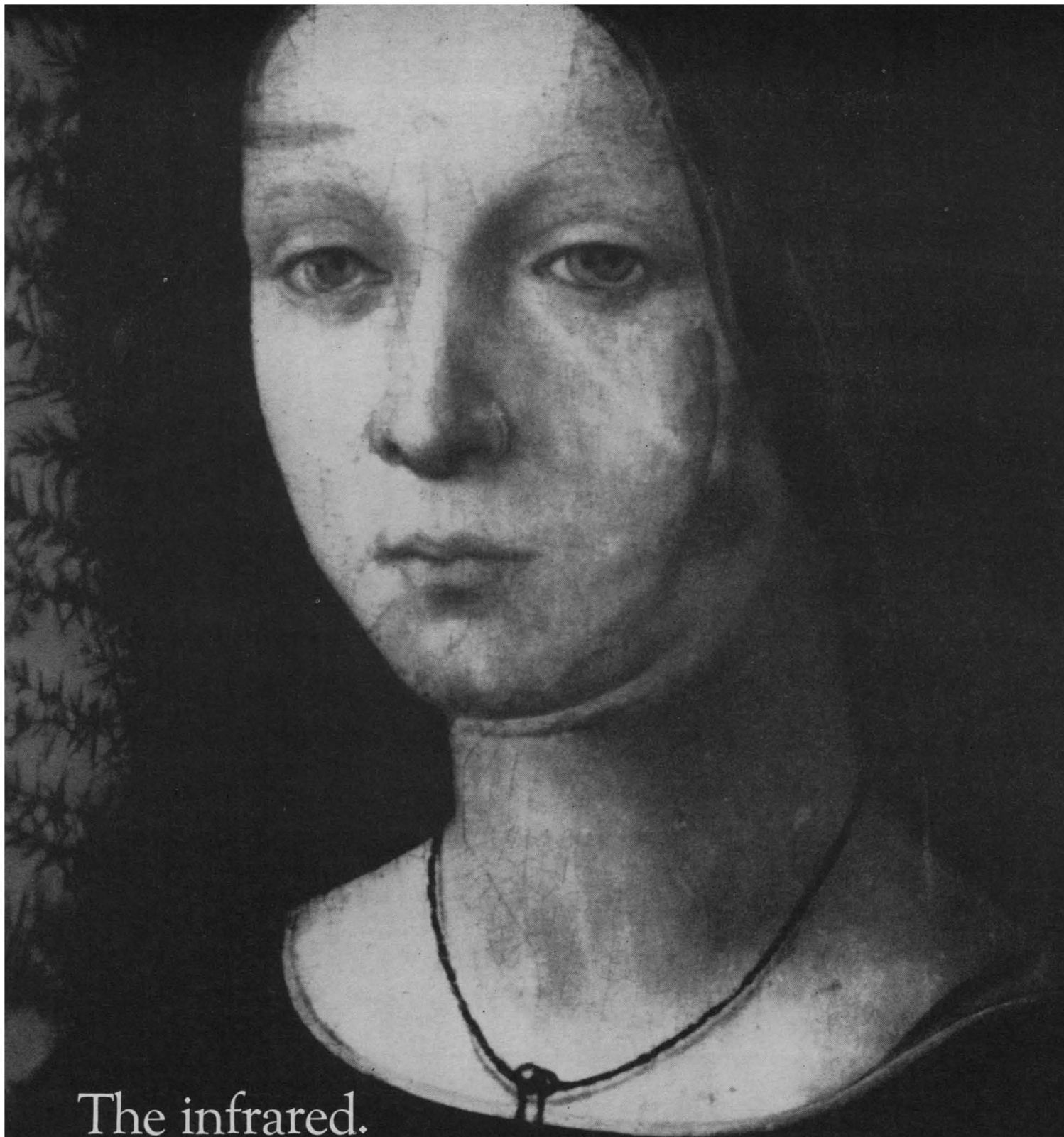
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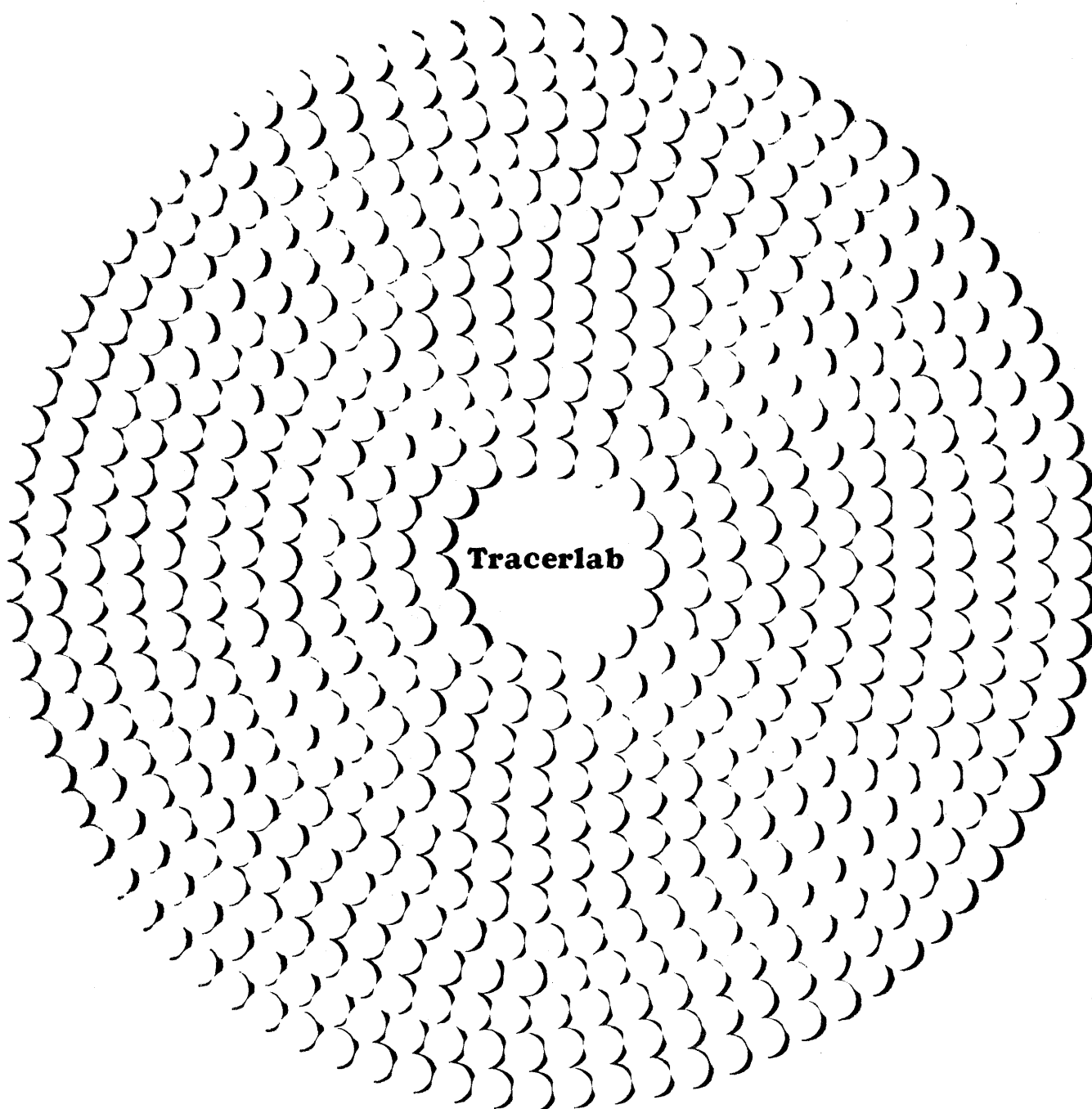
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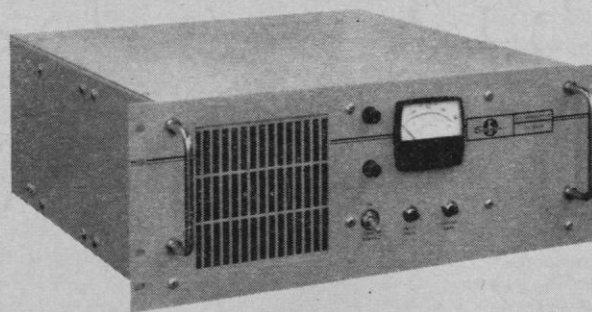


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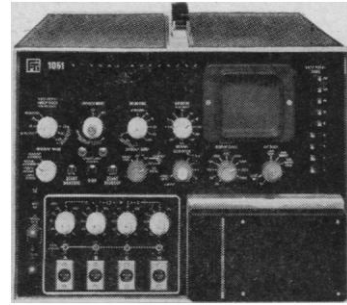
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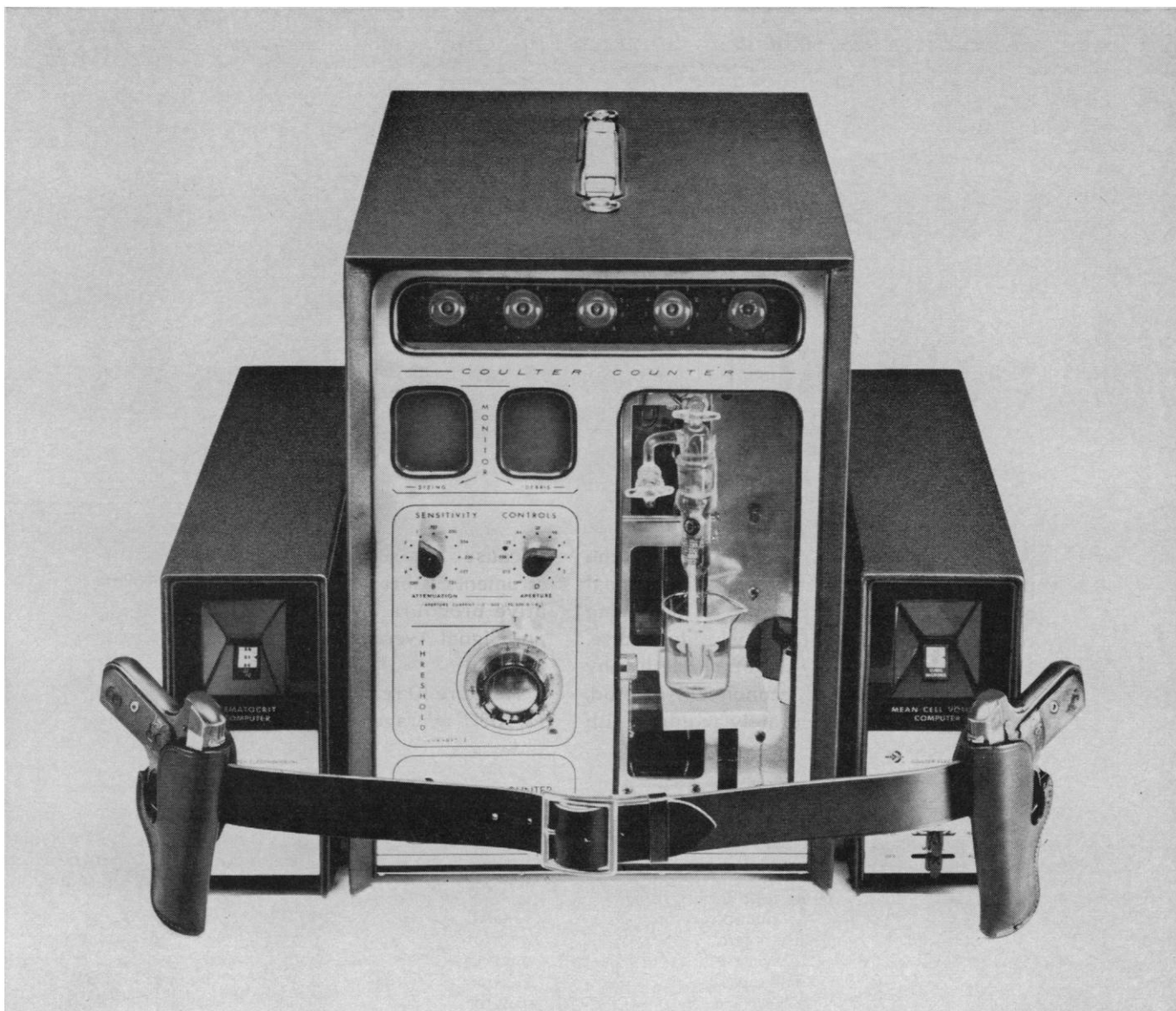
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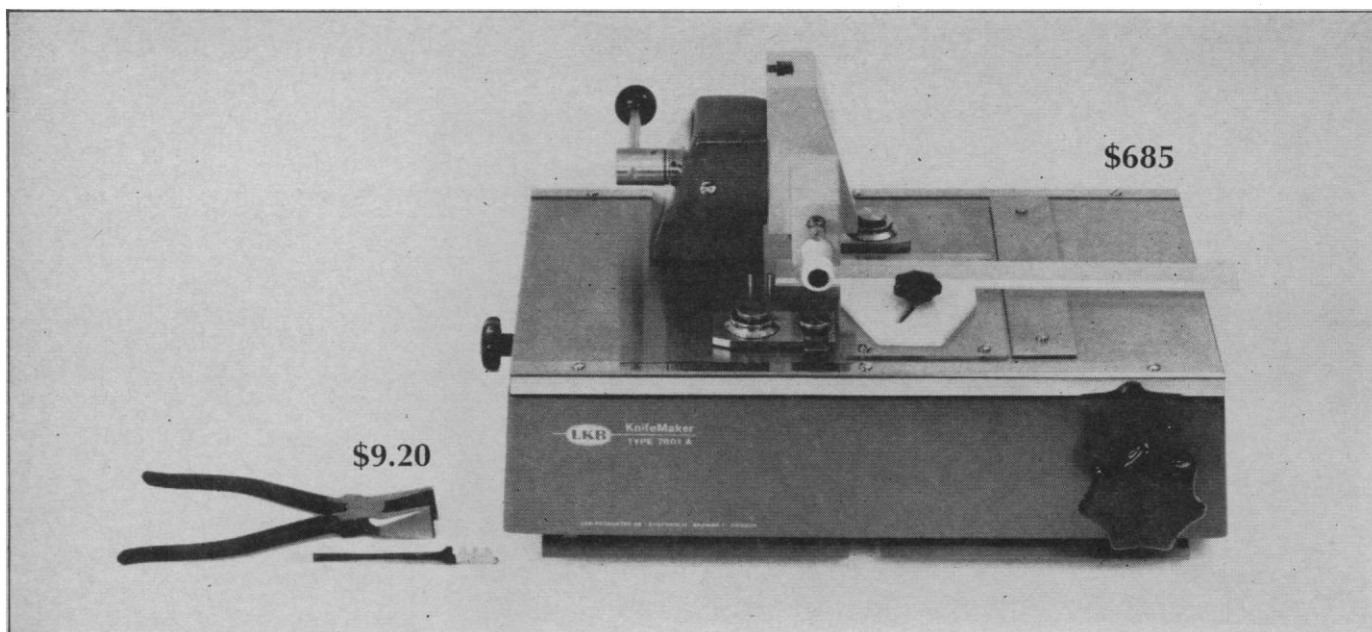
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gles without requiring prolonged experience, manual dexterity, or some special “touch”. Happily, these goals were achieved. (All of this requiring a most modest sacrifice of bench space on your part. The Knifemaker uses only 19” X 12” X 13½”.)

