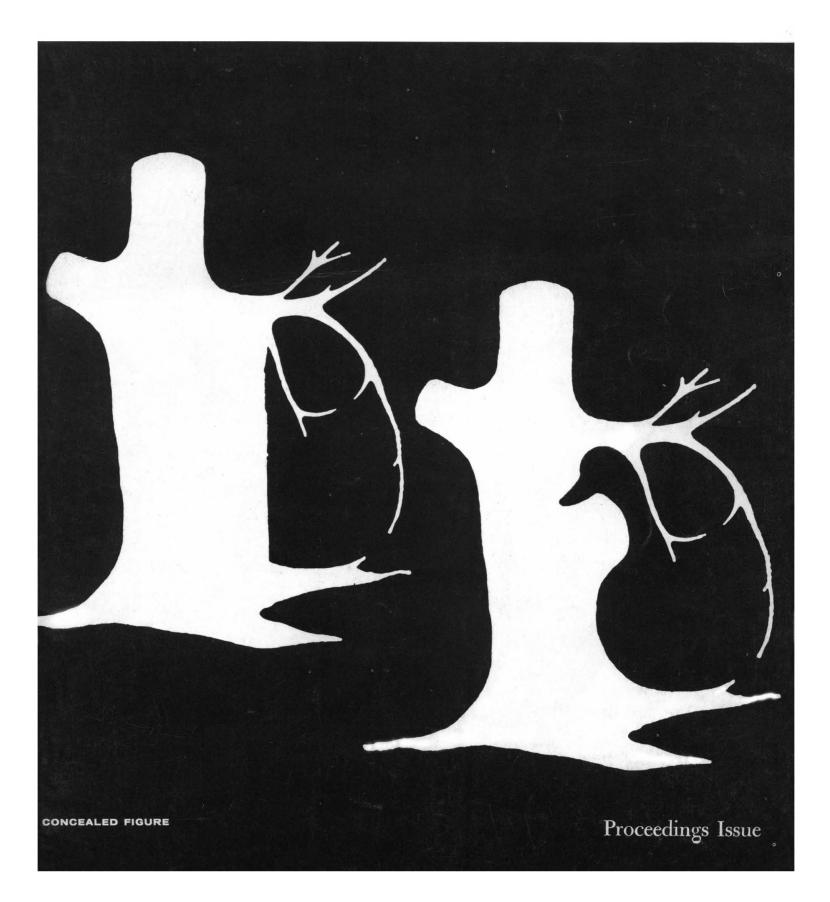
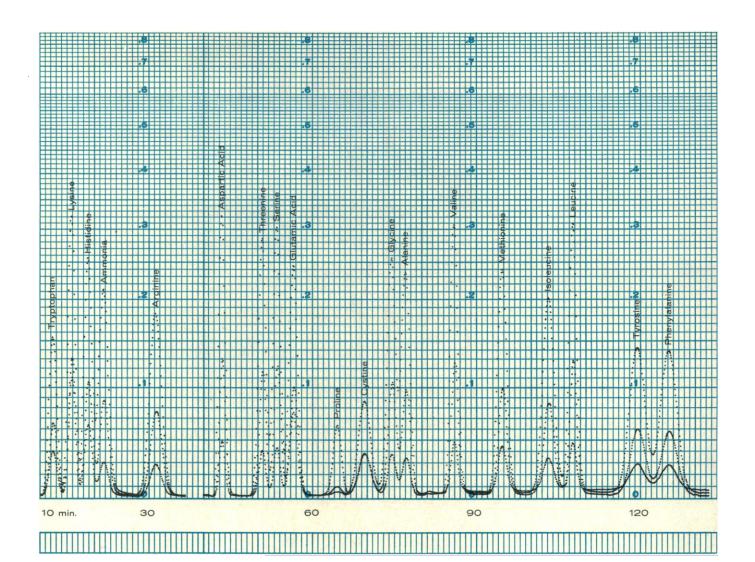
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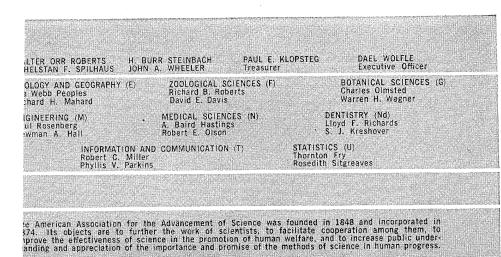


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#### COVER

Experimental stimulus. A background duck, concealed by the tree in the right figure, is not present in the control figure on the left. The concealed form was unperceived by viewers during experiments, but nevertheless did influence the content of subsequent imagery. See page 837. [Adapted from drawing by David Elkind, University of Denver]

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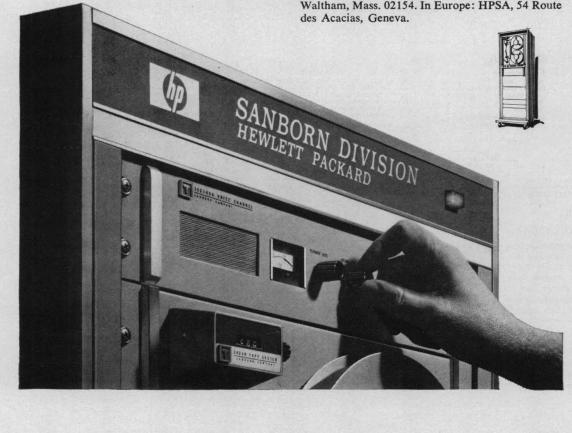
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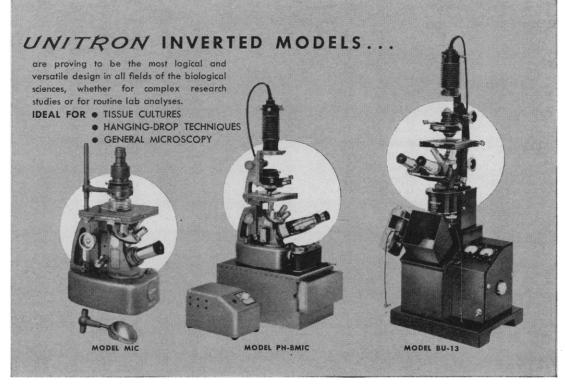
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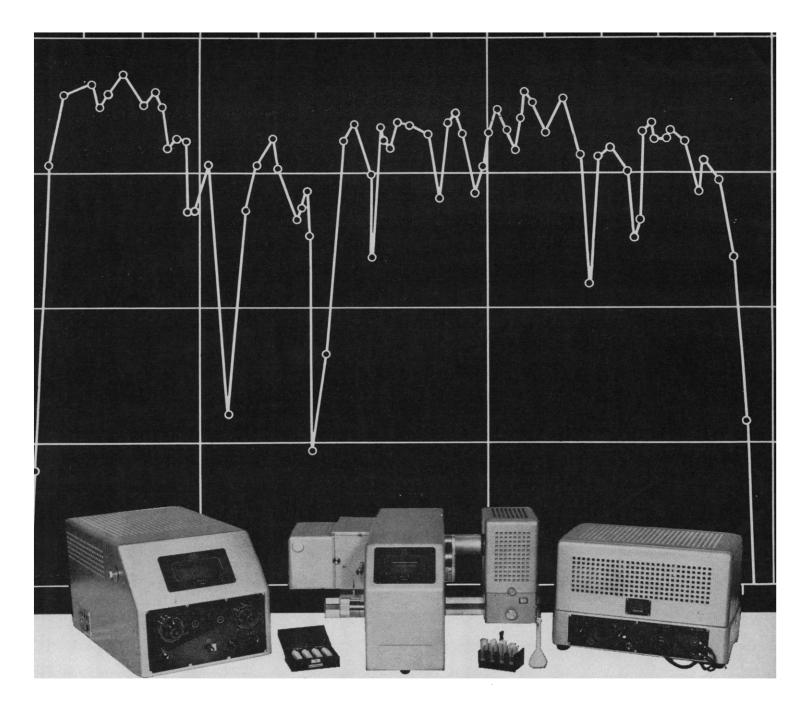
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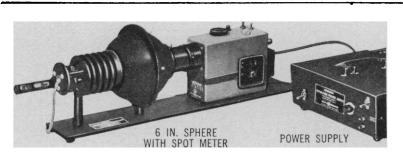
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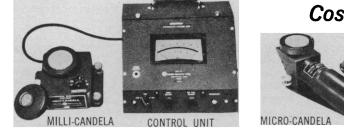


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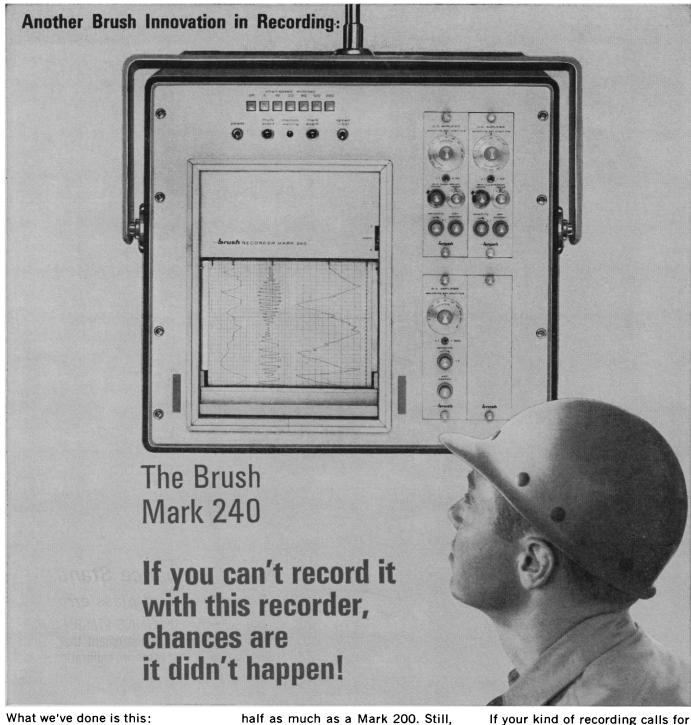
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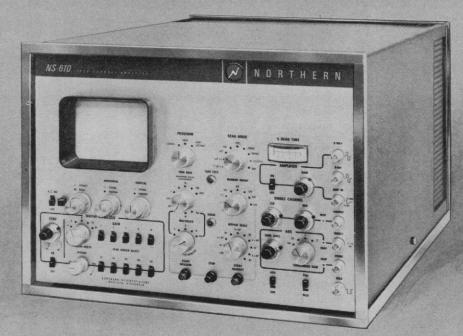
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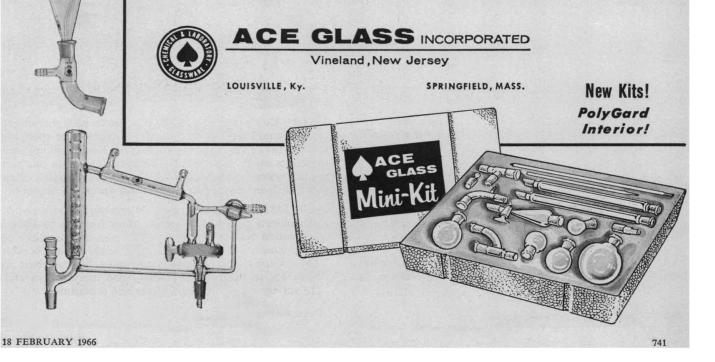
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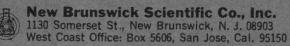
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Routine plate counts can now be accomplished more quickly, more comfortably and with greater accuracy, thanks to a new system of peripheral illumination. A circular fluorescent source floods the petri dish with a uniform field of diffused light while a contrasting dark-field background sharply accentuates specimens in bold relief. Even pinpoint colonies are clearly defined and easily discerned. Viewing comfort is enhanced by a combination of light reflection and absorption that eliminates glare and background interference. As an added convenience, centering knobs are provided for positioning the petri dish over a ruled guide plate. A 1.5X magnification lens meets A.P.H.A. standards. Both unmarked and Wolfheugel guide plates are available. Price: \$110.00. Send for catalog C101S.