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

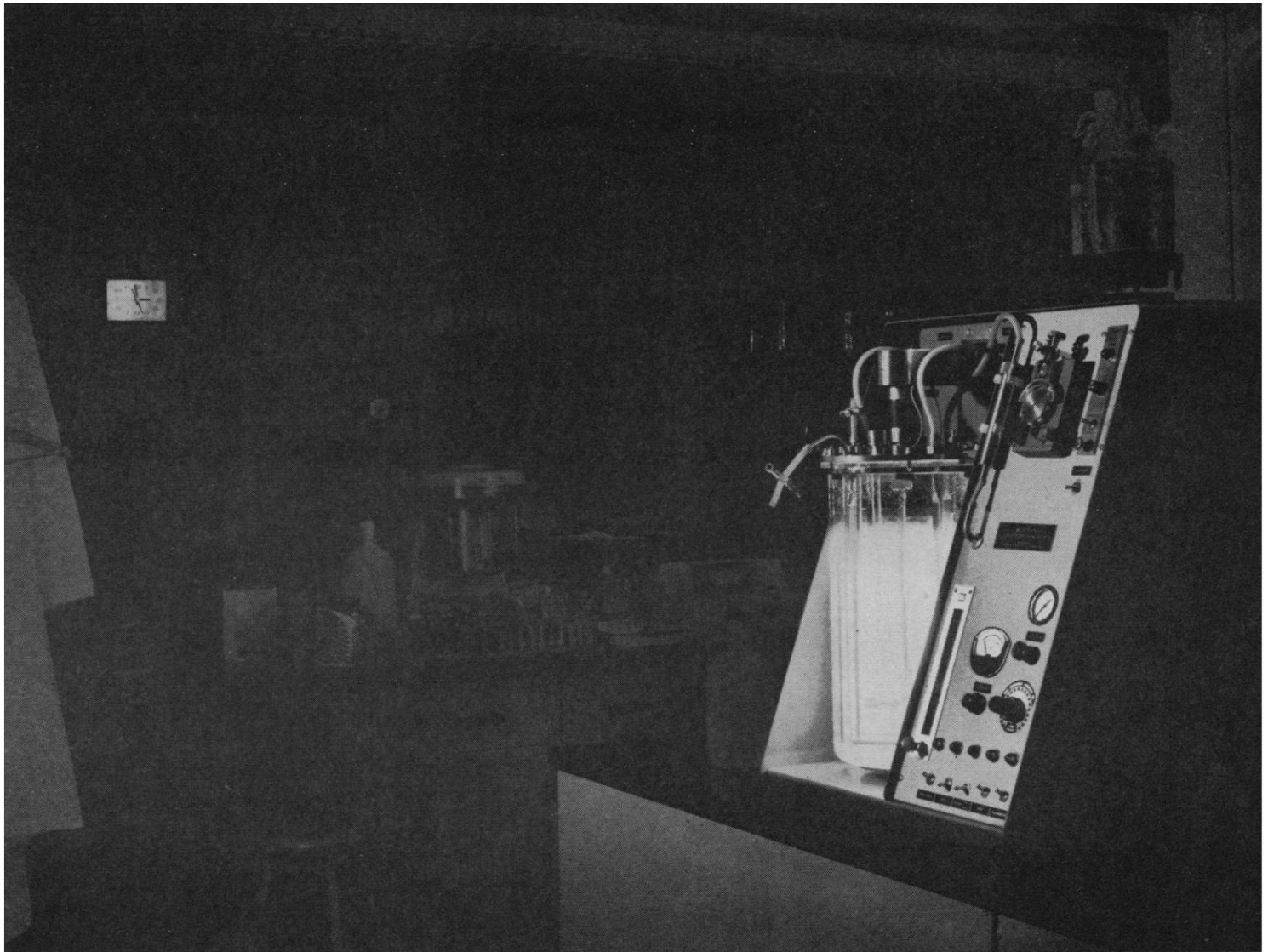
half of this time, you’ll get two usable knives from each break rather than one. Total time required for scoring and breaking square and then scoring and breaking square into two knives? Less than a minute.

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 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.

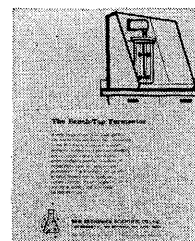
Temperature is regulated electronically to within $\pm 0.25^{\circ}\text{C}$ by a Thermistor controller which allows cool or heated water to circulate on demand through hollow baffles inside the vessel. Rigid control of agitation is assured by a solid state proportional speed controller that adjusts 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.

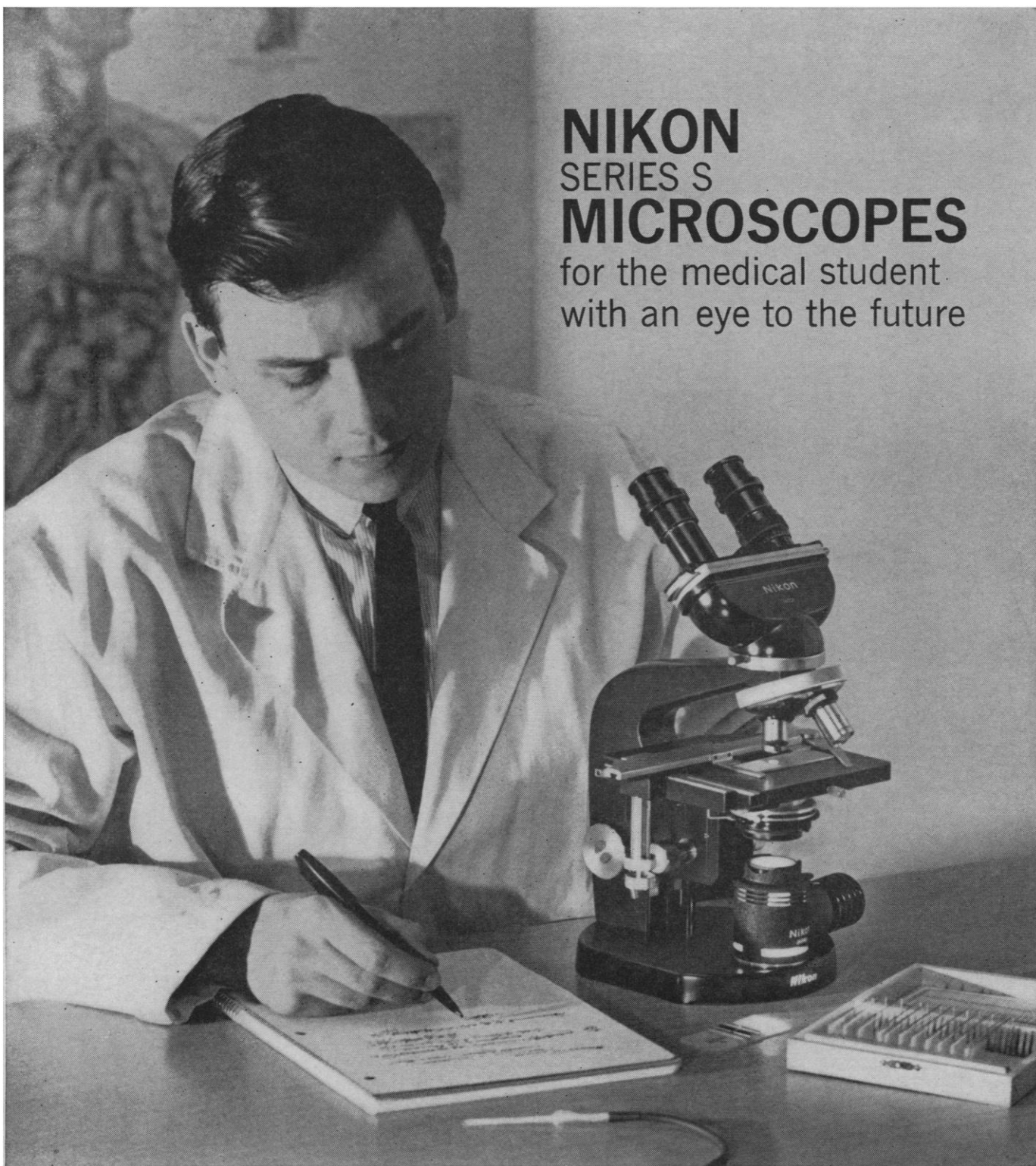
Accommodates 4 interchangeable fermentors: 2 liters, 5 liters, 7½ liters or 14 liters. Easy to remove. Designed for repeated sterilization in a 20" autoclave.



New Brunswick Scientific Co., Inc.
1130 Somerset Street, New Brunswick, N.J. 08903
West Coast Office: Box 5606, San Jose, California 95150



Look into MicroFerm.
Write for
Catalog MFS.



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with an eye to the future

There are no Nikon *student* microscopes, as such. The same Nikon microscope which will serve the medical student through school, has the flexibility to meet his future professional needs, however specialized. Model SBR, the example shown above, is a versatile, sophisticated professional instrument, used widely in school, hospital and commercial laboratories. It is also a favorite with medical students.

For medical student microscope catalog, write to Dept. S-5

NIKON INC. Instrument Div.: Garden City, N.Y. 11533, Subsidiary of Ehrenreich Photo-Optical Industries, Inc.

there are
many laboratory
animal cages
for sale,
but...

ONLY ONE ISOSYSTEM™...

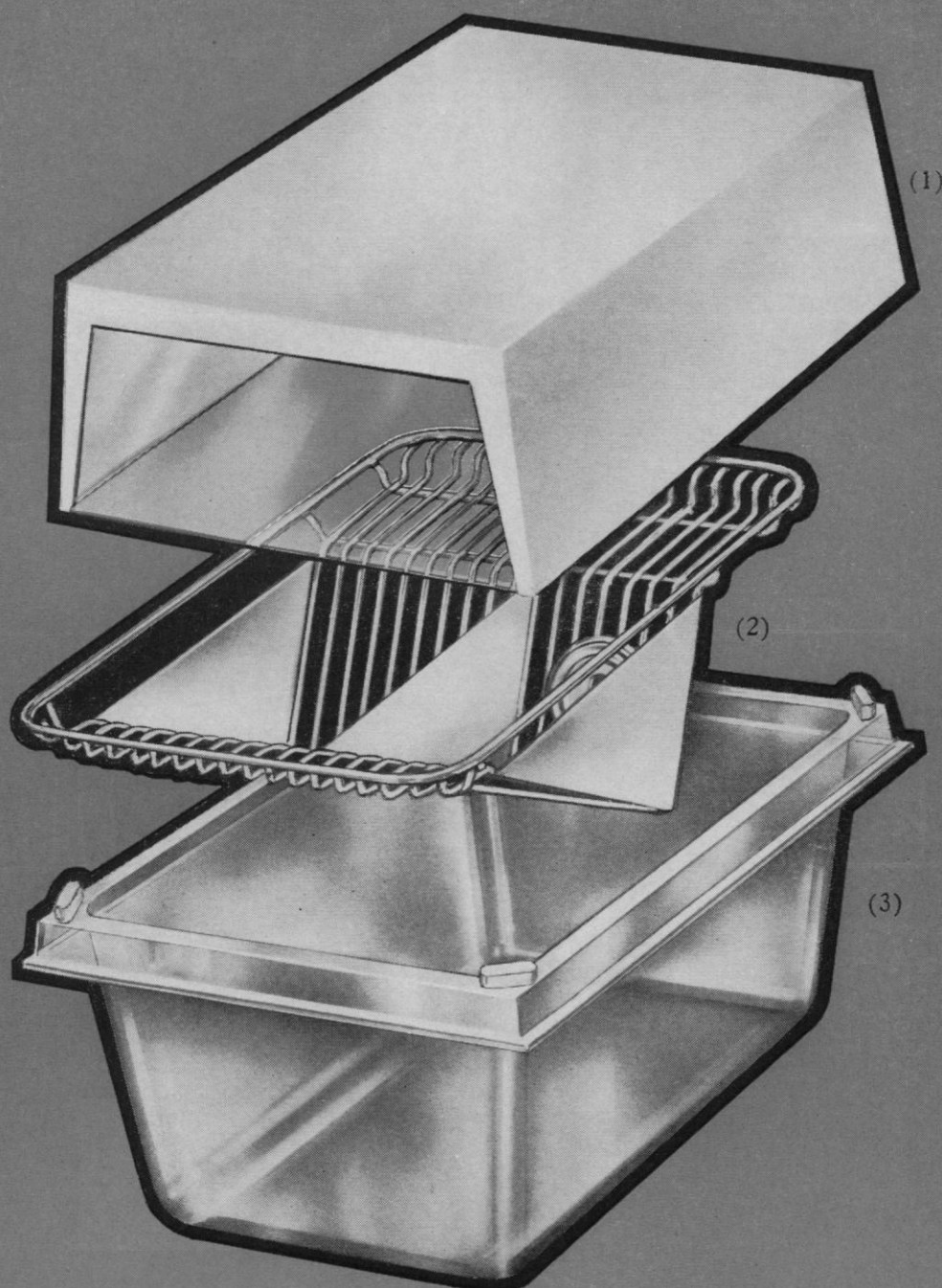
If you're looking for a way to reduce cross-contamination and safeguard experiments, now is the time to try the versatile new **ISOSYSTEM**, animal housing system engineered by Bioquest. **ISOSYSTEM** is the only one ready-made to control the spread of airborne infections. And it is compact and easy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

This new compact **ISOSYSTEM** coordinates: (1) **ISOCAP***, the disposable efficient filter cap, a fibreglass-plastic web, with clear vinyl end windows; (2) made-to-measure **ISOLID***, laboratory cage lid of stainless steel or chrome plated with divider separating food and water bottle (lids nest for storage); and (3) **ISOCAGE***, 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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and COMPANY

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today's research
problems
with tomorrow's
technology

*ISOSYSTEM, ISOCAP, ISOLID, and ISOCAGE are trademarks 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

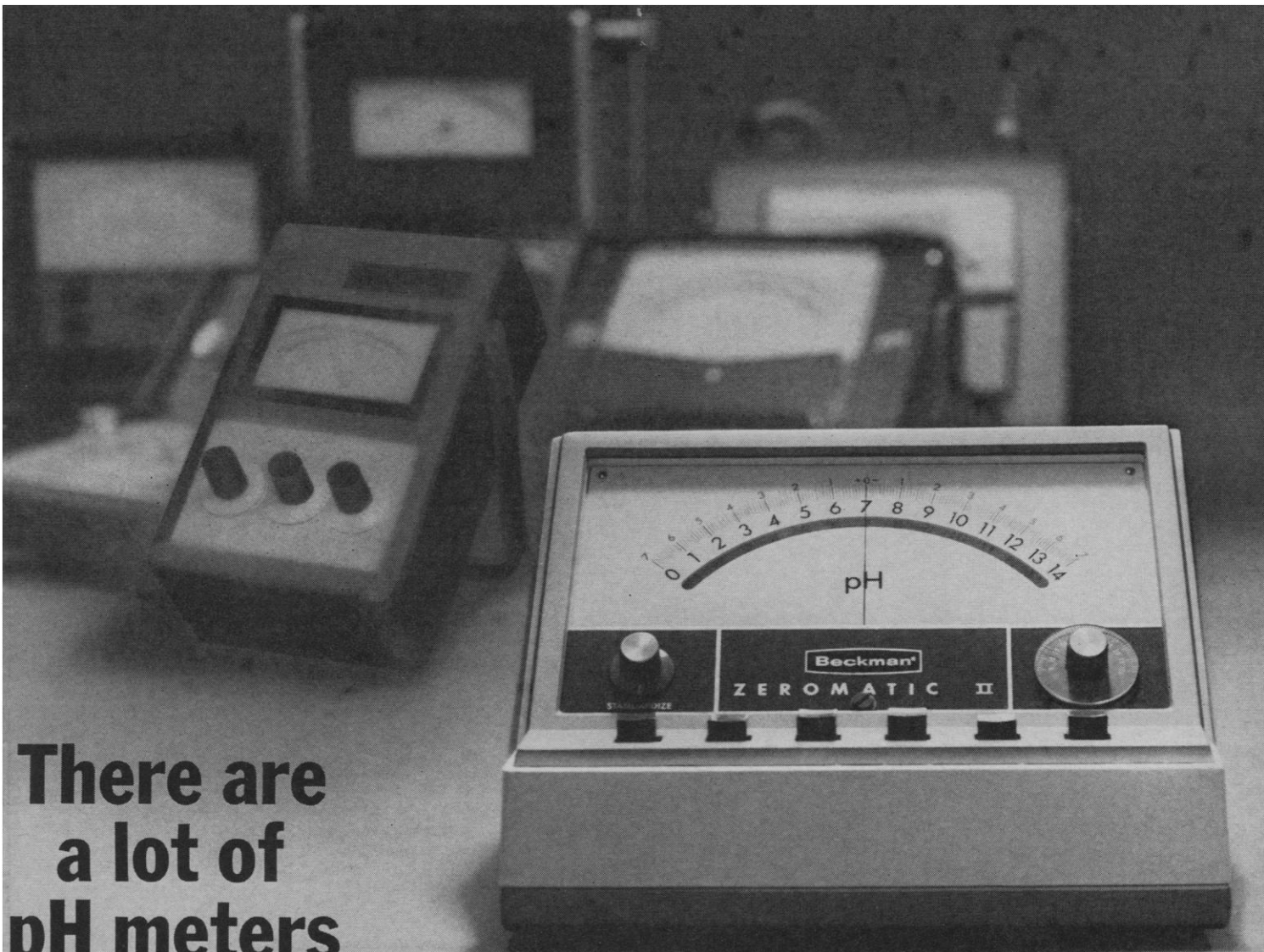
techniques, stress relieving, specialized alloys, and custom developed machinery.

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  EQUIPMENT CO.

300 SECOND AVENUE, NEEDHAM HEIGHTS, MASSACHUSETTS 02194



**There are
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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

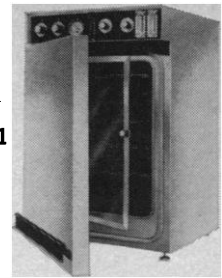
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SCIENTIFIC AND PROCESS
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#3221



National's Water-Jacketed CO₂ 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 CO₂ 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 CO₂ tension is quickly built up to the desired level.

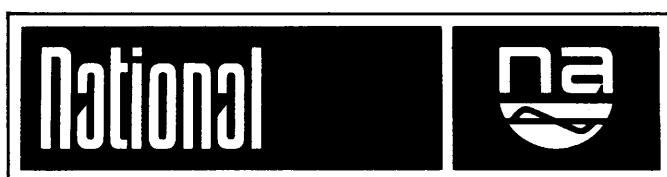
It's another good reason why NATIONAL incubators are the logical choice when efficiency and versatility are demanded. Some of the other reasons are:

- Full water jacket for accurate temperature control
- Built-in CO₂ 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.

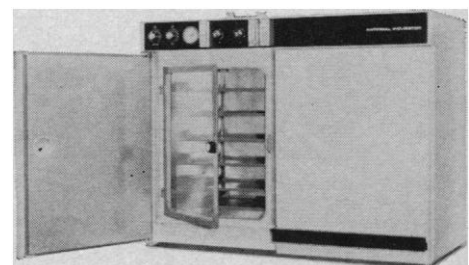
Your franchised NATIONAL dealer can obtain one of these units for you in short order — or, write for a fully illustrated brochure.



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#3321



Look at it this way... and you'll buy Kimax

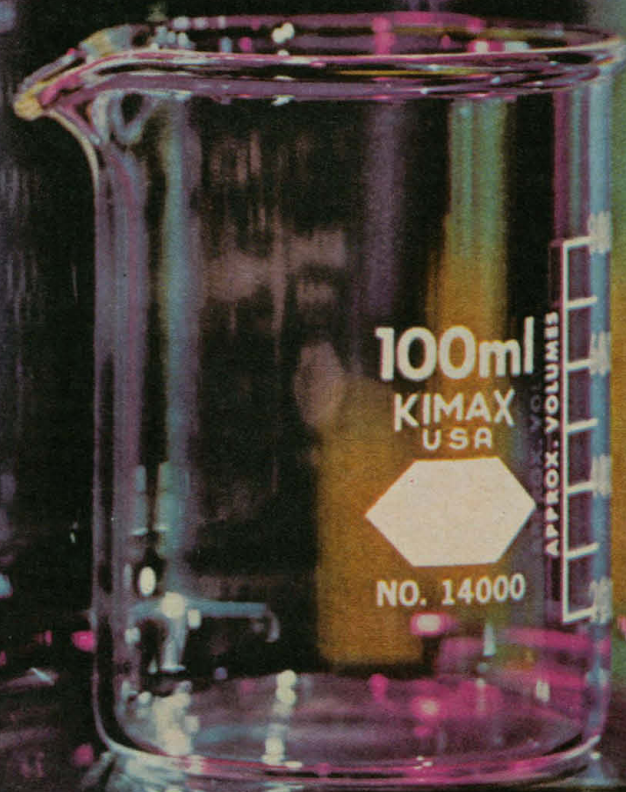
This cross-sectional view shows why KIMAX® beakers are a cut above the ordinary. Walls that are uniform and heavier... rugged rims built to withstand long hard use... an improved pour-out design. And note the printed volume scale — another thoughtful improvement you now get at no extra cost. Altogether, quite a change from the beakers on the market just a few years ago.

Kimble now is offering beakers and Erlenmeyer flasks *in lower case quantities*, for convenience and economy.

Shouldn't you look at it this way, for the best value in scientific glassware?

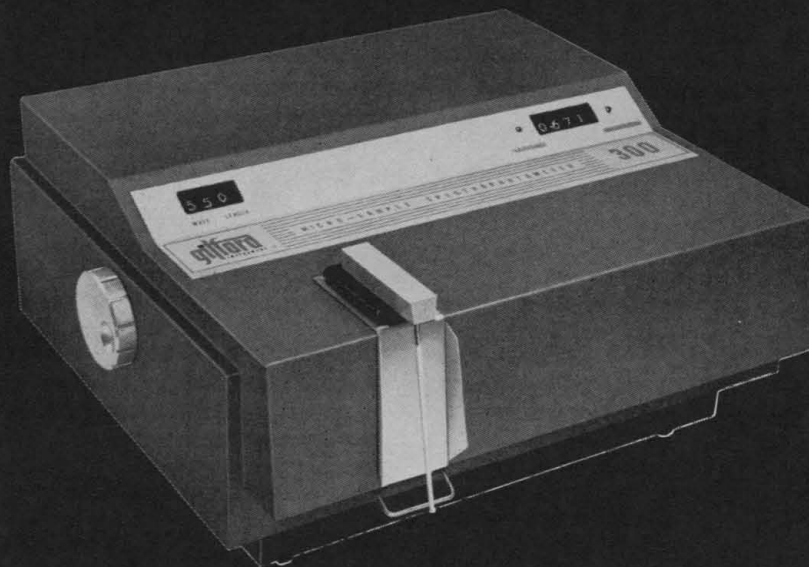
OWENS-ILLINOIS

Maker of Kimble Products
Toledo, Ohio 43601

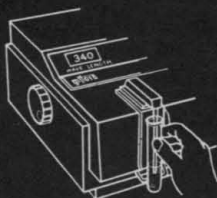


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RANGE**



**WAVELENGTH RANGE
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SIMPLIFIED SAMPLING



**DIRECT READOUT IN
ABSORBANCE OR
CONCENTRATION**

...with the Gilford Model 300 MICRO-SAMPLE SPECTROPHOTOMETER

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

The automatic time-impulse sampling system draws in less than 0.5 ml per sample with no handling of cuvettes or pouring of fluids. Touch a bar, and in a few seconds you flush out the previous sample, then introduce the next. The absorbance value appears immediately on the four-digit numerical indicator. Or, after a single calibration setting, you get direct readings of concentration in any convenient units.

Technicians find the compact Model 300 especially easy to use and maintain. Yet, here is a true spectrophotometer with research accuracy and flexibility, filling a realistic need in busy laboratories.

The remarkable sensitivity and stability of the Model 300 is a product of a unique electronic circuit, sophisticated optical and mechanical design and close tolerance manufacturing.

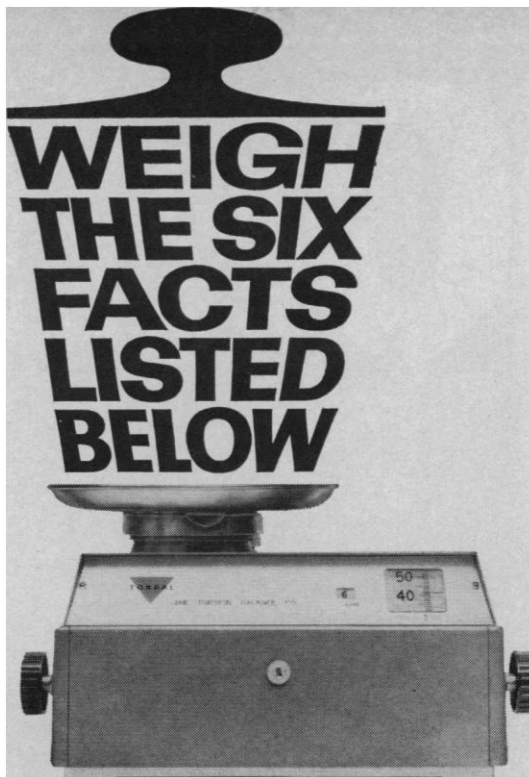
For special applications there are accessories for continuous flow arrangements, use of standard cuvettes and chart recording of absorbance data.

As vital diagnostic and research techniques improve, measurements often require new orders of sensitivity, precision and speed. The Gilford Model 300 is clearly ahead of this trend.

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You'll find more advantages with TORBAL balances

1. From 14 kg. balances to 0.1 mg. analyticals, Torbal is the only complete balance line with friction-free pivots and bearings.
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3. Only Torsion balances are so rugged yet sensitive. The Torsion construction with no knife-edges gives greater protection against damage from objects accidentally dropped on the pans.

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5. The Torbal EA-1 analytical balance is the only analytical offering the advantages of a null-type read-out. This construction eliminates any effect from variations in sensitivity. Sample weighing is much easier.

6. When you use Torsion balances you don't need a service contract. Torbals are so rugged and dependable that adjustment or repairs are rarely needed.

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Main Office and Factory: Clifton, New Jersey, Sales Offices: Chicago, Ill., Richardson, Texas, San Mateo, Cal., Santa Ana, Cal., Pittsburgh, Pa., Lynnfield, Mass. • Plants and Offices in Montreal, Quebec and London, England



CLIP, ATTACH TO YOUR LETTERHEAD AND WE'LL SEND INFO ON ANY YOU CHECK



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

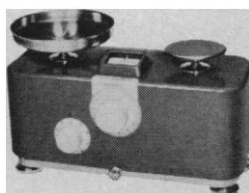


TB-217



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).

Model
DWL-3V



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)



120 gram capacity. Dials permit direct readings from 10 grams to 0.01 grams (can also be read to 0.003 grams by estimation).

Model
DWL-2



Analytical balance, direct digital readout to tenth mg., 160g. capacity. Has exclusive solid-state electronic null indicator. Unaffected by variations in sensitivity. Ease of reading, accuracy and reproducibility greatly enhanced. Null indicator simplifies sample weighing.

Model
EA-1

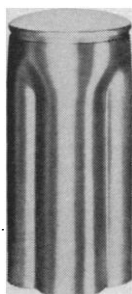
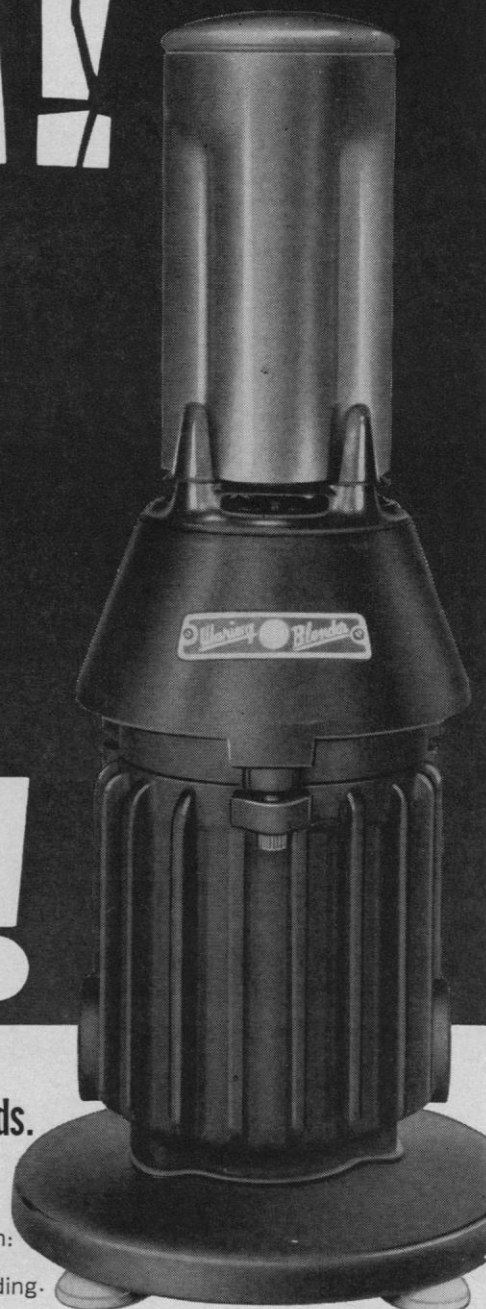


BOOM!

NEVER!

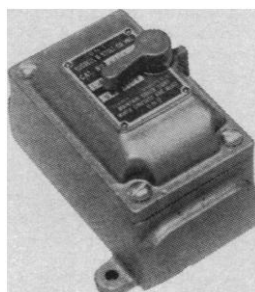
Waring's Explosion-Proof Blendor Base* Protects You in Hazardous Atmospheres or when Blending Hazardous Compounds.

This is the only Blendor Base for use in blending explosive materials. It is the only Blendor Base for use in areas where gases, vapors or particles are found in explosive quantities. Because exposed motor arcing is eliminated, the Waring Explosion-Proof Blendor Base can be operated safely in atmospheres permeated with: Acetone/Methyl Alcohol/Benzene/Petroleum/Ether/Natural Gas/Butane/Propane/Gasoline/Naptha. The powerful 2-speed lifetime lubricated motor gives total blending of all volatile substances quickly, efficiently, safely. Ask your supplier about the Waring Explosion-Proof Blendor. Your lab—and your life—may depend on it. **\$289.00** No. EP-1



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Made from 302 Stainless to assure greater durability and chemical resistance. Surgical steel blending blades. **\$24.95**

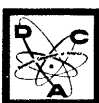


EXPLOSIVE-PROOF SWITCH NO. EPS-2

- Specially designed unit for 2-speed operation.
- May be connected via conduit for remote control of Explosion-Proof Blendor Base. **\$29.95**



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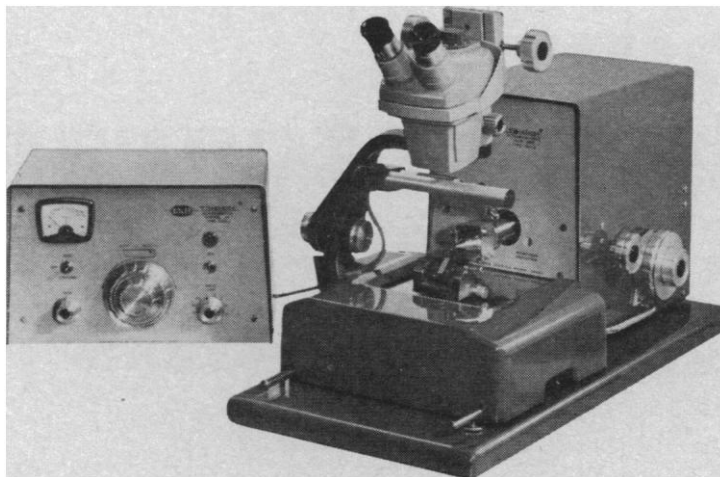


WINSTED, CONN.

Please write for full specifications or for answers to any questions you may have.

*Shown with SS510 Stainless Steel container

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

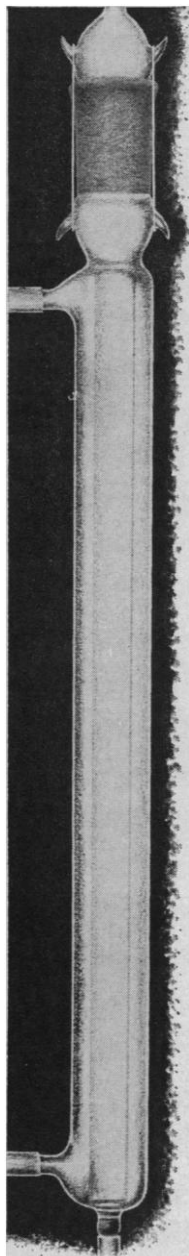
all, the most sophisticated ultramicrotome yet developed.