SCIENCE, VOL. 151

## **Bone once defied direct radiocarbon dating.**

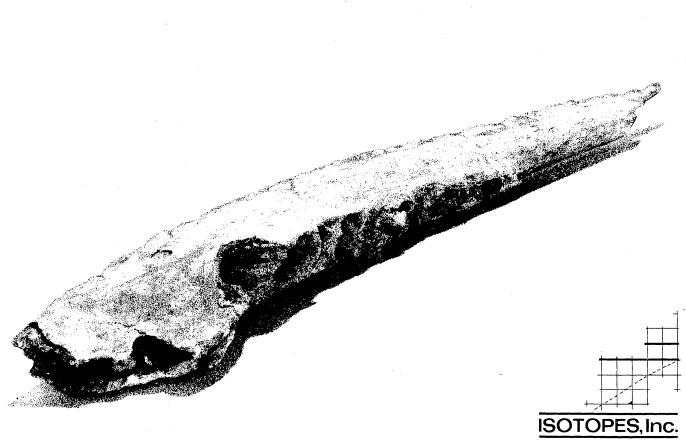
## Not anymore.

Until recently, radiocarbon dating of archaeological bone samples was based primarily on the dating of associated charcoal or associated organic articles. Now, direct dating of bone is fully practical.

Direct age determination of bone is based on the measurement of the contained bone protein, collagen. Fractionation or other natural mechanisms do not occur with collagen to give a false age.

Direct bone dating is best used to determine the relative ages of bones found in the same general locality, because environmental conditions can effect the rate of collagen decrease in a sample. The oldest samples that have been thus far dated by the collagen method are 9000 years old. Isotopes, Inc., can date your bone samples by the collagen method. The collagen method costs no more than normal radiocarbon dating. Our prices per evaluation range from \$160 to \$120 depending on the number of samples submitted to our laboratory during the year. Your results will be reported within three to four weeks after receipt of samples. Complete  $C^{13}/C^{12}$  isotopic analysis is available for just an additional \$25 to \$15 fee, depending once again on the number of samples during the year.

For complete details on our age determination services, and a price list call Bob Adkins at 201-NO4-7070 or write Isotopes, Inc., 124 Woodland Avenue, Westwood, New Jersey 07675.



## This is the Safest, Surest Package for Gases in Small Quantities

#### New, Improved Matheson Lecture Bottles

Exclusive, equipped with packless valves Exclusive, dual threads for compatibility with new, also existing equipment Exclusive, new controls available

The Lecture Bottle, originated by Matheson, has just been redesigned to provide easier handling and greater safety with non-corrosive gases. It is equipped with a new leak-free packless valve, handwheel control, for good metering characteristics. No wrenches are required and hook-up is simplified. A special valve that connects directly to the cylinder valve is available for ultra-fine metering. Other special components include a metal diaphragm regulator (illustrated) with balanced poppet for greater accuracy in pressure regulation. The new Lecture Bottle and packless valve are now standard with many Matheson gases and will soon be standard for all non-corrosive gases. Write to your nearest Matheson plant for descriptive data on our Lecture Bottle innovation. The technical information contained makes an important supplement to your Matheson catalog.

The Matheson Company Inc., P.O. Box 85, East Rutherford, N.J. Please send 
Information on Lecture Bottles
Matheson Gas Catalog

Name\_

Firm\_

Address\_

City, State, Zip\_

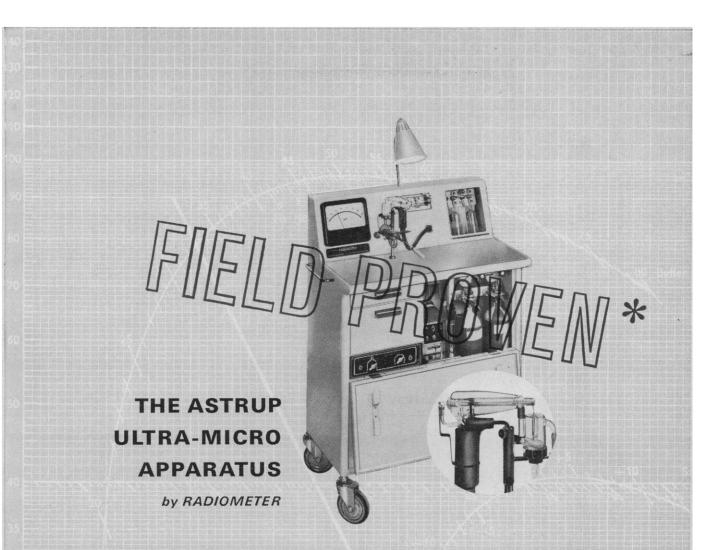
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P.O. Box 85, East Rutherford, New Jersey Plants in East Rutherford, N.J.; Joliet, Ill.; La Porte, Texas; Morrow, Ga.; Newark, Calif. Matheson of Canada, Whitby, Ont.



MATHESO

SCIENCE, VOL. 151



#### A complete system for blood acid-base measurements

In the increasingly important field of blood acid-base status, no reliable diagnosis can be made from *pH alone*, or from *Pco*<sub>2</sub> alone—respiratory and metabolic disturbances are difficult to identify and segregate for therapy unless all the parameters of the acid-base balance are known.

The Astrup technique involves not only an ultra-micro blood sampling method—but as instrumented by Radiometer, a complete system for exposing and evaluating *all* the separate and critical factors: pH, CO<sub>2</sub> tension, Bicarbonates, Buffer Base, Total CO<sub>2</sub>, and a figure of excess acid or base in the system for chemical therapy. The AME-1 is field proven, and requires only a few moments and a few drops of blood for a complete determination—including, with extra accessories, the measurement of oxygen tension.

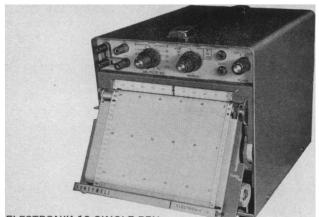
The unit is completely self-contained for both sampling and measurement, and is mounted in a wheeled cabinet for rapid movement between clinical and research labora-tories, or to surgical or after-care wards.

Complete literature, and reprints of pertinent scientific papers are available and, should you wish it, names of the many distinguished and satisfied users in your area.

Write for your copy of the Astrup Method Reference and Data WallChart which details the technique as well as other useful blood acid-base data. THE LONDON COMPANY B11 SHARON DRIVE. WESTLAKE, OHIO RADIOMETER - COPENHAGEN In Canada: Bach-Simpson Limited, Box 2484, London

\* by every major institution on the continent

18 FEBRUARY 1966



ELECTRONIK 19 SINGLE-PEN LAB RECORDER



What's your application?

Differential Thermal Analysis? Spectrophotometry? Chromatography? Temperature? Spectrometry? pH and Conductivity?

Rate of Reaction by Rate of Temperature Rise? Microvolts-Millivolts-Volts?

## The Honeywell <u>Electronik 19</u> Portable Laboratory Recorder is most likely the instrument you need. Why not order one today?

#### FEATURES

- Multi-Range Input: D-C from 100 MICROVOLTS to 100 volts in 19 discrete steps with 1, 2, 5, 10 relationship between steps.
- **High Accuracy:**  $\pm 0.25\%$  of span or 1 MICROVOLT, whichever is greater.
- Fast Response: Less than 0.5 second full scale. Down less than 1% of full scale for a 5 cps 10% of full scale peak-to-peak sine wave input.
- **Two-Step or Eleven-Step Zero Positioning:** Continuously adjustable zero positioning from +100% to -100% of span in 2 steps, or from +100% to -1000% of span in 11 steps. Rotary switch provides either 2 or 11 calibrated zero positions with continuous vernier adjustments to intermediate positions.
- Versatile Chart System: 10 speeds from 1 sec/in to 10 min/in with 1, 2, 5 relationship between steps; chart reroll or positive drive out across table top, and chart platen which tilts to 30° and 45° from vertical.
- Simplified Ink System: Disposable ink cartridge, easily replaced and primed without "splash". Manual pen lifter included.
- **Compact:** Single channel recording 8¾-inch wide x 8¾inch high x 11-inch deep case; two-channel recording in 8¾-inch wide x 10½-inch high x 11-inch deep case.
- Light Weight, Portable: Single-pen recorder weighs less than 20 pounds; two-pen recorder, less than 29 pounds. Equipped with comfortable carrying handle.
- Easy Connections: Front terminals for input, rear power cord and three-prong plug.

#### OPTIONS

Auxiliary Switches: For signalling, alarms and control. Price, 1 switch \$40/pen, 2 switches \$60/pen.

- Transmitting Slidewire: For remote recording, integration, control, etc. Price, 1 transmitting slidewire, \$40/pen.
- **Power Line Option:** 220 or 240 volts instead of 120 volts. Price \$15.
- **Power Frequency:** 50 cycle operation instead of 60 cycles. No extra charge.

#### TO ORDER, SPECIFY:

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| Model 19302-11-01 Two-Pen Recorder, $\pm 100\%$ Zero each pen\$1995      |
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| Model 19302-22-01 Two-Pen Recorder, +100%,<br>-1000% Zero each pen\$2195 |

Note: Prices are net FOB U. S. Factory, All prices and specifications subject to change without notice.

#### WRITE FOR LABORATORY PRODUCTS SHEET LP-4, OR USE READERS' SERVICE CARD

#### For Chromatographic Work

The Honeywell *ElectroniK* 19 Recorder can be modified for chromatographic use by installing a Disc Integrator and using a specially designed chart.

#### WRITE FOR LABORATORY PRODUCTS SHEET LP-6, OR USE READERS' SERVICE CARD

Order from your local Honeywell office or write HONEY-WELL, Philadelphia Division, 1100 Virginia Drive, Fort Washington, Pa. 19034. Also in Canada.

Honeywell also manufactures a complete line of data handling equipment including recording oscillographs, laboratory tape systems, laboratory standards and test instruments. For complete details write Honeywell, Denver Division, 4800 E. Dry Creek Road, Denver, Colorado 80217.