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.

Would you like the entire story? Ask us for bulletin 8800S5.



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Column Chromatography in Three Easy Lessons*

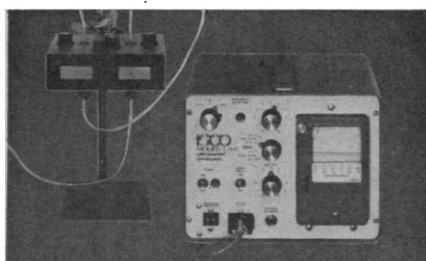
* Three Easy Prices Too!
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Send For Brochure CC17E

Lesson No.1



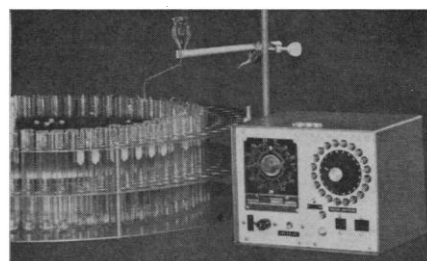
Begin by pumping your solvent into the column in a smooth concentration or pH gradient. ISCO's new programmed gradient pump, the DIALAGRAD, will handle this perfectly. In fact any simple or complex gradient formed by combining two liquids can be dialed directly into the DIALAGRAD. Program duration and 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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5624 SEWARD AVE. • LINCOLN, NEBRASKA 68507, U.S.A. • PHONE (402) 434-8265 • CABLE ADDRESS: ISCOLAB LINCOLN

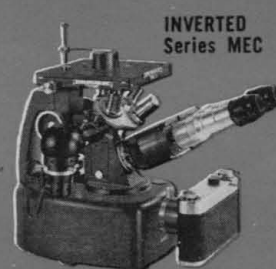
UNITRON... your complete source for Microscopes with the Metallurgists' Stamp of Approval



STUDENT
MODEL MMA
\$154



LABORATORY
MODEL MMU
\$312

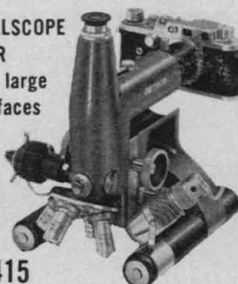


INVERTED
Series MEC
Monocular Model \$416
Binocular Model \$719

SERIES TM
UNIVERSAL
MEASURING
\$1070 up



ROLLSCOPE
DMR
For large
surfaces

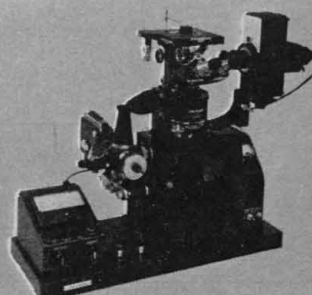


\$415

"SERIES N" METALLOGRAPHS

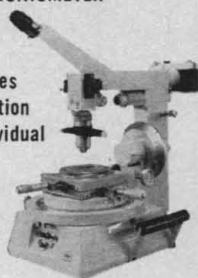
New budget-priced models with flatfield objectives, widefield eyepieces, coaxial stage controls, and many optional accessories. Models with combined xenon-tungsten or tungsten illumination available.

From
\$1398 up

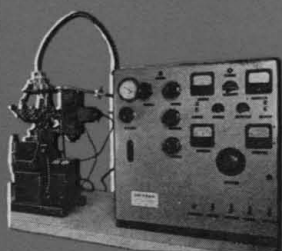


MICROGONIOMETER

Measures
orientation
of individual
grains



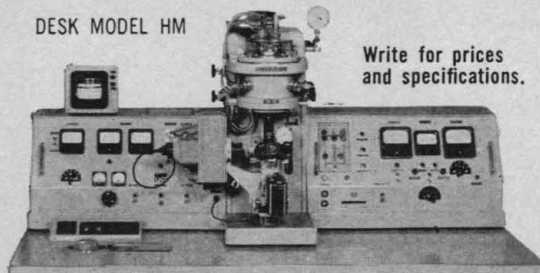
HTL HIGH TEMPERATURE
LABORATORY INSTALLATION



UNITRON'S HIGH-TEMPERATURE RESEARCH METALLOGRAPH

DESK MODEL HM

Write for prices
and specifications.



HHS Vacuum
Heating Stage for
1500°C... \$625



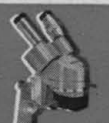
Austenite Grain
Size Eyepieces:
Turret Type \$76
Ke10X... \$25



Widefield Filar
Micrometer \$105



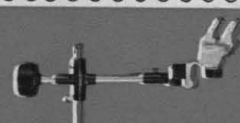
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A salesman's demonstration gives you only about 30 minutes to examine a microscope... hardly the best conditions for a critical appraisal. But UNITRON's Free 10 Day Trial allows you to evaluate the microscope in your own lab, and prove its value to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

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

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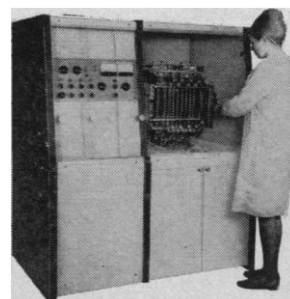
66 NEEDHAM STREET
NEWTON HIGHLANDS
MASS. 02161