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The activity center of the LOWBETA<sup>®</sup> II and WIDEBETA<sup>™</sup> II Radioactivity Counting Systems is the detector and shield assembly. It has been specially designed to provide the lowest background possible—0.5 cpm, at ranges up to 50,000 or 1,000,000 cpm.

LOWBETA II is a moderate cost, highly sensitive, low background system that counts alphas and betas at rates up to 50,000 cpm. WIDEBETA II is the ultimate in a wide range, high sensitivity, low background system that counts from 0.1 to 1,000,000 cpm with less than 1% dead time loss.

Both planchet counting systems have capacities for up to 100 samples. They provide flexible operation with a random access automatic sample changer. They have excellent background reproducibility ( $\pm 2$  sigmas over a 24-hour period). A variety of carefully matched accessories and supplies facilitates counting operations of both.

LOWBETA II AND WIDEBETA II Counting Systems incorporate the most advanced concepts in high-speed alpha and beta counting. Their completely transistorized electronics insure reliable, precise performance.

For more information on Beckman Planchet Counting Systems, contact your local Beckman Sales Engineer or write for Data File LN-166.

#### Beckman



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For the fast flow you want in large columns, there are two new SilicAR<sup>®</sup> CC sorbents in the coarser particle size (100-200 mesh). For maximum resolution in small columns, you'll want to try the two finer sizes (200-325 mesh).

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SCIENCE, VOL. 151

## **Engineers: How many members of your top management group are engineers?**

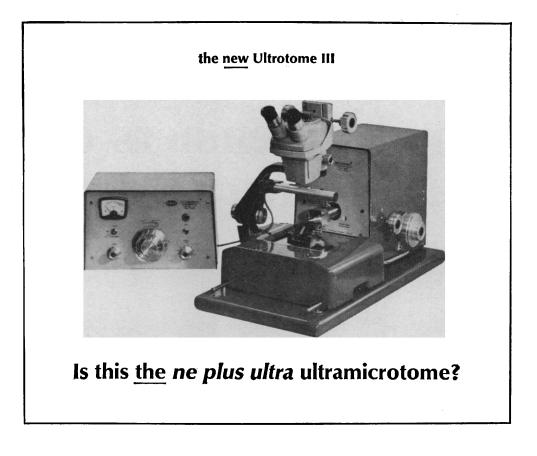
# We average 9 out of 10 in Douglas Territory.

Engineers working under engineer top managers is only one of the benefits at Douglas Aircraft Division. We are actively engaged in such fields as VTOL, supersonic, subsonic and hypersonic aircraft. So there is probably no engineering/ scientific discipline you can't find at Douglas. You'll also find unrivaled professional freedom. And there is the security of a 10-year backlog of over \$1-1/2 billion in all types of jet aircraft. All this plus the total livability of Southern California adds up to *Douglas Territory*. We're looking for systems analysts and engineers in all disciplines – from Aerodynamics to Zoology. If you have a B.S. degree or better, and experience, send your resume and salary history to: J. C. Brizendine, Vice President Engineering, Aircraft Division, Dept. 143-U-1, Douglas Aircraft Company, 3855 Lakewood Boulevard, Long Beach, California 90801. *Douglas* 

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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 macrofeed. There are others. The total package represents an ultramicrotome with unusual versatility which permits the solution of the most difficult sectioning problems. All in all, the most sophisticated ultramicrotome yet developed.

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

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## The shots you goof. The best reason for 10-second photography.

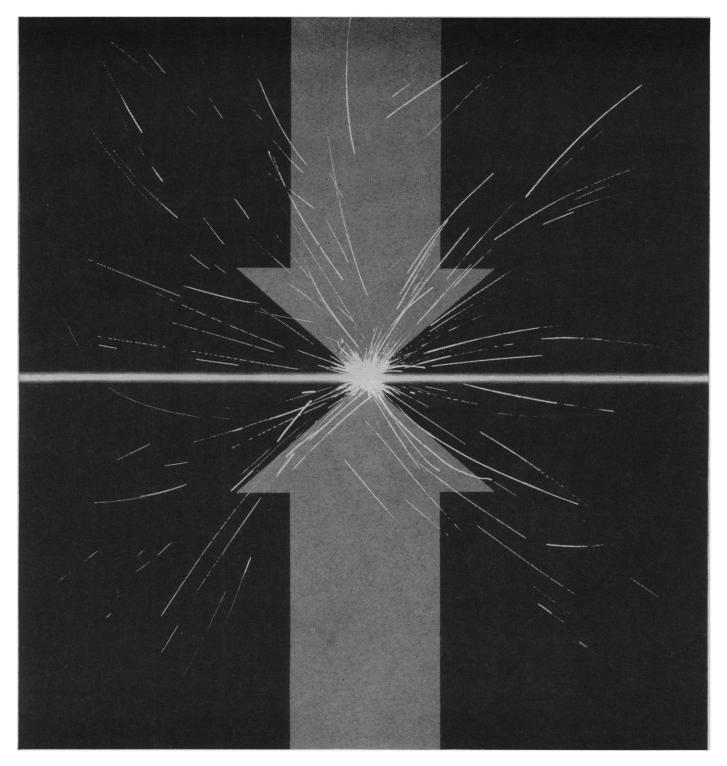
Everybody makes mistakes. But when you're using Polaroid Land photography you don't suffer for them. Say you're shooting a photomicrograph and the exposure is off. Or the filtration. Or the position of the slide. You'll know it 10 seconds after you snap the shutter — when you see your Polaroid print. You can then make your correction and take a perfect picture right away. While everything is still set up.

This nice advantage comes with all Polaroid Land

films. And there are quite a few to choose from. There are black-and-white emulsions rated at A.S.A. 3000, 400, and 200. They're the ones that develop in 10 seconds. There's also a black-and-white film that gives you a positive and a true film negative outside the darkroom in 20 seconds. And, of course, there's Polacolor film which gives you a full-color recording in 60 seconds.

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## A new magnitude of power in cw gas lasers

Perkin-Elmer presents a molecular gas laser generating 10 watts cw power at a wave-length of  $10.6\mu$ . This new continuous flow gas laser operates at unusually high efficiency. Available on 90 days' delivery, the new Model 6200 Laser is priced at \$8,950, f.o.b. Norwalk, Conn. Write for details to Electronic Products Division, Perkin-Elmer Corp., 723 Main Avenue, Norwalk, Conn.



in teaching aids to put together and take apart; to teach, to study, and to use in instruments to scrape and slice, to clip and cut and clamp in machines to mix and separate; to shake, rotate and incubate in equipment to collect, dilute; to time and measure and weigh; to view, to type, to count

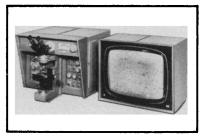
> Wherever biomedical people are learning, practicing, teaching— Clay-Adams quality is there—as it has been for more than half a century.

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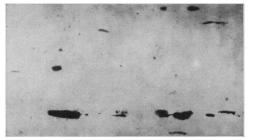
## **NOW...** instant, electronic measurement of microscopic features

#### The Quantitative Micro-Image Analyzer

has a microscope fitted with beam splitting prism which projects the image simultaneously into a conventional binocular eyepiece for direct viewing and to a television camera which displays it for easy focusing and field selection. The output from the camera is also fed directly into an electronic detector which responds to

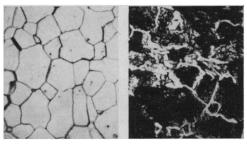


the changes in output voltage as the scanning spot in the camera tube passes over features in the field, such as grain boundaries, inclusion pores, cells, bacteria, or powder particles. The signals obtained from such areas are also fed immediately into the computer which then presents the desired information on the meter. The screen provides the operator with an instantaneous visual check of setting and instrument operation. Below are examples of this versatile instrument in action. To get more complete details, write for our bulletin QTM-1.



**INCLUSIONS IN METAL** 

For this field of sulphide and silicate inclusions in steel, the Quantitative Micro-Image Analyzer will provide the following information: the number of inclusions present. counting the silicate stringers either as one inclusion or as number of fragments; the number of inclusions in any size range; the area or volume fraction; the average form factor; the average size.



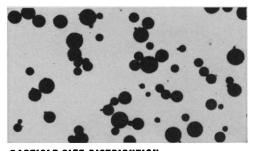
**GRAIN SIZE AND FORM FACTOR** 

The Quantitative Micro-Image Analyzer provides a figure for Mean Linear intercept which is readily converted to A,S.T.M. standards, Shown above is a conventionally prepared mild steel sample etched in 2% nital and a McQuaid-Ehn Test sample. By taking readings along and across the direction of elongation, an average form fac-tor for grains is readily and accurately determined.



**VOLUME FRACTION** 

In just two minutes, the Quantitative Micro-Image Analyzer was able to make readings for 10 different parts of this specimen, measuring the pearlite fraction in this conventionally prepared plain carbon steel sample.



PARTICLE SIZE DISTRIBUTION The Quantitative Micro-Image Analyzer provided the

following information on the acrylic granules shown. There are 9 particles 0-5 microns in size; 21 in the 5-10 range; 37 between 10-20; 20 between 20-40; 3 between 40-80: none above 80 microns.