PROTEIN SEPARATION... PREPARATION... CONCENTRATION

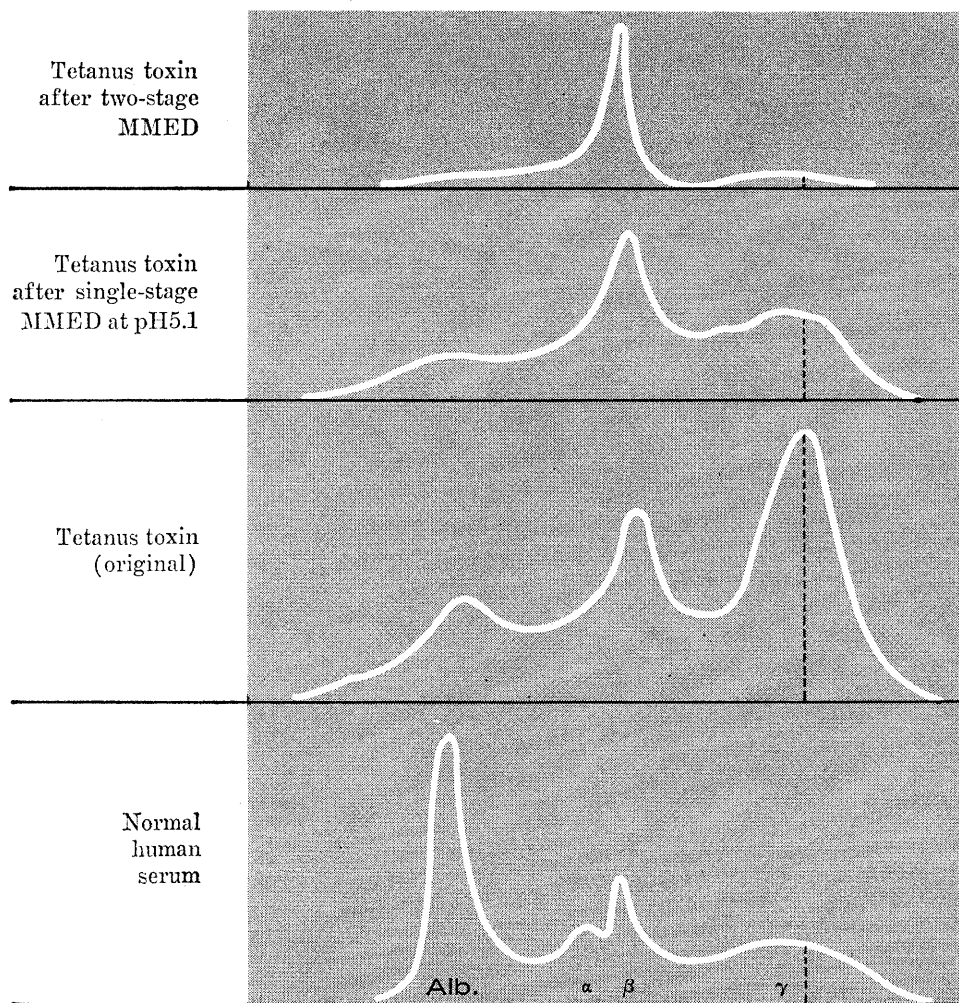
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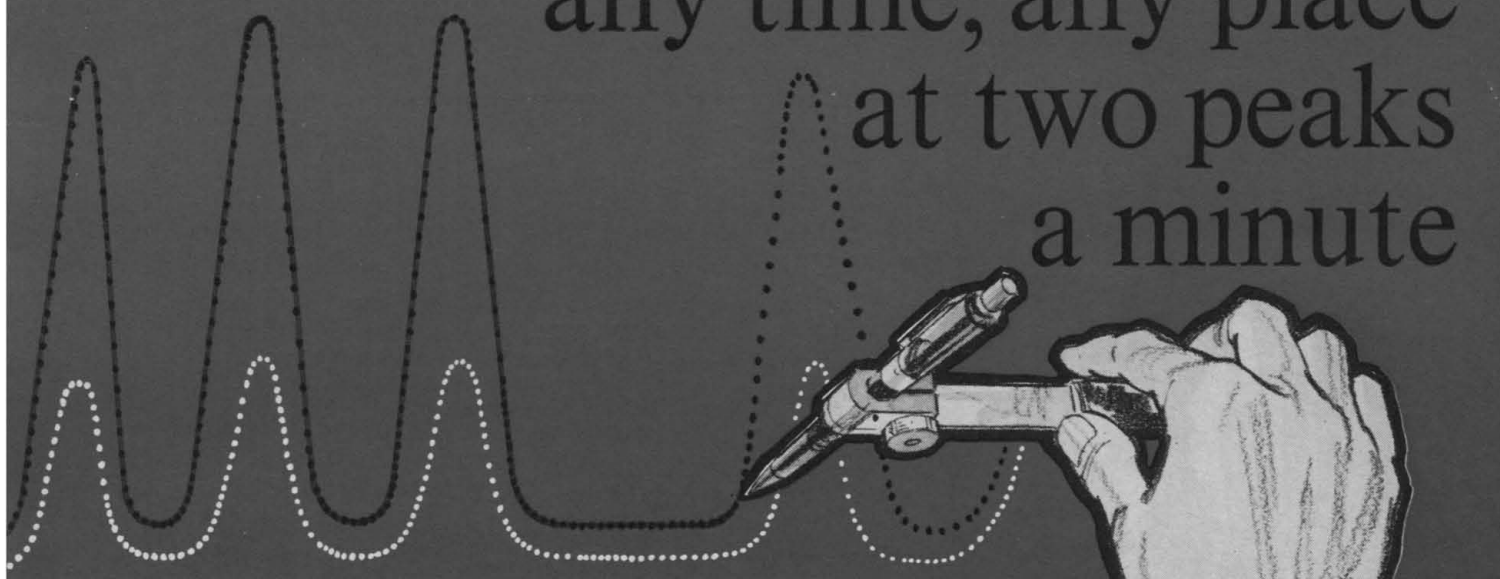
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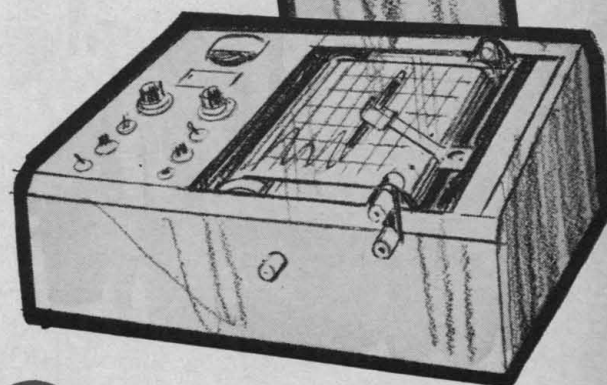
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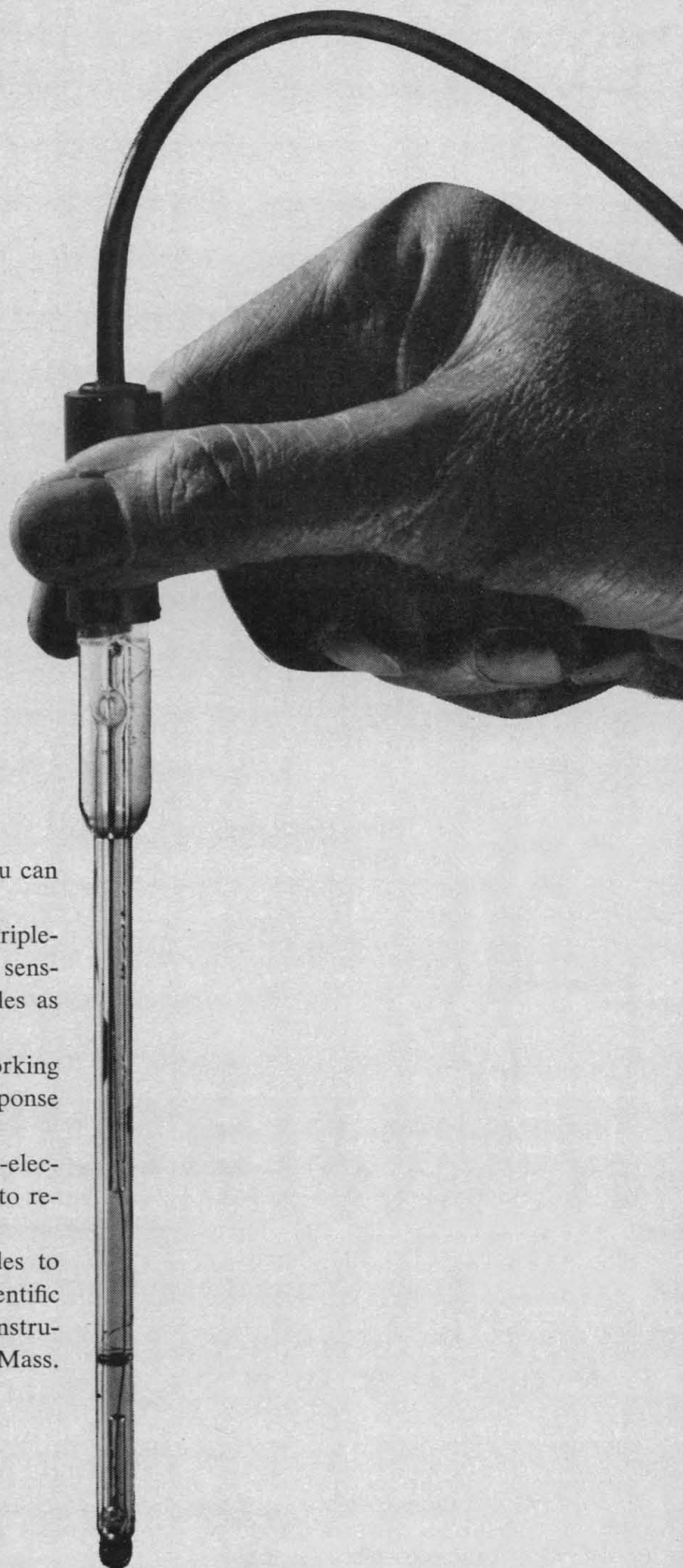
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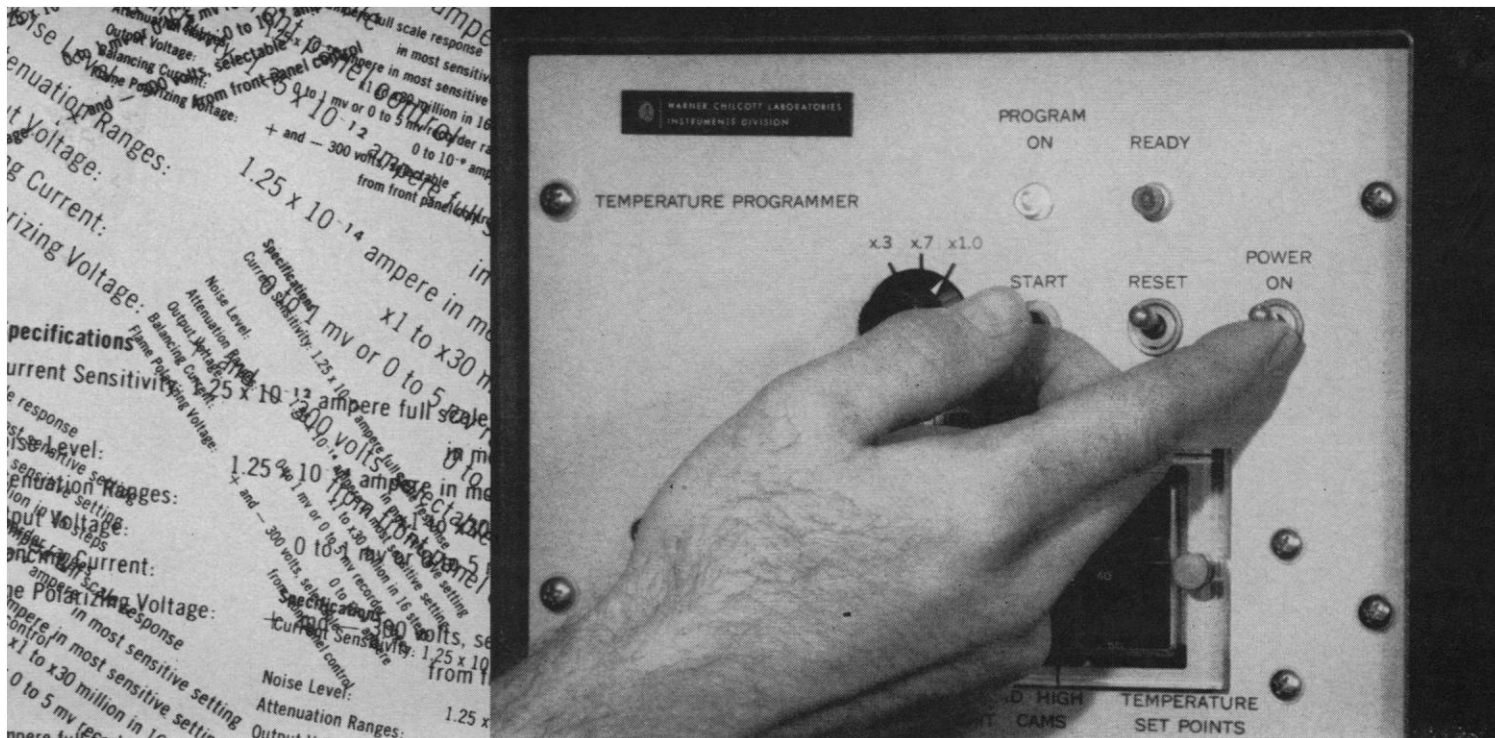
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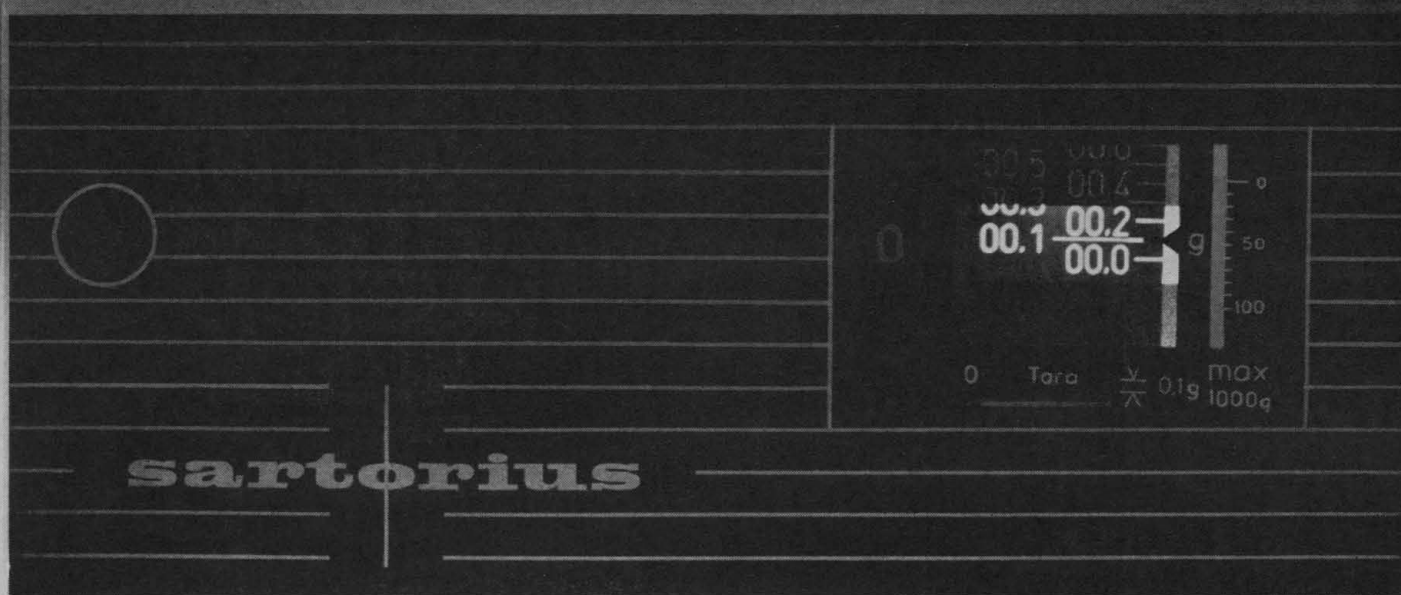
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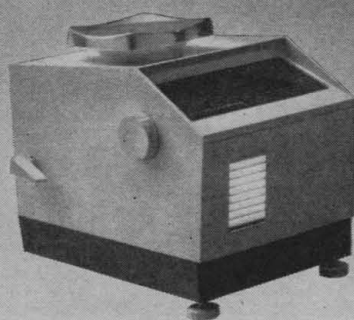
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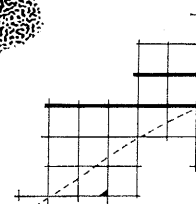
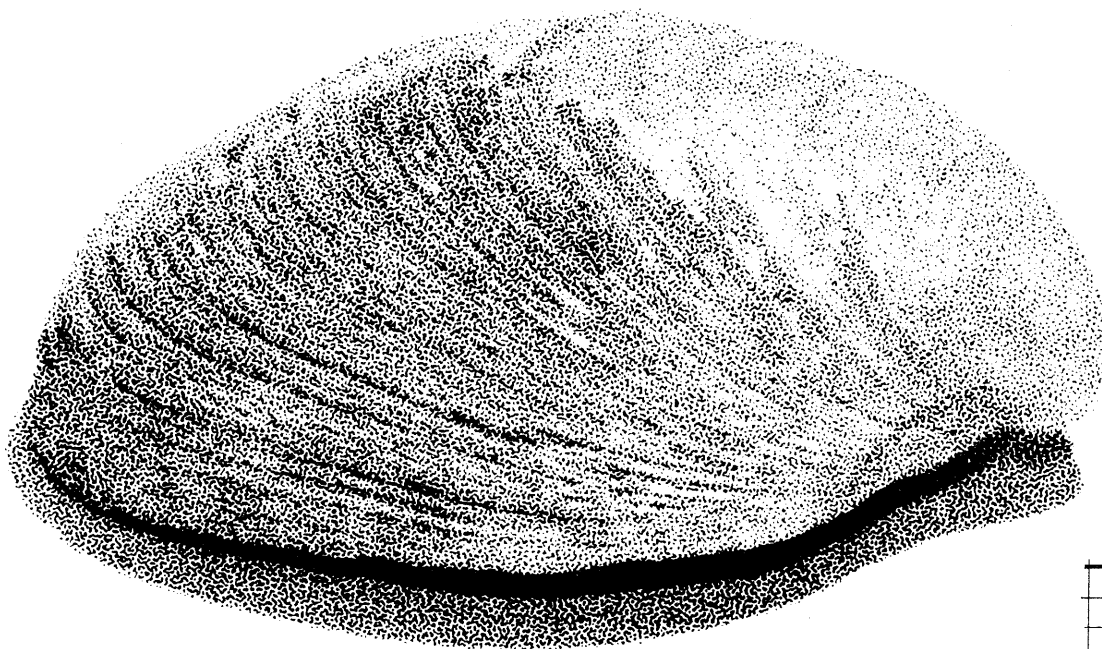
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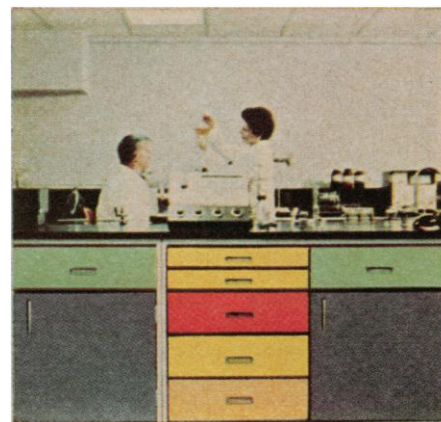
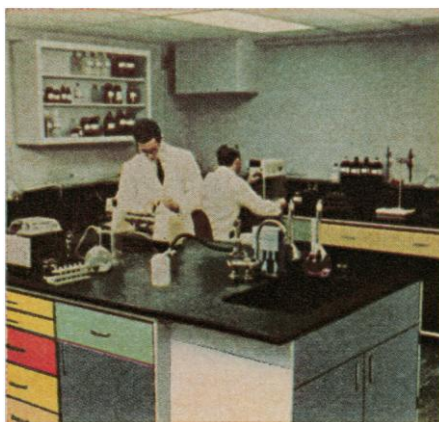
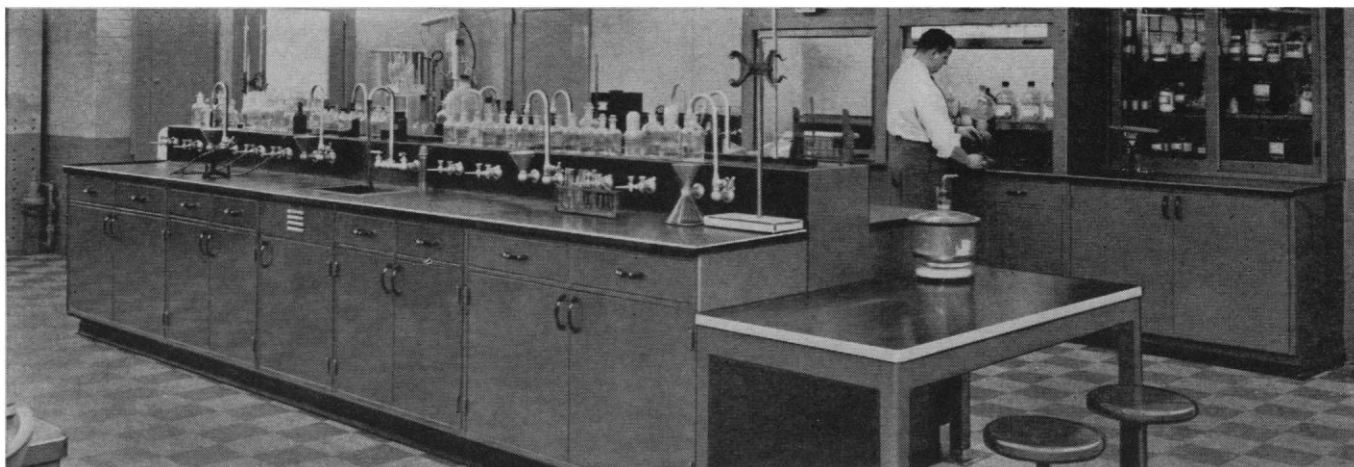
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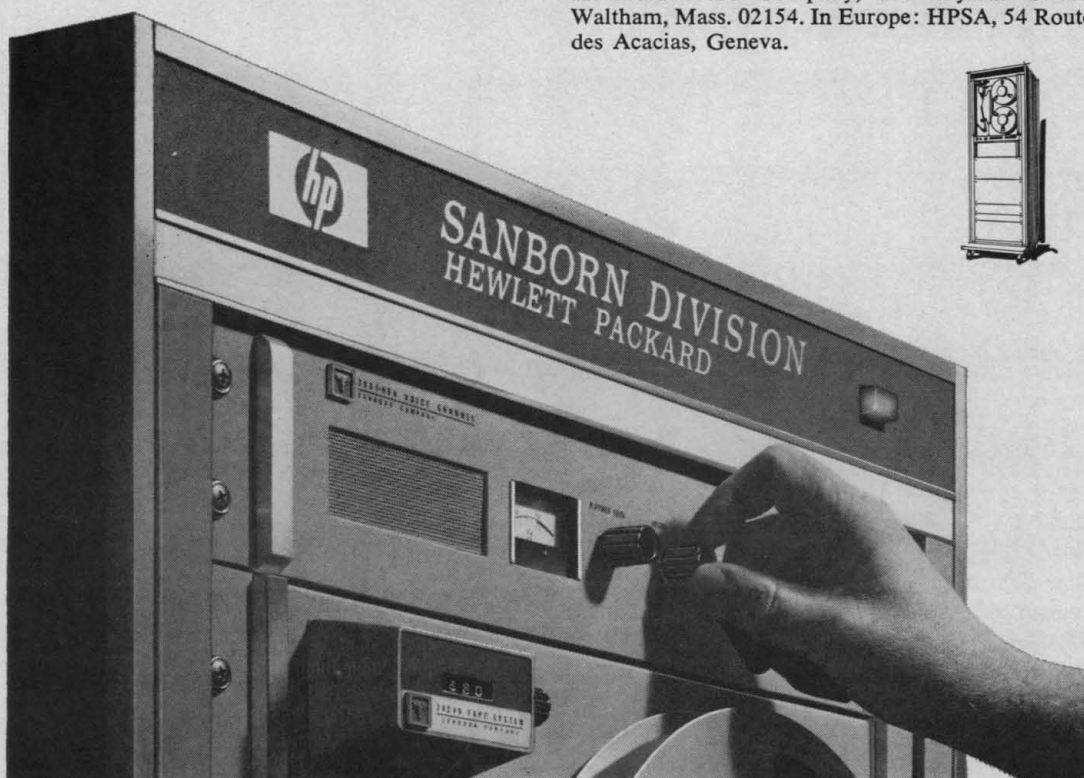
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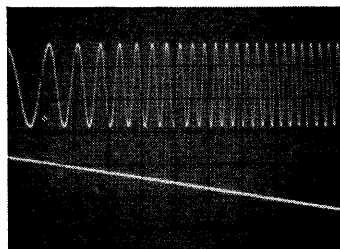
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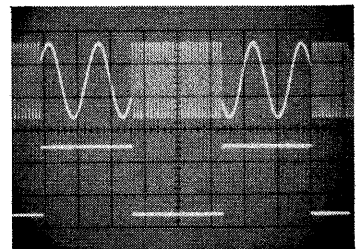
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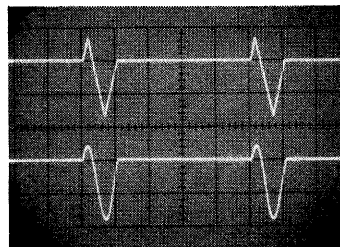
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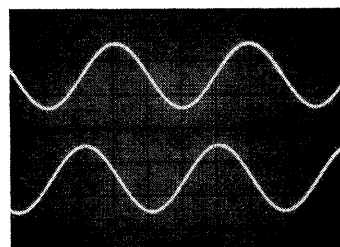
Voltage programming; frequency upper trace, programming voltage below.



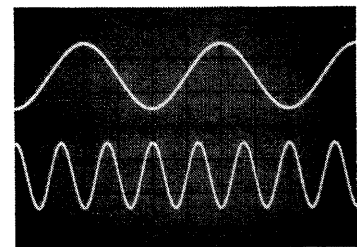
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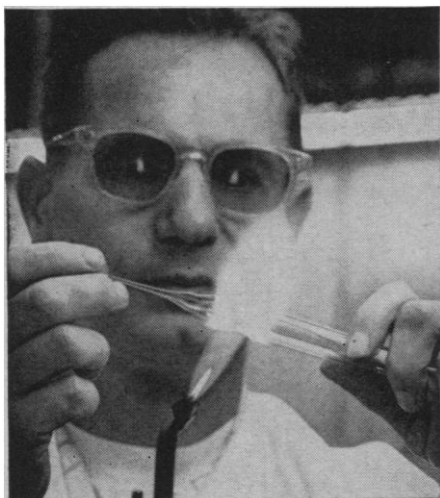
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Phase lock; output from function generator (upper trace) locked to external fundamental (lower trace).