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|   |  | S.A.  |       | Price    |        |
| -a complete                               | Compounds                                      | C/mM  | 1 mc  | 5 mc     | 25 mc  |
|   | Acetic anhydride-GL-H-3                        | 0.1-1 |       |          | 40.00  |
|   | Adenosine-GL-H-3                               | 2-5   | 30.00 | 100.00   | 395.00 |
| line by I.C.N.                            | Adenosine-51-diphosphate-GL-H-3                | 0.5-1 | 95.00 | 350.00   | 995.00 |
|   | Adenosine-5 <sup>1</sup> -monophosphate-GL-H-3 | 0.5-1 | 95.00 | 350.00   | 995.00 |
|   | Adenosine-51-triphosphate-GL-H-3               | 0.5-1 | 95.00 | 350.00   | 995.00 |
|   | L-Arginine-HC1-GL-H-3                          | 2-10  | 70.00 | 200.00   | 595.00 |
| — offering C <sup>14</sup> ,              | Cytidine-GL-H-3                                | 2-10  | 55.00 | 100.00   | 395.00 |
|   | Deoxyadenosine-GL-H-3                          | 2-5   | 75.00 | 280.00   | 840.00 |
| D32 U3 and non                            | D-Glucose-1-H-3                                | 0.3-1 | 30.00 | 100.00   | 300.00 |
| P <sup>32</sup> , H <sup>3</sup> and non- | Guanosine-GL-H-3                               | 1-5   | 30.00 | 100.00   | 300.00 |
|   | Guanosine-51-diphosphate-GL-H-3                | 0.5-1 | 95.00 | 350.00   | 995.00 |
| radioactive                               | Guanosine-51-monophosphate-GL-H-3              | 0.5-1 | 95.00 | 350.00   | 995.00 |
|   | Guanosine-51-triphosphate-GL-H-3               | 0.5-1 | 95.00 | 350.00   | 995.00 |
| nucleotides,                              | DL-Histidine-2-H-3                             | 2-5   | 75.00 | 100.00   | 395.00 |
| 1146160 (1465,                            | DL-5-Hydroxytryptophan-GL-H-3                  | 1-5   | 55.00 | 95.00    | 335.00 |
|   | L-Methionine-GL-H-3                            | 2-10  | 30.00 | 100.00   | 400.00 |
| of guaranteed                             | L-Norepinephrine-GL-H-3                        | 0.5-5 | 95.00 | 210.00   | 675.00 |
|   | Orotic acid-5-H-3                              | 1-5   | 35.00 | 95.00    | 350.00 |
| quality,                                  | L-Proline-GL-H-3                               | 1-10  | 70.00 | 95.00    | 385.00 |
| quanty,                                   | DL-Serine-GL-H-3                               | 1-5   | 50.00 | 95.00    | 385.00 |
|   | Serotonin-GL-H-3                               | 2-5   | 65.00 | 125.00   | 395.00 |
| delivered                                 | Taurine-GL-H-3                                 | 1-5   | 55.00 | 95.00    | 350.00 |
|   | Thymidine-GL-H-3                               | 1-6   | 25.00 | 80.00    | 295.00 |
| from stock                                | Thymidine-methyl-H-3                           | 6-15  | 25.00 | 80.00    | 295.00 |
| nom stock                                 | Thymine-methyl-H-3                             | 5-15  | 25.00 | 80.00    | 295.00 |
|   | L-Tryptophan-GL-H-3                            | 1-5   | 55.00 | 100.00   | 300.00 |
|   | Uracil-5, 6-H-3                                | 2-5   | 35.00 | 95.00    | 315.00 |
|   | Uridine-5-H-3                                  | 2-10  | 35.00 | 95.00    | 315.00 |
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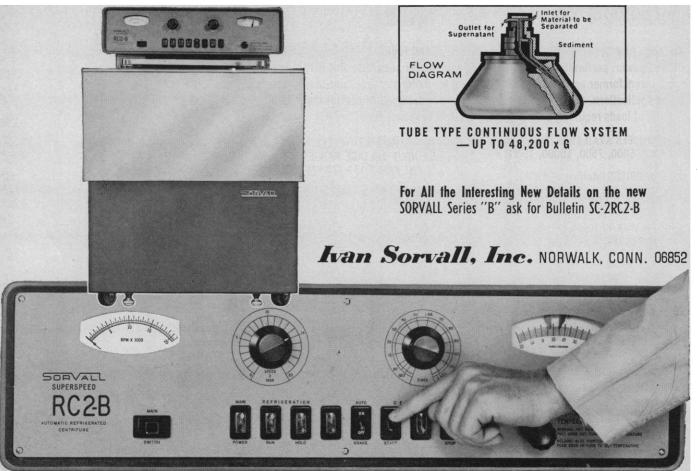




The SORVALL RC2-B Automatic Superspeed Refrigerated Centrifuge has greater performance capabilities than any other centrifuge in its range. Completely improved operational design puts the RC2-B way out front. More G's, more versatility, and even greater reliability than before — combined with modest price (\$2,610 Basic Unit) — make the RC2-B superior to any competitive centrifuge. Check the features below:

- □ Up to 49,500 x G with 24 x 15 ml SM-24 Rotor — 48,200 x G with standard 8 x 50 ml SS-34 Rotor — 27,300 x G with 6 x 250 ml GSA Rotor — comparably higher G's with all Rotors
- □ Up to 48,200 x G with "Szent-Gyorgyi & Blum" KSB Tube Type Continuous Flow System
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1/2 to 1/3 the size and less than 1/2 the weight of conventional units ....

## Sorensen ACR Voltage Regulators give up to 95% efficiency, too!

In these new Sorensen silicon controlled rectifier AC regulators, you get the best combination of power, performance, and packaging you've ever seen. The unit is reduced to the size of the transformer and control circuitry. Ideal for motor starting, lamp loads, tube filaments, X-ray applications, etc., ACR Series regulators are designed to control the RMS voltage to a variety of loads requiring precise regulation, fast response time, and low distortion.

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- 4. UP TO 95% efficiency
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For data on these and other Sorensen power supplies-the DCR Series low voltage (SCR), the QB narrow range and the QRB wide range transistorized units-send for a complete catalog. Write: Sorensen, A Unit of Raytheon Co., Richards Ave., South Norwalk, Conn. 06856.

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| MODEL<br>NUMBER   | VA<br>Range | ACCU<br>Line | JRACY<br>Load | EFFICIENCY<br>(FULL VA) | POWER<br>Factor | AMBIENT<br>(°C) | COEFFICIENT<br>(°C) | WIDTH               | HEIGHT | DEPTH | RACK<br>HEIGHT | PRICE** |
| ACR 500           | 0-500       | ±0.1%        | ±0.1%         | 88%                     | 75%             | 0-50            | .03%                | 15*                 | 5      | 9     | 51/4           | \$ 290  |
| ACR 1000          | 0-1000      | ±0.1%        | ±0.1%         | 90%                     | 75%             | 0-50            | .03%                | 19                  | 51/4   | 11    | 51/4           | 340     |
| ACR 2000          | 0-2000      | ±0.1%        | ±0.1%         | 92%                     | 75%             | 0-50            | .03%                | 19                  | 51/4   | 15    | 51/4           | 435     |
| ACR 3000          | 0-3000      | ±0.1%        | ±0.1%         | 95%                     | 75%             | 0-50            | .03%                | 19                  | 7      | 15    | 7              | 555     |
| ACR 5000          | 0-5000      | ±0.15%       | ±0.15%        | 95%                     | 75%             | 0-50            | .03%                | 19                  | 7      | 20    | 7              | 715     |
| ACR 7500          | 0-7500      | ±0.15%       | ±0.15%        | 95%                     | 75%             | 0-50            | .03%                | 19                  | 121/32 | 20    | 121/32         | 850     |
| ACR 10000         | 0-10000     | ±0.15%       | ±0.15%        | 95%                     | 75%             | 0-50            | .03%                | 19                  | 121/32 | 20    | 1232           | 1,200   |
| ACR 15000         | 0-15000     | ±0.15%       | ±0.15%        | 95%                     | 75%             | 0-50            | .03%                | 19                  | 17'5/2 | 20    | 17'52          | 1,500   |

\*A 19 inch adapter (rack) panel is available. \*Optional Meter \$22.



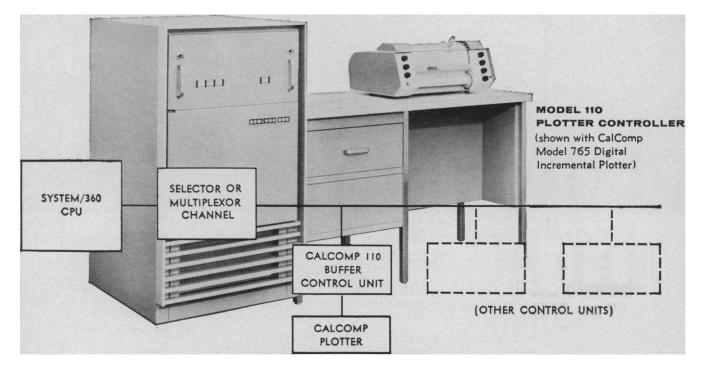
7. LOW DISTORTION (3% max.)

- 8. STABILITY (.05% / 8 hours, after a 30minute warm-up)
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- **10. PROGRAMMABLE**
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(B) STAINLESS STEEL TEMPERATURE CONTROL COIL NO. SS510TCC All stainless steel coil accessory for temperature control of container contents. Construction allows free flow of material to blades for unhindered blending action. \$49.95 (c) STAINLESS STEEL FOAM ARESTER NO. SS510FA All stainless steel accessory prevents introduction of atmospheres into mixtures where excess foaming is not desirable. \$16.95 (D) BLADES FOR SPECIAL BLENDING PROBLEMS

> Please write for full specifications or for answers to any questions.

18 FEBRUARY 1966

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## "The System" Now it has electric drive. So you can create where you used to just crank.

People are always saying, "'the system' is more versatile than anything called 'camera'." Well, if you thought *that* before, you won't believe "the system" now. You see, now there's the Hasselblad 500EL,

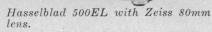
the first electric motor-driven 2<sup>1</sup>/<sub>4</sub> x 2<sup>1</sup>/<sub>4</sub> single lens reflex. And it'll let you do what you've probably never been able to do before. The new 500EL cocks the shutter and advances the film automatically. So you can clickclickclick off a whole series of shots without ever look-

ing up. Or moving a muscle. Without ever losing sight of your subject. Right now you might say "Fine, I want the 500EL. But what am I supposed to do with all the Has-

selblad lenses and backs I have? The answer is simple: use the 500EL as an addition to "the system." It will take any lenses, magazines, or viewfinders, and most accessories the 500C will take. What else can the 500EL do? Well,



The 500EL is for the guy who has to be in two places at one time. In this case, being a pilot and an aerial photographer simultaneously.



first of all, you don't have to even be near it when you're clicking off pictures. (There's nothing worse than being tied to your camera when you'd like to be working with your subject.) So by using the 500EL with a special release cord, you can clickclickclick at distances of up to 200 yards. Or by adding the new remote-control Hasselblad radio transmitter, you can click click from even miles away. And then there's time lapse. By adding a Hasselblad timer to the 500EL you can shoot automatically at intervals anywhere from one second to sixty hours. (With that kind of time-lapse, we dare say there's little you can't do.)

N ow you know about the 500EL. But it's only part of the

story. The rest has to do with interchangeability. The thing that makes "the system" the system.

In the area of lenses, for example, "the system" doesn't have one or two. The number is six. 50, 80, 120, 150, 250 and 500mm. Each is Zeiss. Each has a Synchro-Compur shutter. Each is completely interchangeable. And film backs. You get a choice of four. Three for roll film, each in a different format. One for cut film.

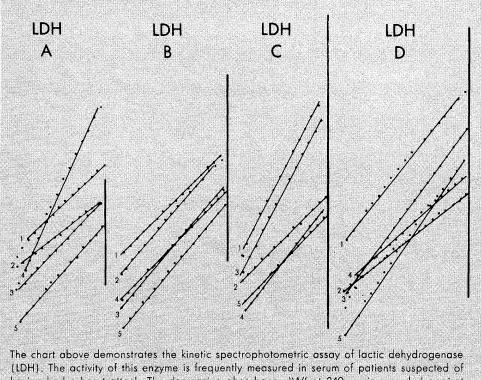
Each interchangeable. So you can go from color to black and white, indoor to outdoor film midroll. Viewfinders, too. "The system" gives you five. (That's four more than most "cameras.") Eyelevel prisms, hoods, the terchangetruck-full

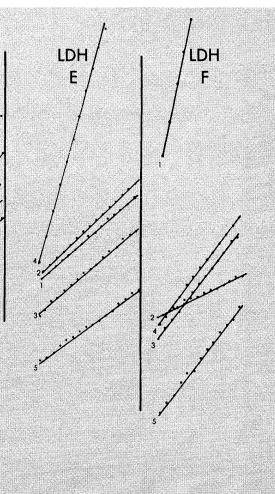


Left to right: Hasselblad 500C with 80mm lens and light meter knob; Hasselblad 500EL with 80mm lens; Zeiss 500mm, 50mm, 150mm, 250mm, and 120mm lenses.