Phase lock; output from function generator (upper trace) locked to external harmonic (lower trace).



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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,
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... 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! . . .

WINSTON OBERG

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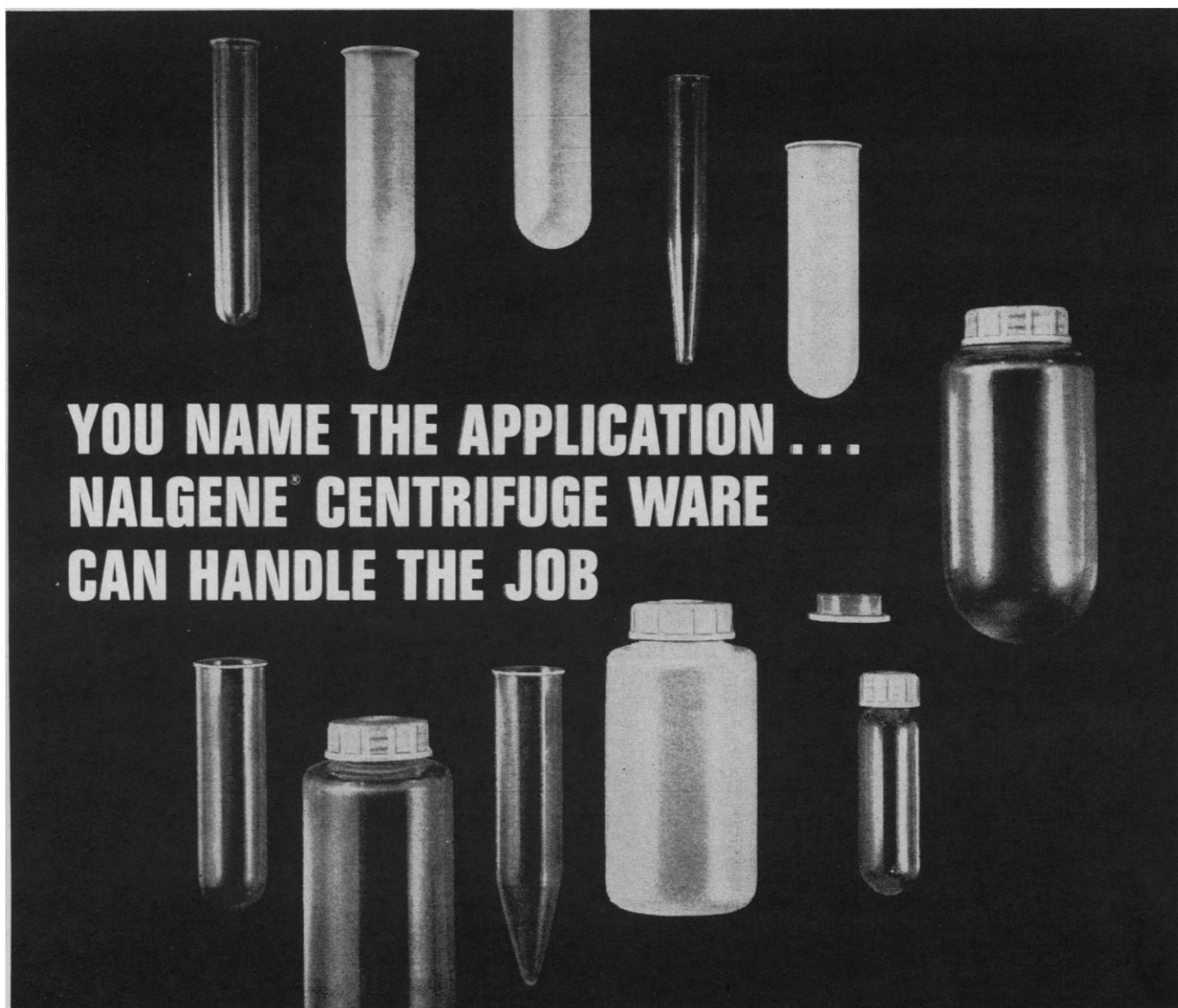
... I fail to find justification for Altus's conclusion that "relatively few of the total available first-borns" are affected by the relation of birth order to achievement or that "birth order is effectively linked to aptitude *only at the top level*" (emphasis his). This conclusion seems to me to be 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 $\frac{1}{4}$ 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 $\frac{3}{4}$ standard deviations from the mean for first-borns, but is $\frac{1}{2}$ 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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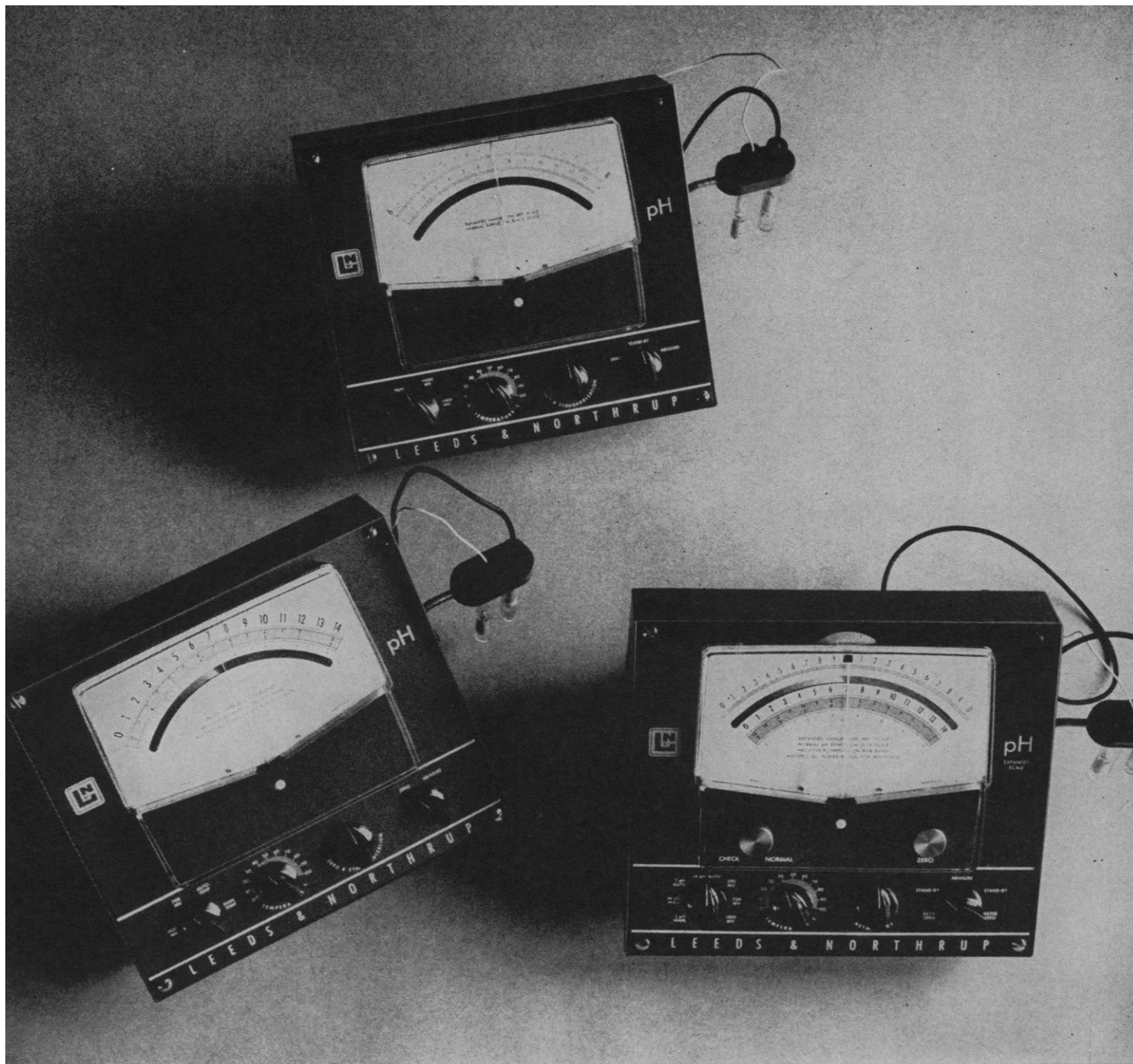
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up just as clearly at the low end of the distribution as at the high end, so it should be interesting to count the number of first-borns among the mentally retarded; the paucity of first-borns in that group should match the abundance of first-borns in the high-ability groups.

JOHN D. MCGERVEY

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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 over-represented; 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.

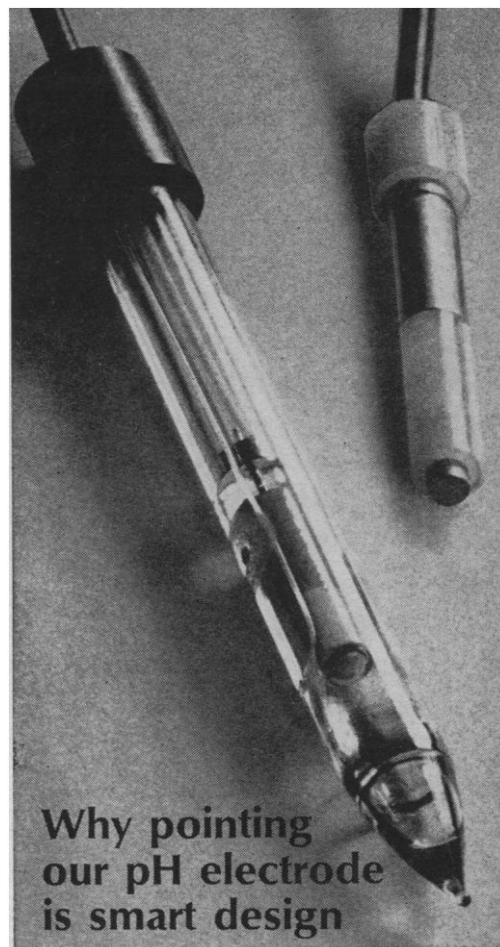
LOIS-ELLEN DATTA

National Institute of Mental Health,
Bethesda, Maryland

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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



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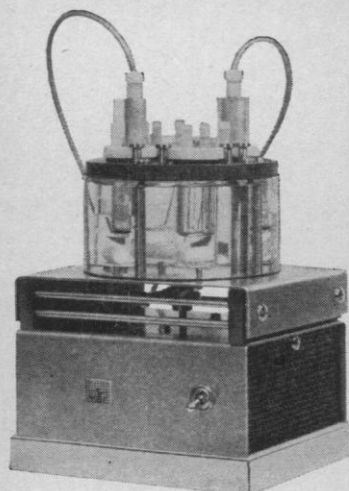
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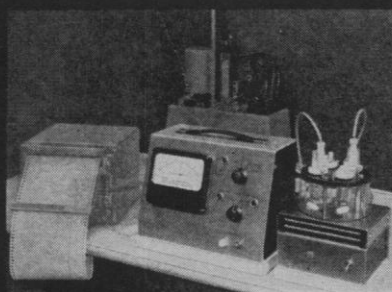
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thesis. Ratios of first births may vary considerably year to year, but my data—and Schachter's (1)—tend to show an overrepresentation in college of the first-born which is not to be explained simply as derivative from these ratios, varying or constant.

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



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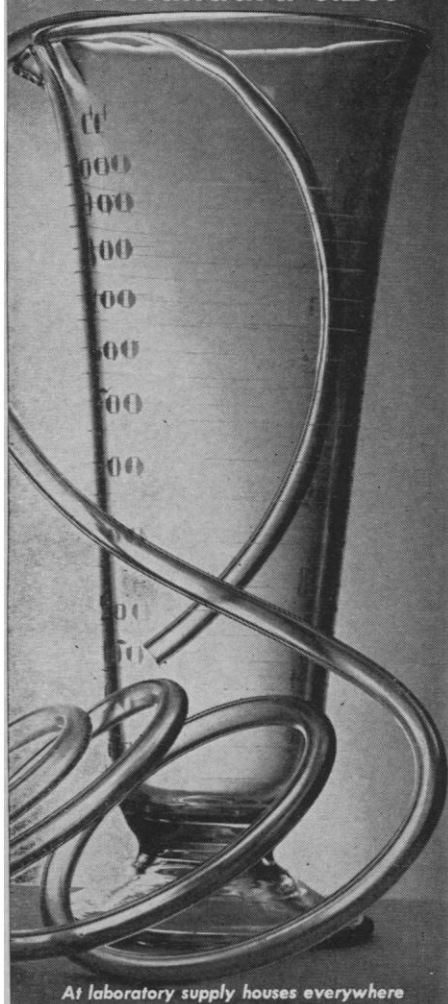
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a generation, giving time for the lag-guards to catch up—if they can. But like Hooke I would feel much more comfortable with an established set of expectancy ratios for our birth orders.

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.

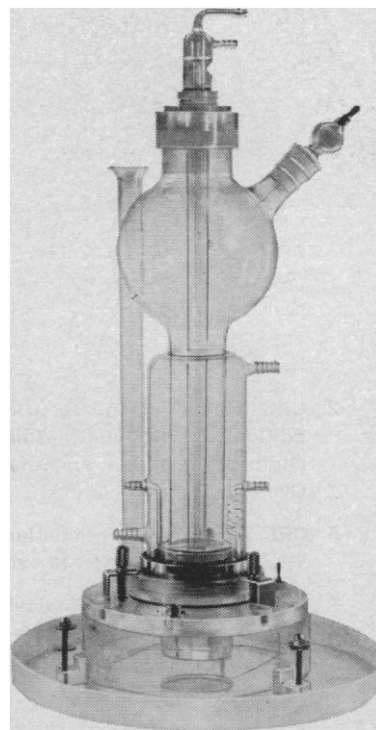
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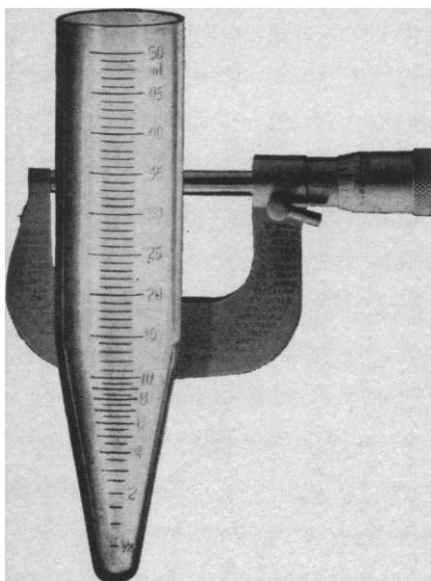
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The Office of Education figures (News and Comment, 11 Feb., p. 667) projecting the number of engineering degrees to be awarded in 1970 and 1975 seem to me to be very unrealistic in view of the actual figures given for 1960 and 1965. The increase in 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"?