Sure, "the system" was versatile before the 500EL. But now with its addition, we can say, more than ever, "This is a system. Not to be confused with a camera." For information on the 500EL, write: Paillard Incorporated, 1900 Lower Road, Linden, N.J.







having had a heart attack. The decreasing absorbance "A" at 340 mµ is recorded against time as LDH catalyzes the reaction. + LDH

pyruvate + DPNH  $\stackrel{\rightarrow}{\leftarrow}$  DPN + H<sup>+</sup> + lactate

The rate of this reaction (slope of dA/dt during the initial "O" order portion) is a measure of the enzyme's activity. Extreme slopes and/or deviation from linearity are indicative of an LDH abnormality. 30 production runs in 6 groups are recorded on one chart, at 3 minutes/ group.

# NEW AUTOMATIC TECHNIQUE REDUCES ENZYME **ALYSIS COSTS**

You can do all of your reaction kinetics experiments on this one instrument, and still have a double-beam, scanning UV-Visible Spectrophotometer for bilirubin, barbiturate and salicylate analyses.

The Automatic Multiple Sampling System using Perkin-Elmer's Model 202 Spectrophotometer, saves you vital laboratory analysis time in clinical serum studies. Kinetic reactions may be studied spectrophotometrically, on a production scale of hundreds of analyses per day, at a minimum cost per analysis.

The analysis proceeds at a fixed wavelength of light. The wavelength you select is held constant while the decrease in absorbance of one of the reactants is recorded as a function of time.

Perkin-Elmer's Automatic Multiple Sampling System features...

 A double beam, direct absorbance recording spectrophotometer with analytical accuracy of  $\pm$  .01 absorbance units;

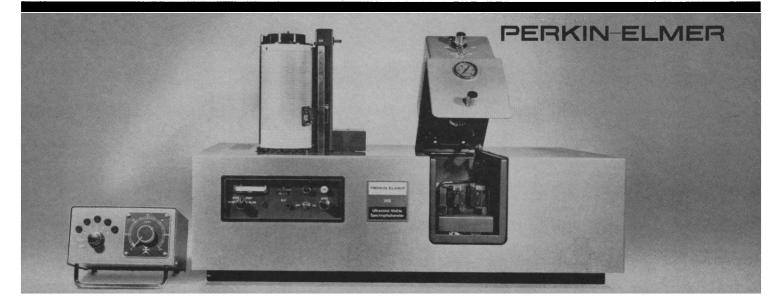
• A unique dot readout system that pro-

vides, on one chart, a complete continuous record of absorbance as a function of time for a batch of 5 samples plus a separate reference blank;

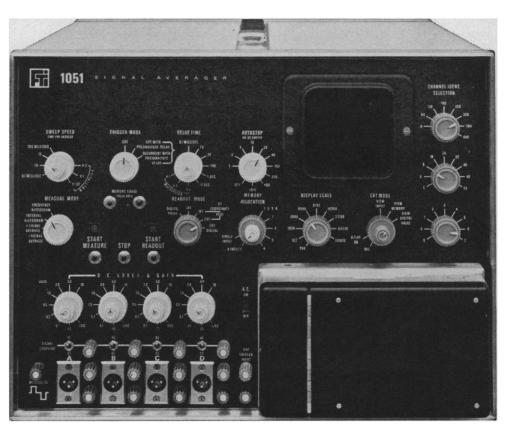
• A thermostated sample compartment, with temperature control within  $\pm 0.5^{\circ}C$ from 20° to 50°C plus automatic sample positioning;

 An adjustable time interval between sample readings of 3 to 120 seconds.

For more information about this new enzyme analysis technique plus details on the Perkin-Elmer Model 202 Spectrophotometer write to: Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut.



# This NEW signal averager won't be obsolete next year!



If your research requires the precise measurement of signals buried in unfilterable noise, you can have tomorrow's instrumentation today with Fabri-Tek's new 1051 Signal Averager. Produced by the leader in computer memory technology, the model 1051 combines the standard signal averaging features with new functions to provide a versatility and accuracy never before available.

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- Four input channels Up to 4 input analog signals can be averaged . . . display each signal singly or simultaneously on full-sized 4" CRT.
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- Three readouts Fast, plug-in optical printer records 10-times faster than a typewriter. Built-in facilities for connection to external data processing equipment or pen recorder.

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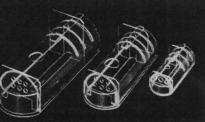
For more details about this unique signal averager, write or call Fabri-Tek Incorporated, Instrument Division, P.O. Box 4218, Madison, Wisconsin 53711. Phone: 608-238-8476.

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SCIENCE, VOL. 151





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### There are at least 16 UV monitors already available (and one of them is even <u>ours</u>). Whatever possessed us to develop number 17?

Unbounded optimism. That, and the rather firm conviction that it was now time for a first-rate, fully quantitative flow analyzer for monitoring UV absorption at either 254 or 280 m $\mu$ .

This new analyzer, the Uvicord II, is now available as a particularly useful tool for continuous measurement of the UV absorption of electrophoretic or chromatographic effluents containing fractions which absorb at 254 or 280 m $\mu$ . And it is especially suited for cold room use because: (1) the light source compartment is insulated and has its own built-in heating coil, and (2) the control unit *and/or* recorder can be physically separated from the detector unit, thanks to a very long cable. (One of several advantages of a separate recorder.)

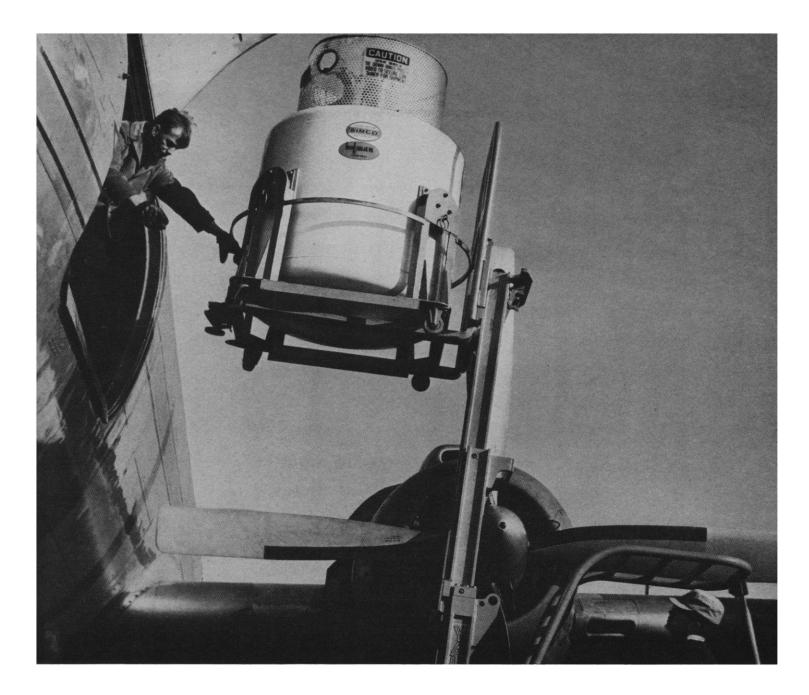
The primary source of the 254 m $\mu$  in the Uvicord II is a stable, long-lived, low-pressure mercury lamp. But then getting the desired 280 m $\mu$  was quite another matter and proved to be somewhat of a strain on the aforementioned unbounded optimism. The eventual elegant exclusive solution: the 254 m $\mu$  from the mercury lamp is used to excite a transparent rod which has been specially activated to fluoresce strongly. This rod then emits UV in a relatively narrow peak with a maximum at 280 mµ. Unwanted radiation is eliminated by using black glass and selective interference filters. This latter interference filter was also developed by us and provides unique assurance of getting the essentially monochromatic light needed for quantitative measurements. What is the possibility of harming UV-

sensitive materials with the Uvicord II? It's unlikely. The maximum UV dose to which a sample can be exposed is a negligible  $10^{-11}$  Einstein/ min, equivalent to 0.09  $\mu$ W. Then we should probably also tell you that this instrument has a well-designed detector unit, that the very small measuring cells have good flow properties and are easy to get to, and that the circuitry is simple, straightforward and dependable. All true. Or, that the Uvicord II is compatible with our entire line of chromatographic devices, fraction collectors, and recorders. The Uvicord II takes its place comfortably in our complete systems (whose individual units are all LKBdesigned and built), or, alternatively, can perform as a versatile UV analyzer when coupled to other equipment. Incidentally, the Uvicord II follows the Uvicord I but doesn't necessarily displace it. You might keep the Uvicord I in mind if your need is solely for 254  $m\mu$ ; it's still very viable.

(So now there are at least 17 UV monitors, and two of them are ours.) For complete specifications on the Uvicord II, ask for bulletin 8300S2.



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Liquid helium users are enthusiastic about Hofman's 500 liter container. It's made to take air pockets, truck bumps and abusive handling.

The suspension system frees the neck tube from damage done in loading, a major cause of operating failure. The built-in frame, not the container, dampens the shock. This unit is the only container on the market using this principle.

It's also the only helium container with three independent relief passages, a special design to prevent over-pressurization.

The vacuum jacketed withdrawal valve simplifies liquid helium transfer. Because of the unique vapor shield, minimum product is lost in shipment. The loss rate is less than 1.5% per day for a 500 liter capacity and a tare weight of 1000 pounds.

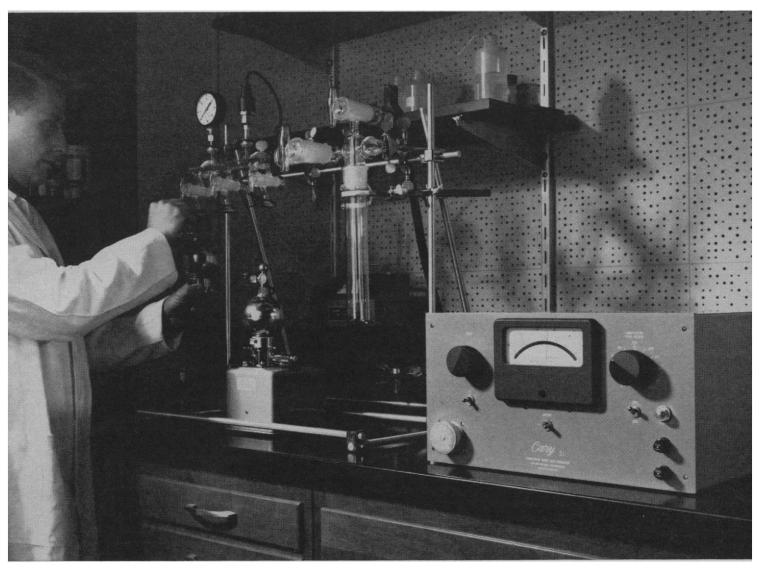
For detailed information, write Hofman-Paul Cryogenic Div., 225 Parkhurst Street, Newark, New Jersey. Call 201-824-4900.

West Coast facility: 6750 Caballero Blvd., Buena Park, Calif. Call 714-521-2917.

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# CARY MODEL 31 VIBRATING REED ELECTROMETER with ion chamber...for precise direct measurement of $C^{14}$ or $H^3$ in gases



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**Model 31 detects less than 3 dpm C<sup>14</sup>/cc air** with Cary 250-cc ion chamber, provides measurements reproducible to better than 1%, and operates for months with a single calibration. It is ideal for simplifying measurement of either gaseous or combustible non-gaseous radioactive samples. Gaseous samples to 250°C are collected in or passed through the ion chamber for static or continuous flow measurements. Far more precise and sensitive than liquid trapping equipment, a Model 31 with ion chamber costs less than \$2,000.

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If you have space problems in your lab, this one instrument that does the work of two will give you an extra bonus, space conservation.

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# 5 NEW BOOKS FOR YOUR SCIENCE LIBRARY

ANTIFERTILITY COMPOUNDS IN THE MALE AND FEMALE: Development, Actions and Applications of Chemicals Affecting the Reproductive Processes of Animals, Insects and Man by Harold Jackson, Medical Research Council, London. This book is the first in mono-

**NEW** graph form to cover chemical agents affecting the fertility of both mammalian sexes at experimental levels as well as developments in the field of insect chemosterilants and the complementary pheromones. *Feb. '66, about 252 pp., about 151 il., 19 tables, (Amer. Lec. Living Chemistry edited by I. Newton Kugelmass). In Press* 

> **PROTOZOOLOGY (5th Ed)** by Richard R. Kudo, Visiting Professor of Zoology, Southern Illinois Univ., Carbondale. While the new Fifth Edition maintains its original aim in setting forth introductory information on the common and representative genera and species of both freeliving and parasitic protozoa, it has been completely re-

**NEW** living and parasitic protozoa, it has been completely revised, enlarged, and updated . "... an unusually good source for basic knowledge on the ecology, morphology, physiology, reproduction, variation, and heredity of the Protozoa."—American Journal of Public Health. Feb. '66, 1,184 pp., 2,291 il. in 388 figures (8 plates in full color), 10 tables, \$15.75

> SURGICAL APPLICATIONS OF LASER by Paul Edward McGuff, Laser Medical Research Foundation, Boston. Laser theory and operation and types of lasers are discussed. The current status of laser applications in many fields is presented ... cancer tissue or tumor investiga-

**NEW** tion, photo-coagulation of retinal holes and tears, retinal tumor treatment, vision research, dental surgery, micro-surgery, dermatology, neurosurgery, controlled coagulation and cutting, experimental blood vessel anastomosis, and laser spectroscopic analysis. Jan. '66, 224 pp., 70 il., 56 tables, \$10.50

HYPERBARIC OXYGENATION by Charles B. Pittinger, Vanderbilt Univ., Nashville. Offered as a concise introduction to the various aspects of hyperbaric oxygenation. Contents: Historical Development; Physiologic Considerations; Oxygen Toxicity; Decompression Sickness; Nitrogen Narcosis; Clinical Applications; Cancer Therapy; Surgery; Anaerobic and Other Infections; Re-

Surgery; Surgery; Anaerobic and Other Infections, Resuscitation; Cardiovascular Insufficiency; Shock; Hyaline Membrane Disease; Hyperbaric Anesthesia; Safety Considerations; and Status of Hyperbaric Oxygenation. Jan. '66, 128 pp., (Amer. Lec. Anesthesiology edited by John Adriani), \$5.50

**STUDIES ON THE DIENCEPHALON** by Santiago Ramón y Cajal, Late Professor of Histology and Pathology, Univ. of Madrid, Spain. Translated by Enrique Ramón-Moliner, Université Laval, Quebec. The reports presented include outstanding contributions of current interest . . .

**NEW** the presence of extralemniscal ascending sensory systems, the presence of thalamo-cortical as well as cortico-thalamic fibers together with a discussion of the possible significance of the latter, the presence of bundles of collaterals originating from both ascending and descending fiber systems, etc. Jan. '66, 248 pp., 114 il., \$11.50

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□ RESEARCH METHODOLOGY AND NEEDS IN PERINATAL STUDIES by Sidney S. Chipman, Univ. of North Carolina, Chapel, Hill; Abraham M. Lilienfeld, The Johns Hopkins Univ.; Bernard G. Greenberg, Univ. of North Carolina; and James F. Donnelly, North Carolina State Board of Health, Raleigh. (67 Participants). Jan. '66, 328 pp., 16 il., 33 tables, \$16.50

**HUMAN RACES** (2nd Ed.) by Stanley Garn, Antioch College, Yellow Springs, Ohio. '65, 172 pp., 26 il., \$5.50

**THE ARCHITECTURE OF BONE** by Michael C. Hall, Univ. of Toronto, Canada. With the assistance of Dorothy S. Kinoshita. Jan. '66,  $360 \text{ pp.} (8\frac{1}{2} \times 11), 496 \text{ figs.}, $21.75$ 

☐ DISTURBANCES IN HEME SYNTHESIS: Special Considerations of the Sideroachrestic Anemias and Erythropoietic Porphyrias by Ludwig Heilmeyer. With the collaboration of Roman Clotten and Ludwig Heilmeyer, Jr. All of Univ. of Freiburg, Germany. Translated by Manfred Steiner, New England Center Hosp., Boston. Jan. '66, 250 pp., 83 il. (3 in full color), 39 tables, (Amer. Lec. Hematology edited by Walter H. Seegers), \$10.50

CELLULAR CONCEPTS IN RHEUMATOID ARTHRITIS. Holbrook Memorial Symposium. Compiled and edited by C. A. L. Stephens, Jr., Southwestern Clinic and Research Institute, Inc., and A. B. Stanfield, Univ. of Arizona. Both of Tucson. With the assistance of Margaret L. Doorly. (10 Contributors) Jan. '66, 232 pp. (7 x 10), 78 il., \$14.75

**SELECTED HISTOCHEMICAL AND HISTOPATHOLOGICAL METHODS** by Samuel Wesley **Thompson.** With two chapters contributed by Ronald D. Hunt. Both of Fitzsimons General Hosp., Denver. Jan. '66, 1,680 pp. (7 x 10), 401 il., \$65.00

□ VISION: Biophysics and Biochemistry of the Retinal Photoreceptors by Jerome J. Wolken, Carnegie Institute of Technology, Pittsburgh. Jan. '66, 216 pp., 154 il., 9 tables, (Amer. Lec. Living Chemistry), \$9.00

SCIENCE, VOL. 151

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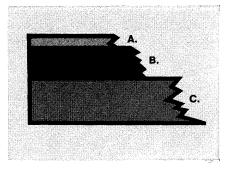
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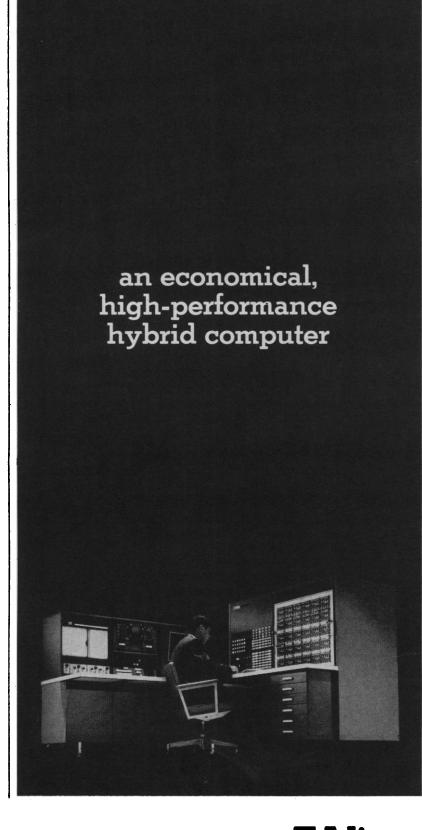
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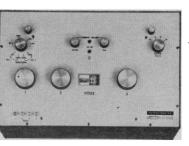
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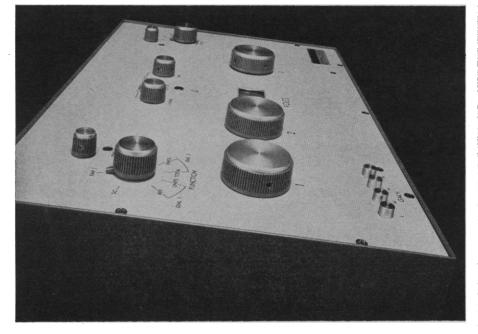
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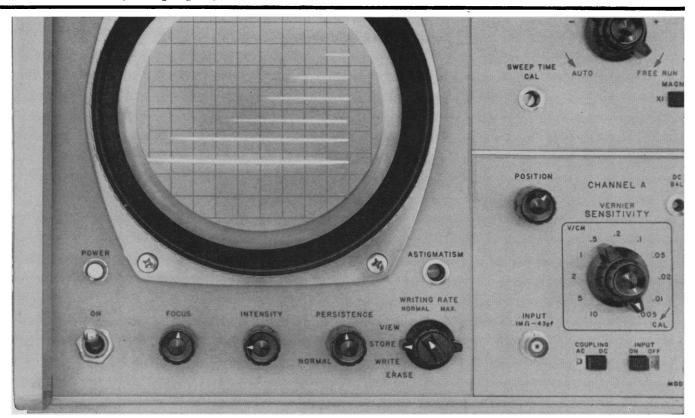
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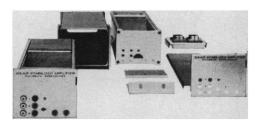
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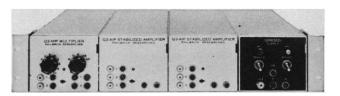


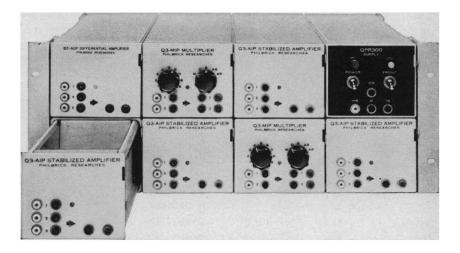
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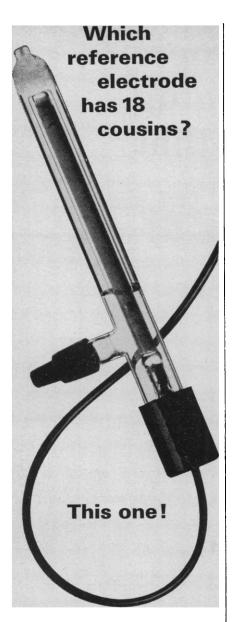
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INTERNATIONAL SUBSIDIARIES: GENEVA. SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA man cites as occurring in Virginia in 1963 can hardly be attributed to the activities of scientists; and even that situation, deplorable as it was, was not quite as Goldman describes it. The fact remains that collection, care, and animal use are three separate endeavors and the faults of one should not be translated to be the faults of all. The fact remains that upon investigation almost every one of the reports of the evils of collection, care, and experimentation described by the "humanitarians" involves either a halftruth, a nonsequitur, or ignorance.