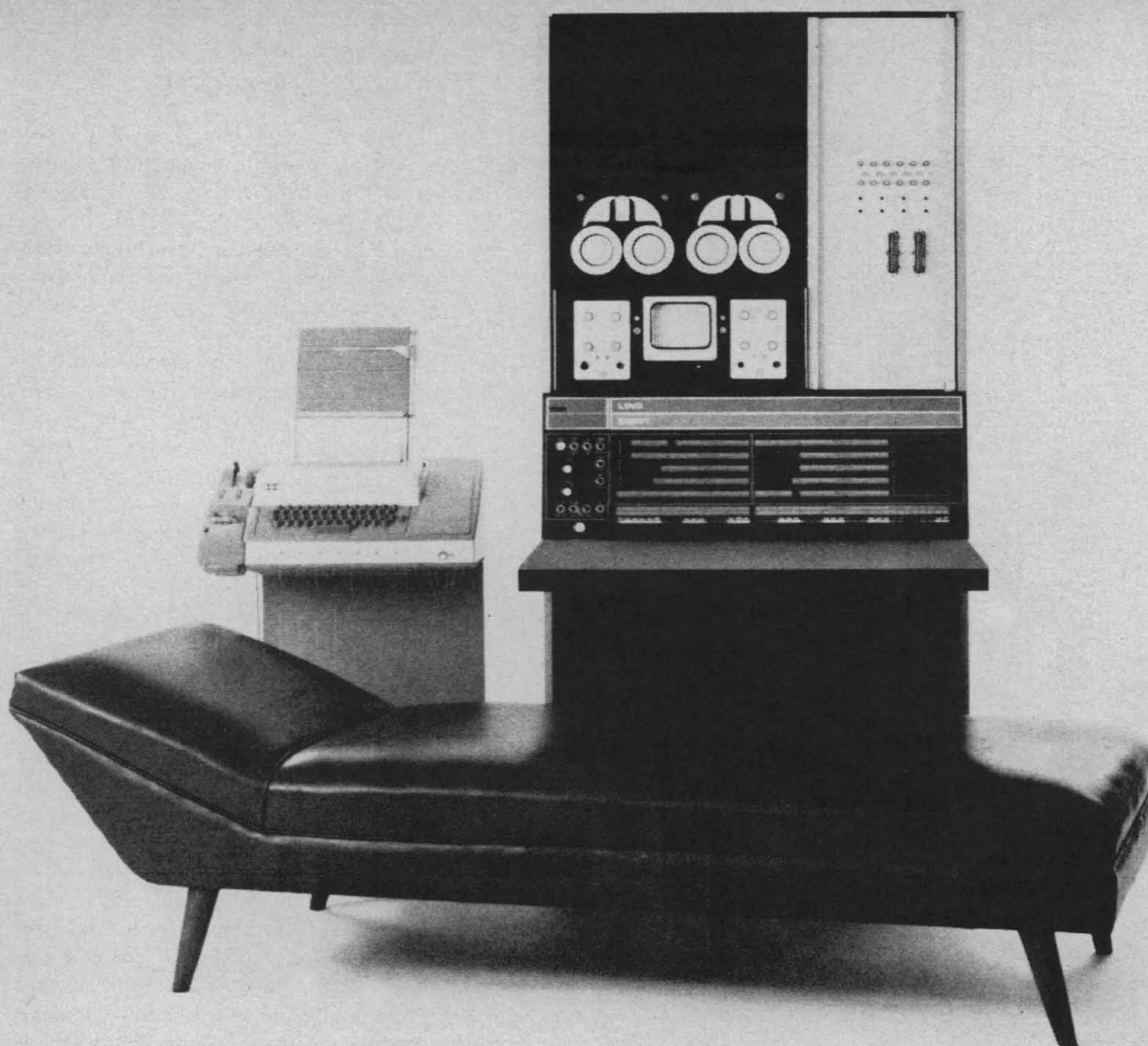
Commenting (Letters, 4 Mar.) on a new program of elementary science instruction described by R. M. Gagné (7 Jan., p. 49), J. M. Atkin, by repeatedly applying the unfortunate term "skills," gives a pejorative coloration to the elements of scientific activity which the program is designed to teach—observation, 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.

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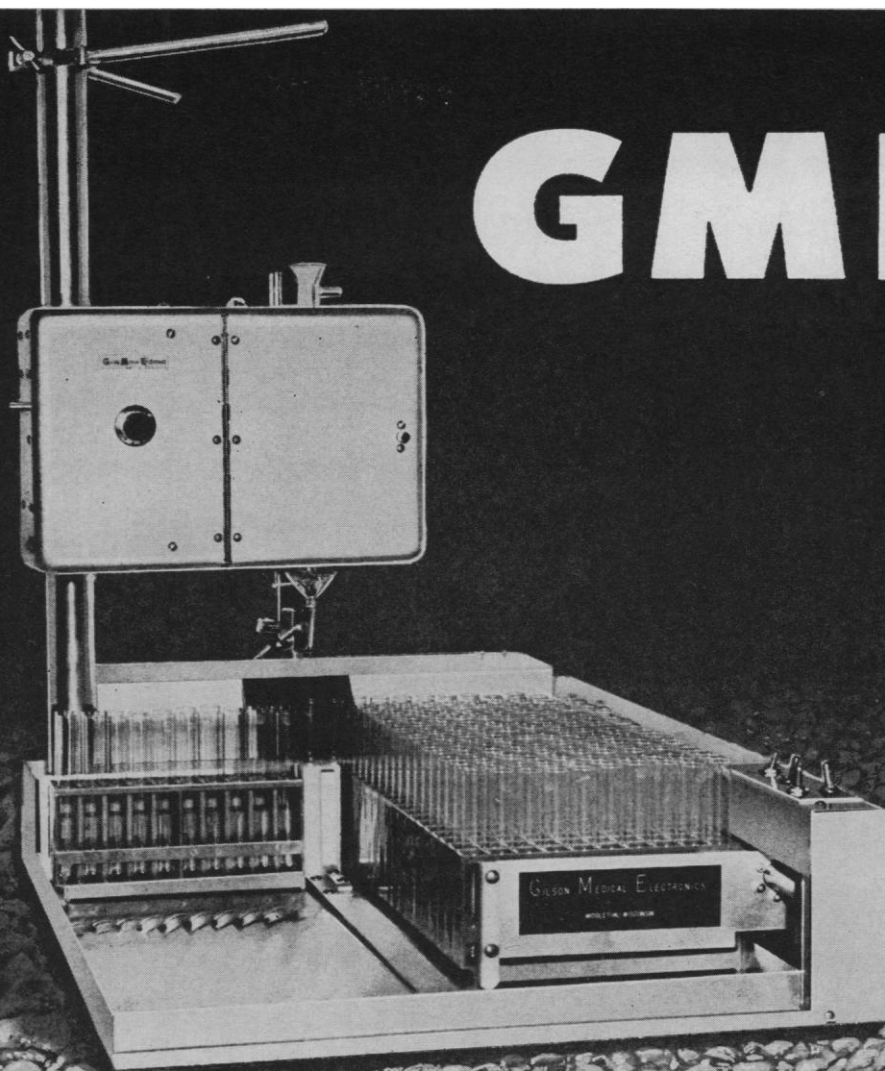
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Academic Quality

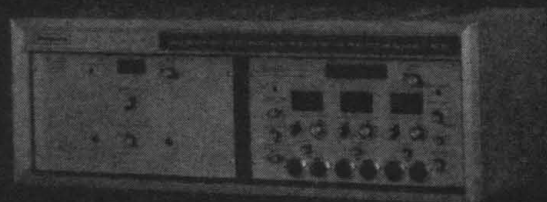
There is frequent occasion to ask, "How good is the department of X at the University of Y?" Answers are now available for 29 academic fields in the 106 universities that award some 95 percent of all Ph.D. degrees in the U.S. Allan M. Cartter, vice president of the American Council on Education, has 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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and Herpetologists, annual mtg., Miami, Fla. (The Society, Div. of Reptiles, U.S. Natl. Museum, Washington, D.C. 20561)

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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.)

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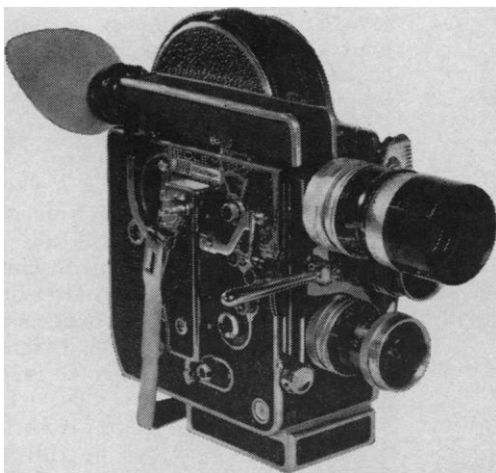
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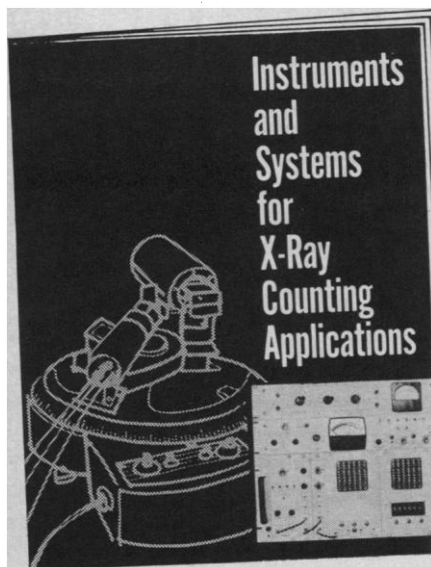
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22-25. **Endocrine Soc.**, 48th annual mtg., Chicago, Ill. (The Society, 1200 N. Walker, Oklahoma City, Okla.)

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 Nazionale 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. Orehsoski, 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. Sapocho, 306 Nassau Hall, Princeton)

30-2. **European Soc. for the Study of Drug Toxicity**, congr., Prague, Czechoslovakia. (Tschechoslowakische 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)

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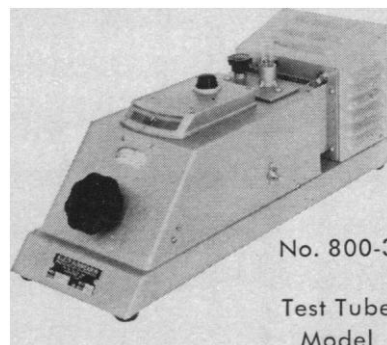
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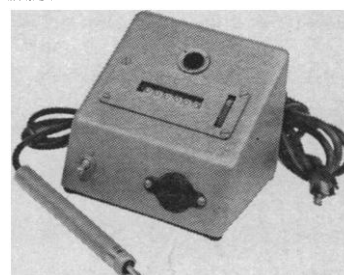
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- 4-8. **British Medical Assoc.**, Exeter, England. (Secretary, Tavistock Sq., London W.C.1, England)
- 4-8. **Magnetohydrodynamic Electrical Power Generation**, intern. symp., Salzburg, Austria. (European Nuclear Energy Agency, 38 blvd. Suchet, Paris 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,



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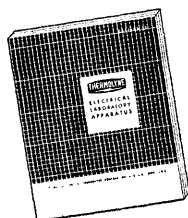
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Scotland. (Meetings Officer, Inst. of Physics and the Physics Soc., 47 Belgrave Sq., London S.W.1)

8-12. **Graph Theory**, seminar, Rome, Italy. (International Computation Centre, Viale Civiltà 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 Agriculture Org., Via delle Terme 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)

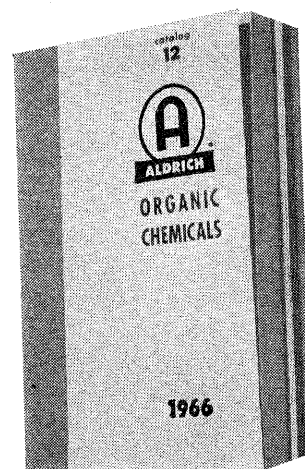
12-19. **International Union of Crystallography**, 7th general assembly and congr., Moscow, U.S.S.R. (J. Ibers, Chemistry Dept., Northwestern Univ., Evanston, Ill.)

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)

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

17-21. **Canadian Veterinary Medical Assoc.**, annual conv., Vancouver, 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., São Paulo, Brazil. (Conference Secretary, Inst. Butantan, Caixa Postal 65, São 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 Astronautics, 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., São Paulo, Brazil. (M. Roche e Silva, Dept. of Pharmacology, Faculty of Medicine, Univ. of São Paulo, Ribeirão Preto, São Paulo)

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

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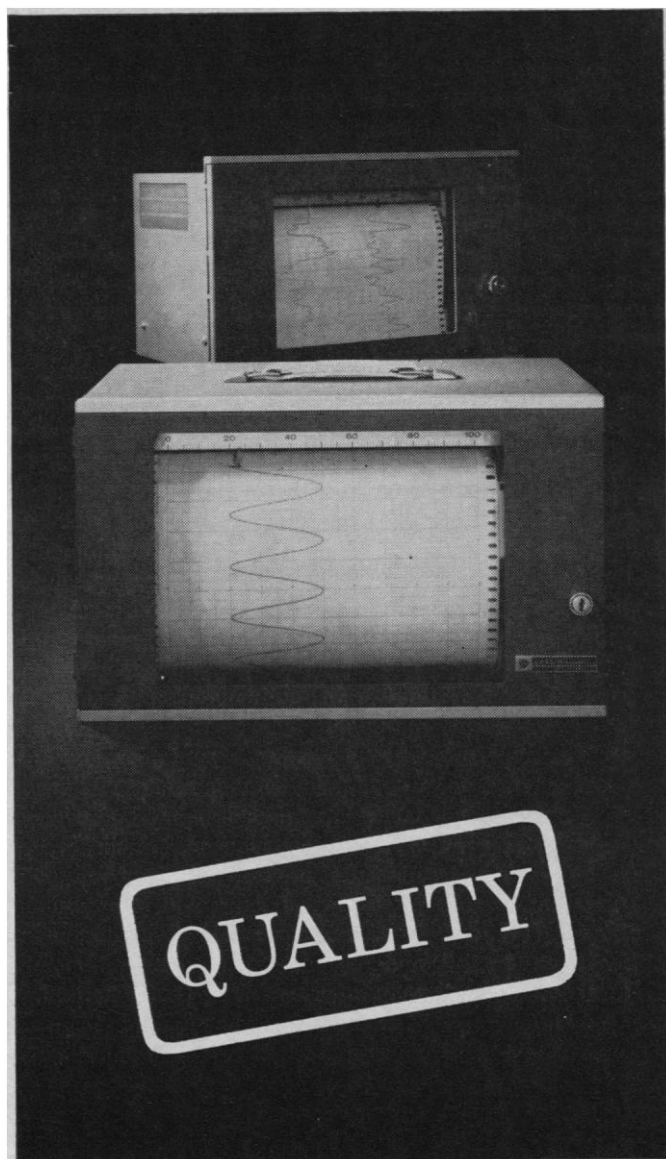
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Technical Activities Board, Inst. of Electrical and Electronics Engineers, 345 E. 47 St., New York 10017)

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., São Paulo, Brazil. (G. Pavan, Dept. of Biology, Univ. of São Paulo, Caixa Postal 8105, São 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, 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)

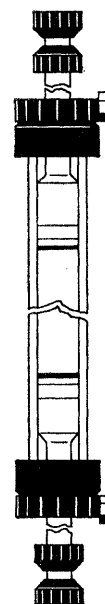
1-4. Toxicology and Occupational Medicine, 5th inter-American conf., Miami, Fla. (W. B. Deichmann, Univ. of Miami School of Medicine, Coral Gables, Fla. 33134)

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)

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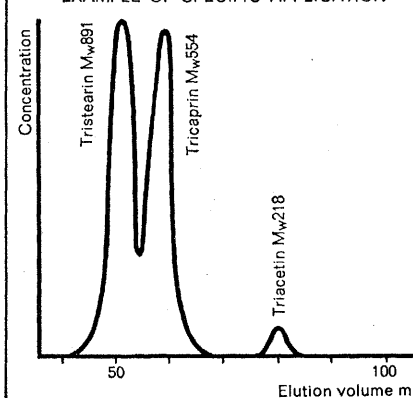
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NEW BOOKS

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Angular Scattering Functions for Spheres. Harry H. Denman, Wilfried Heller, and William J. Pagonis. 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.

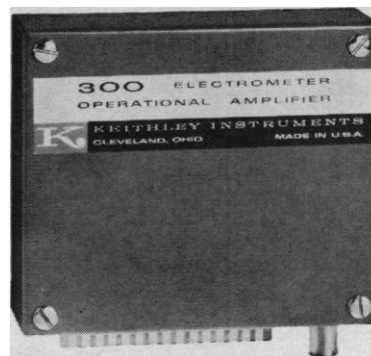
Cahiers de Synthèse Organique: Méthodes et tableaux d'application. vol. 12. Jean Mathieu and André Allais. Masson, Paris, 1966. 297 pp. Illus. F. 120.

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.



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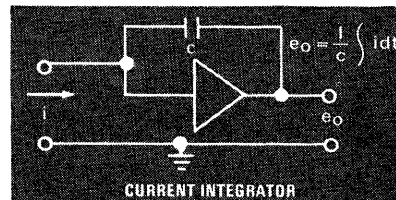
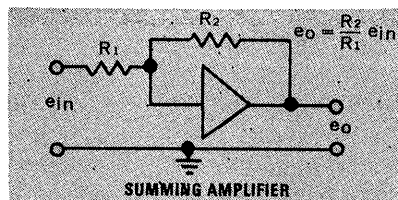
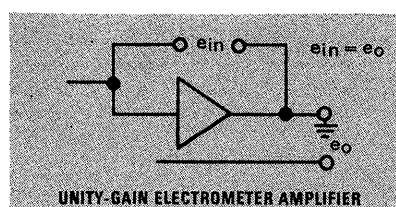
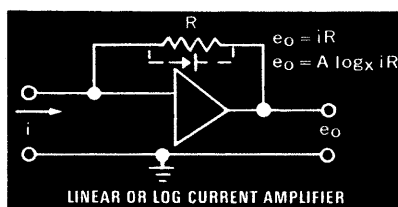
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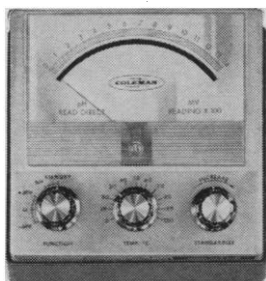
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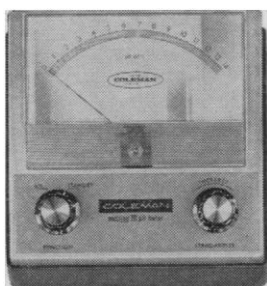
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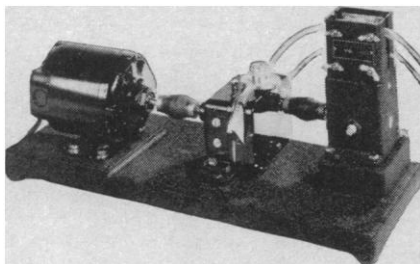
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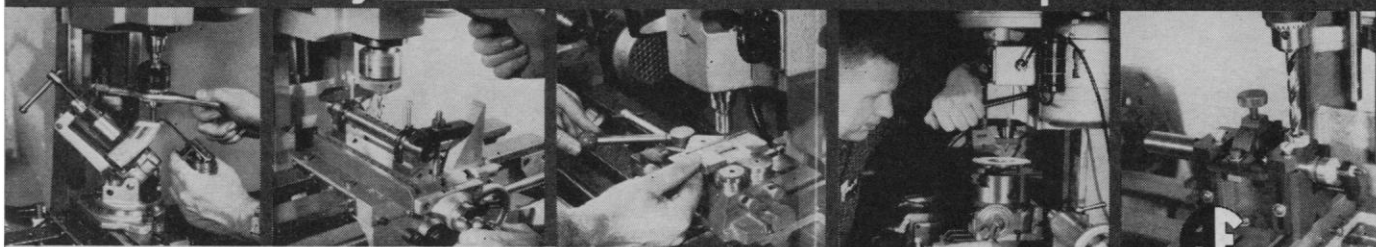
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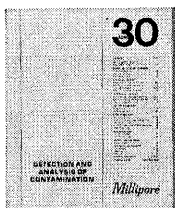
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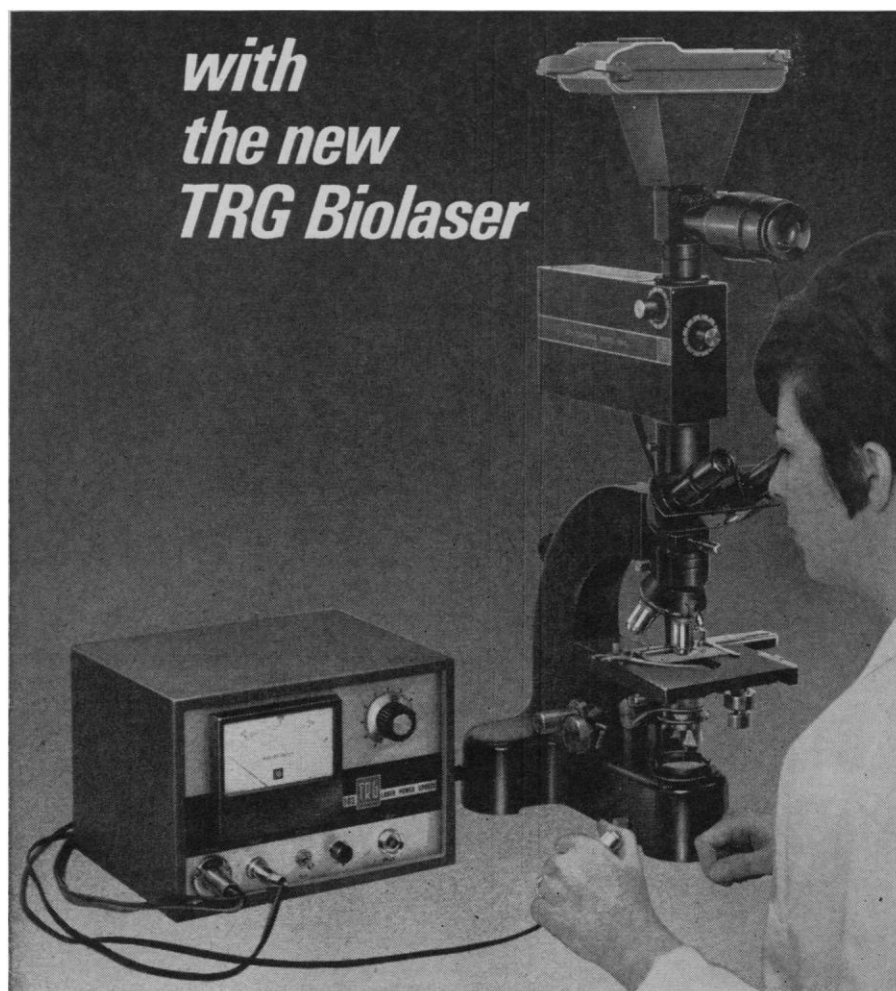
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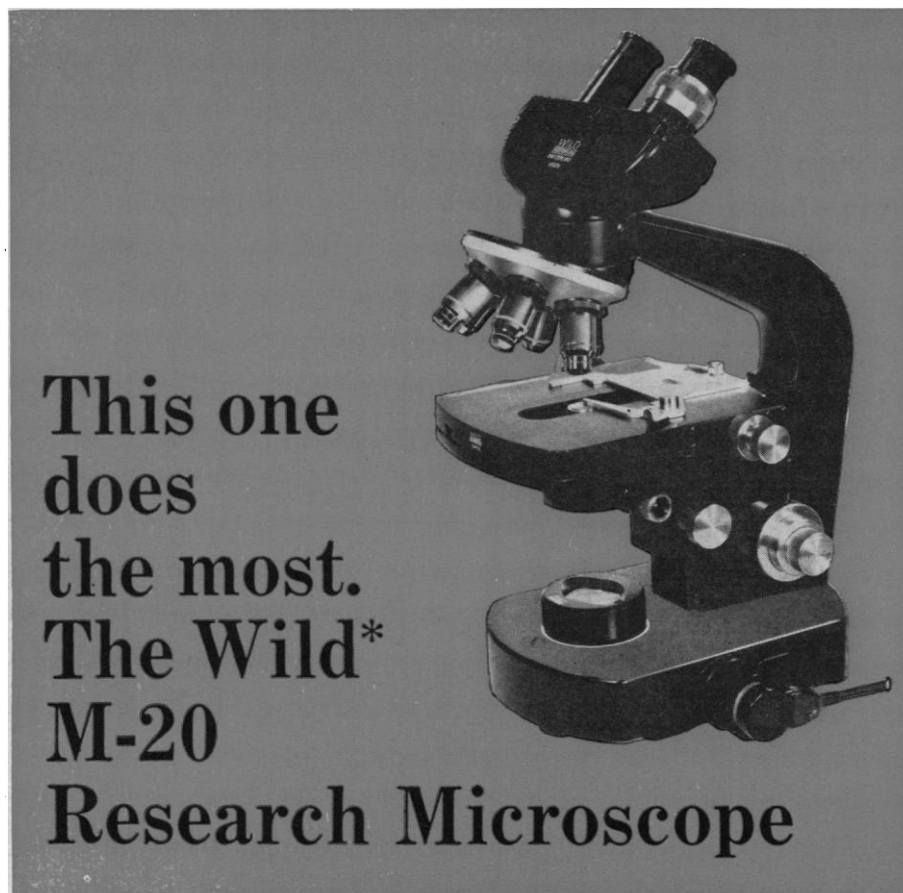
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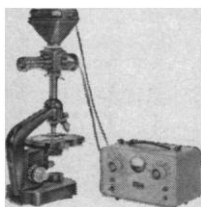
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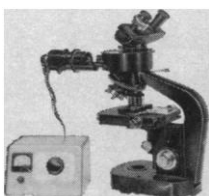


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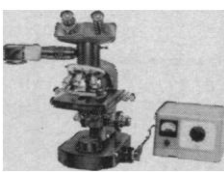
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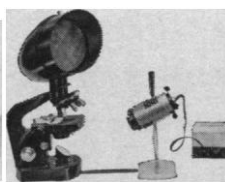
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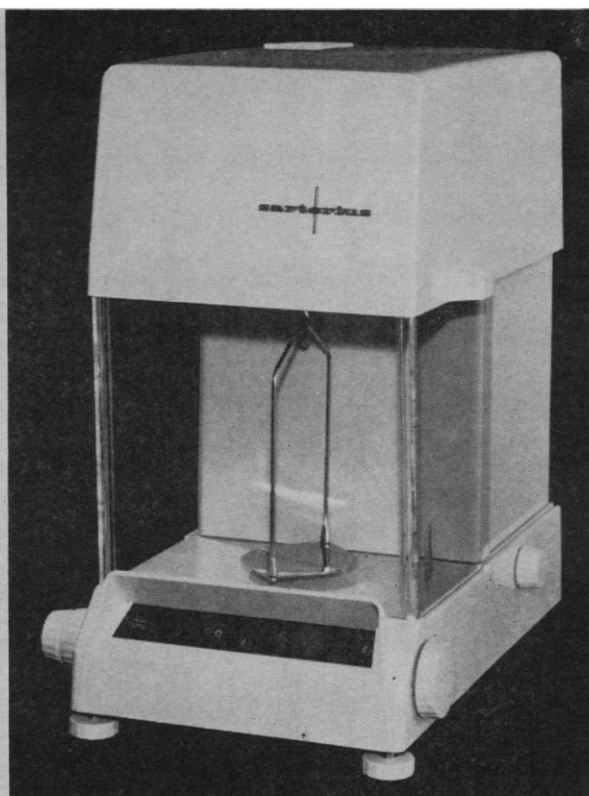
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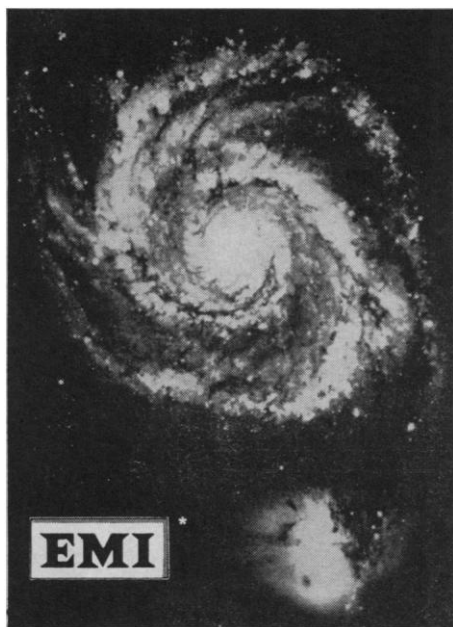
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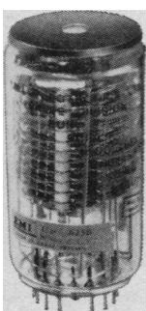
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Whales, Dolphins, and Porpoises. Based on a symposium (Washington, D.C.), August 1963. Kenneth S. Norris, Ed. Univ. of California Press, Berkeley, 1966. 805 pp. Illus. \$15. Thirty-eight papers presented at the First International Symposium on Cetacean 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.

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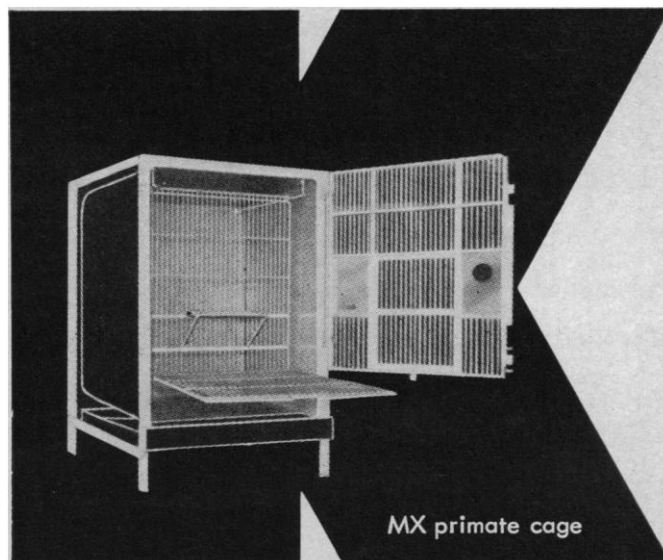
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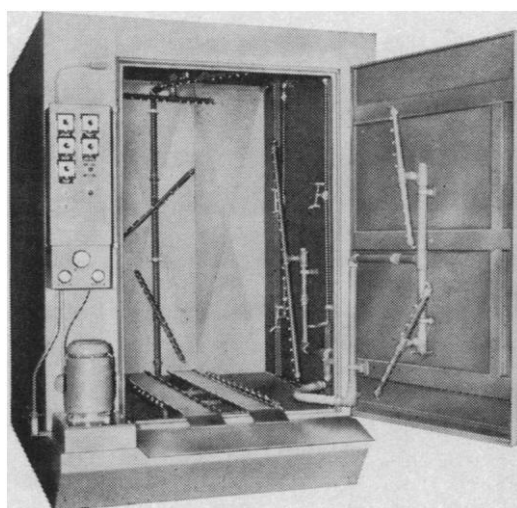
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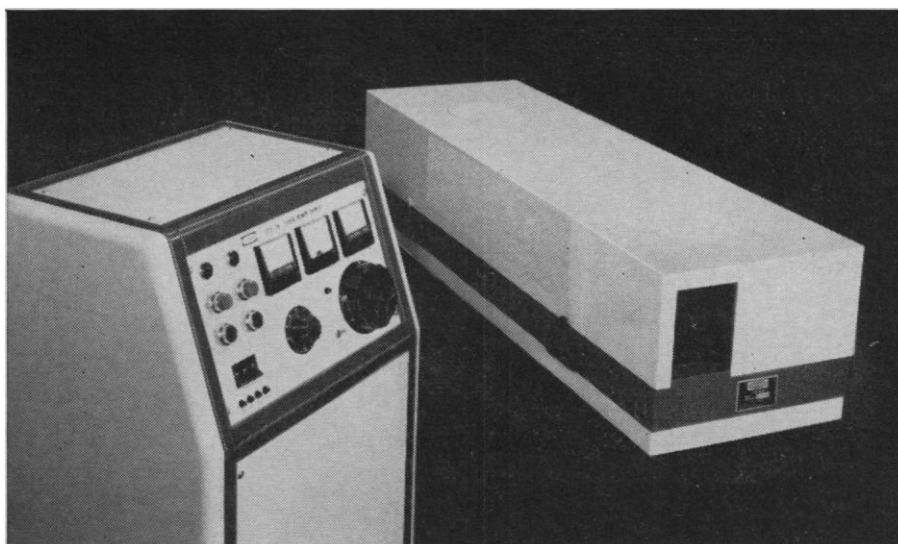
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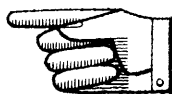
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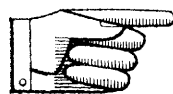
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