Regardless of the category of "humanitarianism" from which it issues, the constant barrage of attacks, some of them scurrilous, is in the greatest degree anti-intellectual and in the know-nothing tradition. It is not a coincidence that from time to time we find these "humanitarians" embracing other fringe causes. The little old lady in sneakers wears mink, rides a chauffeur-driven Rolls Royce, and supports a Cause. These people probably distrust any intellectual effort in any field. The evidence for their opposition to any animal experimentation rather than their concern for proper treatment may be seen in the provisions of their proposed legislation, which would limit the numbers of animals used in any experiment, limit the species used for any experiment, and limit the experiment itself. A federal official would determine whether an experiment was a repetition of a previous one, and if it were, it would be forbidden. The implication is that experiments are repeated solely to satisfy the sadistic urge of the scientists. . . . It is disconcerting to find Goldman and a very few other trained people being duped into aligning themselves with such groups. . . .

FREDERICK SPERLING Department of Pharmacology, Howard University Medical School, Washington, D.C.

It is true, as Goldman says, that laboratory-animal care and use is imperfect. If there were preponderant evidence that legal restrictions on animal research are more beneficial than otherwise, they should be applied, regardless of the partisan outcries of scientists. But the case against a federal police solution to the problem has nothing to do with the feelings or personal convenience of scientists. Laws and other social remedies should

be evaluated pragmatically, like drugs. It is as foolish and dangerous to judge a law by its statement of purpose as it would be to judge a drug in advance of tests, simply on the basis of what it is hoped it may do.

Thirteen states in the United States and a number of municipal governments regulate scientific use of animals more closely than other uses of animals. In addition, all state anticruelty laws apply to scientific use of animals. National laws in several European countries are similar to regulatory proposals now before the U.S. Congress. It is a fact that there is no correlation between the laws governing animal experimentation and the quality of animal care. There are more differences within jurisdictions than between jurisdictions. Factors other than laws-money, cultural development, personalities, manpower, available technology-are the important factors. The scientific community, represented by nearly 1200 organizations and institutions that are members of the National Society for Medical Research, is recommending to Congress the adoption of legislation providing for technological development, manpower development, informational exchange, and the provision of facilities that make the big differences.

What about the problem of moral perversity? Is there nothing that can be done about that? Yes, but not very effectively, it would seem, by annual visits of a federal inspector. Imagine, for a moment, the use of such a preposterous device for the control of crime. I would imagine that government functionaries could inspect the headquarters of the crime syndicate year after year and never find anything wrong. Unpleasant as the task is, disciplinary control of the rare misdeeds of scientists is the duty of other scientists. One has to be in relatively intimate contact in order to discover offenses.

Turning the task over to the federal government is not only irresponsible, it might even be deadly. If Congress votes to encumber and censor scientific study of animals, an incalculable number of our friends, relatives, and descendants will die sooner because discoveries come later. Consider what even a brief delay in an effective new treatment means to the 550,000 Americans who die annually from coronary thrombosis. Consider, for perspective, the daily toll of more than 750 lives lost to cancer in this country alone. Any law complicating the solution of health problems should be required to offer great and certain benefits before being adopted.

RALPH ROHWEDER National Society for Medical Research, 111 Fourth Street, SE, Rochester, Minnesota

### **Paleomagnetism** and Evolution

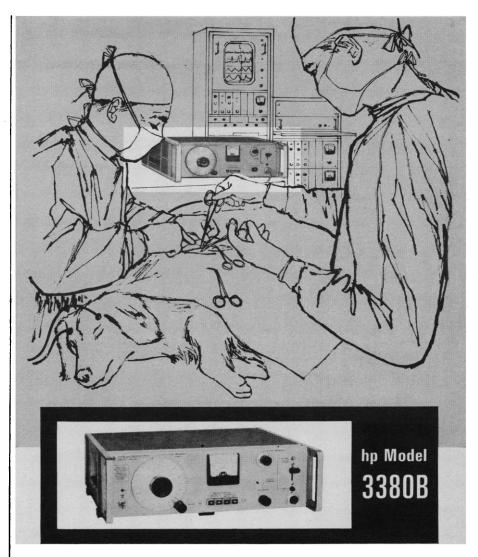
"An obscure Cambridge scientist wrote a book in the 1850's; and, although Darwin shaped no national policy in those ten years, the book altered, for ever since, the way in which educated people look at any question." So wrote T. R. Glover, the Cambridge historian (*The Ancient World*, Cambridge University Press, 1935); but as far as I know, no one has looked at paleomagnetism in an evolutionary kind of way.

The earth began as a homogeneous mass. It is now a highly differentiated mass with nickel-iron core and silicate crust. Of significance for paleomagnetism is the iron core. But since the earth began as a homogeneous mass, there has been an evolutionary process by which the mantle has gradually differentiated from the heavier iron-rich core. With the iron of the earth dispersed, or in local centers, the magnetic qualities of the earth must have been different from the present.

But there is a second component in the magnetic phenomena of our planet —the Van Allen belt. Over a century ago Balfour Stewart put forward the idea of the earth as a dynamo, and forecast the presence of the ionosphere (*Encyclopaedia Britannica*, ninth edition), although the idea was not accepted at the time. The present Van Allen belt could hardly have been there when the earth was formed, and so it also has, apparently, an evolutionary history.

A study of the evolution of the earth as a magnet could throw light on the subject of paleomagnetism. In that the earth is not yet fully differentiated, it may well be that this is a continuing process, and it would be interesting to consider how this continued evolution will affect the magnetic qualities of the earth.

EDMUND D. GILL National Museum of Victoria, Melbourne, Australia



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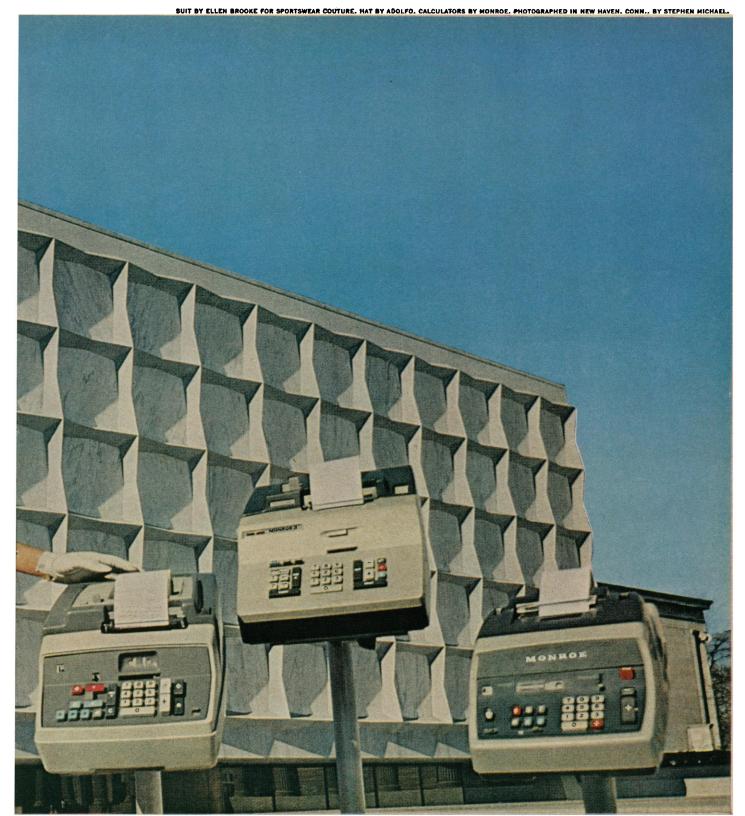




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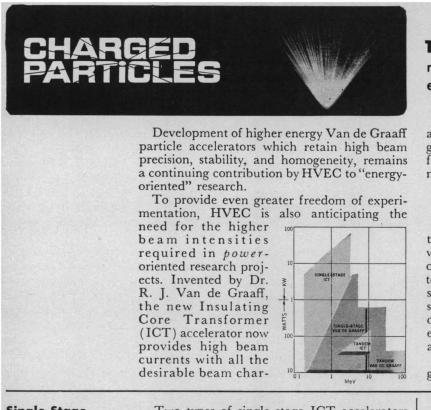
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### The Tea Leaves or the Record?

Our scientific leadership has been less than brilliant both in justifying public support of basic research and in managing the funds made available. Federal support of basic research was initiated because citizens developed a profound respect for a great record of scientific accomplishments. Nevertheless, scientists, in talking to politicians, have taken the line, "You never know what will come out of scientific research." Then, instead of talking of recent accomplishments, the spokesmen speak of Newton or Faraday.

Despite professing inability to judge significance of research work in advance, a granting agency such as the National Science Foundation tries to do just that in passing on research proposals. In deciding whom to support, considerable emphasis is placed on the content of the research proposal. Knowing this, some scientists are willing to make extravagant promises. All of us can have hopes, and it is just as easy to have high hopes as lesser ones. Panelists are not stupid or easily taken in, but often the proposal is the principal piece of information at their disposal. In considering grants, much more weight should be given to past scientific achievements of the individual than to his merchandising abilities. Men who have produced are likely to continue to do so; those who have promised much and delivered little will continue to promise. The scientist's past stewardship of federal funds should be examined. Although expenditures are audited, there is at present little follow-up on the scientific results.

In evaluating grant proposals we should focus on the man-his accomplishments and the trends in his accomplishments. If he is young and just beginning, we should rely on the judgment of his professors. As his professional development proceeds, more and more weight should be given to achievement. The principle of looking at the record for guidance has relevance beyond the individual proposals. Valuable judgments about whole fields of science can be made by looking at the record.

However, instead of giving predominant weight to trends in productivity of fields of research, the NSF has made allocations for grants for the various sciences largely on the basis of so-called "proposal pressure." The NSF has assumed that the scientific community will generate proposals for grant support in proportions representative of the needs and opportunities of the various fields.

After recommendations have been made on the grant proposals by panelists, the bookkeepers total the sums involved. If the physicists approve of grants calling for \$120 million and the chemists approve of grants involving \$80 million, proposal pressure in physics is considered to be greater than proposal pressure in chemistry. Accordingly, the physicists are given more money.

A little consideration will make it evident that the mechanism of proposal pressure can easily be distorted. Panelists early become aware that the more they recommend the more their science gets. In the past some NSF staff members have been active and successful in encouraging grant proposals for their particular discipline. This led to high proposal pressure in some fields and not in others, and to distortions in the support of science.

The NSF can function as a balance wheel only if it develops a better approach to the advocacy and management of basic research. Such an effort will necessarily involve continuing analysis of trends and accomplishments in scientific research. Increased support for NSF will be available if the foundation makes a convincing demonstration that basic research is continuing to be productive in creating important new insights. In judging individuals, areas of science, and organizations, a look at the record is superior to a look at the tea leaves, and a lot more convincing .- PHILIP H. ABELSON

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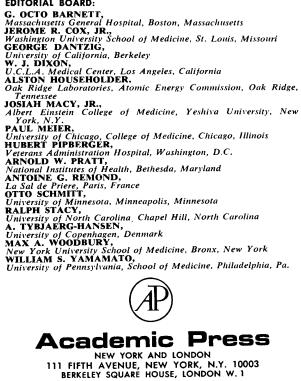
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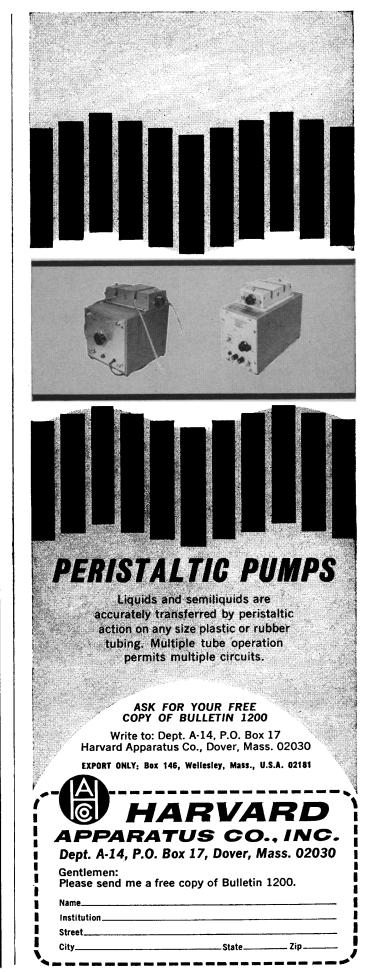
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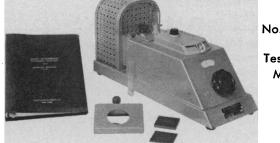
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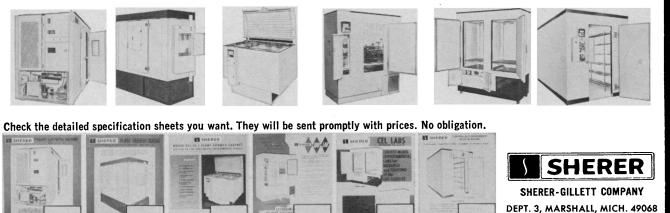
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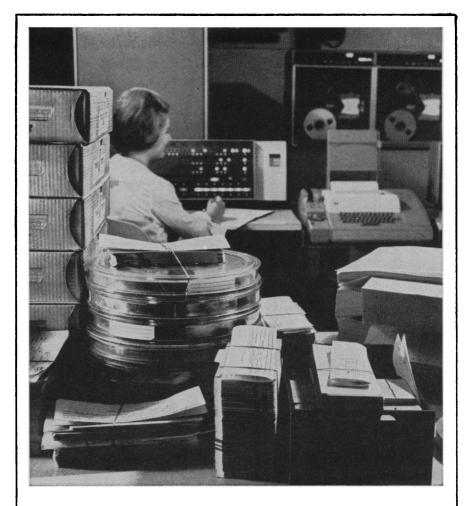
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with special training in the teaching of modern science and mathematics, works closely with a committee of Turkish scientists. The teaching materials for science and mathematics consist of special adaptations of new U.S. materials. These adaptations have been made on the campus by Turkish and American scientists and science teachers working together. Summer training courses for groups of Turkish high school science and mathematics teachers are also conducted at the school, and plans are being made to extend the influence of the school in a number of ways with the ultimate aim being to help improve the teaching of science and mathematics in the country in general.

Jack S. Goldstein (Brandeis University) discussed the progress being made in the African elementary school science project administered by Educational Services Incorporated, with support from a number of sources including the United States Agency for International Development (AID), the Ford Foundation, and the Louis and Pauline Cowan Foundation. In particular. Goldstein described the summer workshop which he directed in Entebbe, Uganda, in 1965, attended by selected representatives of the primary schools of the Tropical African Countries. The three objectives of the workshop were: (i) to develop primary school science units, (ii) to exchange information about primary school science activities from the countries represented, and (iii) to develop a corps of people from each country who would be equipped to staff school science resource centers in each of the countries. Goldstein noted the eagerness and ability of the African students and teachers and the tremendous problems which must be overcome in each of the countries.

Claude A. Welch (Michigan State University) related observations on science education made during a visit to Japan in the summer of 1965 in connection with the U.S.-Japan Cooperative Science Program. Welch described Japanese progress in translating and adapting biology teaching materials developed in the United States by the Biological Sciences Study Committee. He also discussed the network of science teaching centers which have been established in Japan where a wide range of activities, from the preparation of science teaching materials to the supplemental training of science teachers,



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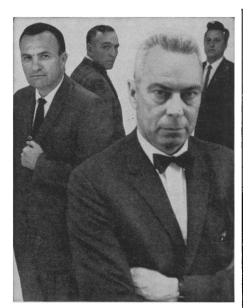
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18 FEBRUARY 1966

tion in the process of proportional thinking. His paper reports the results of an investigation of children's thinking within the first and second proportion schema. In the first stage, the child is able to see the relationship between the changes of one variable and the proportionate changes of the final results. Thus, he can predict that an increase in the height of an inclined plane will produce an increase in the speed of an object moving down the plane. During the second stage, the child comprehends that an increase in one variable can be compensated for by reducing or increasing another variable. For example, we can hold the speed of a car constant by increasing the angle of an inclined plane even though we have placed the car lower on the plane.

The purpose of this experiment was to determine what the effects of two different rules were on the ability of the child to manipulate the variables governing the speed of objects down the inclined plane. In the first experiment, six-, seven-, and eight-year-old children used the rule that the speed of an object down the plane was directly proportional to the height of the object on the plane and the angle of the plane. Weight was not a factor in determining the speed of the object. In the second part of the experiment, children of the same age group were using the rule that the speed of the object down the inclined plane was directly proportional to the weight, height of the object on the plane, and the angle of the plane. The car was adjusted so that an increase in weight would make it go faster contrary to "accepted" laws of physics.

Six- and seven-year-old children had more difficulty excluding the weight as a variable than did the eight-year-old children. Even though the first rule involved only two variables, the children scored consistently higher on problems dealing with the rule involving three variables. It is to be noted that all the children had previously been operating by a rule that lighter things go faster. The second experiment made them operate by an opposite rule that heavier things go faster. In spite of the unusual nature of the latter rule, the children still preferred to operate by it rather than exclude weight as a factor determining the speed of objects down the plane. It would appear that children have formed a strong relationship between weight and speed. The results of the experiment show



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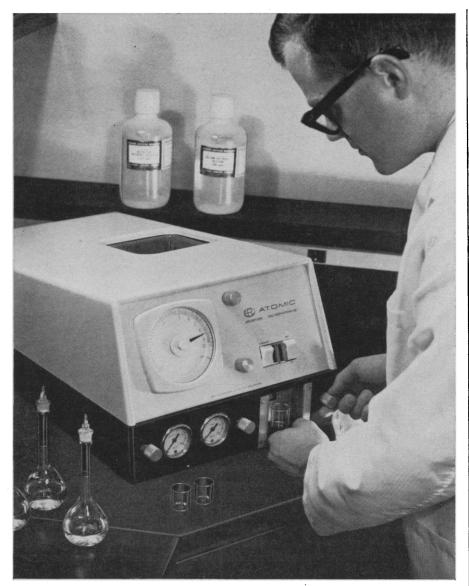
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### **Measurement of Quality in Education**

During this symposium (29 December), all participants generally accepted Allan M. Cartter's opening comments that "quality" is an elusive term and that we are living in an age of public accountability. Using chemistry as an example, Cartter described a "subjective opinion study" of graduate departments of 106 major universities, involving ratings of graduate programs in 30 subject fields. The judgments of department chairmen, senior scholars, and junior scholars were tabulated independently and collectively for these groups. Judgments and subsequent rankings were made on the scholastic stature of the faculty of each graduate department and the general effectiveness of each doctoral program.

William Firman reported on a study conducted in New York state which involved ability and basic skills achievement measures of 70,000 pupils in 100 school systems. Analysis of the results of students tested at these grade levels (4, 7, and 10), with type of system, general ability level as indicated by I.Q., and socio-economic levels has led to a "mosaic of strengths and weaknesses" for each system and sets of achievement expectancy norms. Two general conclusions reported were that "good" schools tend to recruit teachers on a nationwide basis and have more faculty members with masters degrees; and, second, that holding power is positively related to the availability of special services.

Henry S. Dyer reported on pilot work which has led to the development of a plan to evaluate educational programs in Pennsylvania. Citing the act of the Pennsylvania legislature which calls for the development of this type of program, Dyer pointed out that the pilot work demonstrated that dialogue between laymen and school people on educational matters is possible. The plan calls for the involvement of the public right down to the tests ultimately devised for use. It would yield expected outputs for schools of different types based on predictor variables over which the school system has control. The five salient features of the plan are (i) direct public involvement, (ii) continuous review, (iii) breadth of purposes, (iv) a cumulative program of research, and (v) encouragement of vital diversity.

Ralph W. Tyler discussed the work of the Exploratory Committee on Assessing the Progress of Education. He pointed to the value of descriptive type information provided during the depression by the reports of the National Youth Commission, and national measures in the fields of health and business; he noted that we do not have such information about the progress of education. He said a national assessment would differ from a national testing program in many ways. Each student would complete only a portion of the exercises and only a sample of students would be involved. There would be no scores or reports on individual students, teachers, or school systems. Rather, descriptive reports would be made on 192 populations based on four age levels (9, 13, 17, adult), four regions, two socio-economic levels, three types of communities (large city, suburban, rural-small town, and sex. Tyler cited the involvement of scholars, teachers, and public-spirited laymen in the deliberations of the committee and in initial steps toward instrument development.

### Curriculum Development for Elementary School Science

This symposium was a joint session of Section Q, the National Association for Research in Science Teaching, and the American Educational Research Association (30 December 1965).

Joseph Lipson reported on how the Learning Research and Development Center of the University of Pittsburgh has for the past two years been engaged in the preparation of individualized science lessons for the elementary school. The individualized program depends on diagnostic pretesting and achievement post-testing of the abilities of the students so that no student is asked to learn objectives which he has already mastered and so that each student is assured of mastery of the objectives of the lessons he has had. In order to have an effective coEspecially designed for Gel Filtration Chromatography Ion Exchange Chromatography Sephadex<sup>•</sup> Laboratory Columns A product of over six years' research know-how brings you these 'exclusive" column features: 1 SPECIAL DESIGN BED SUPPORT-eliminates troublesome sintered glass disc 2 MIXING CHAMBER-of less than 1/10% of bed volume minimizes sample dilution to insure optimal zone sharpness for critical separations 3 INERT NYLON NETTING-on both the sample applicator and bottom endpiece eliminates adsorption of biologic material 4 DESCENDING TO ASCENDING SYSTEMeasily converted by replacing both endpieces with upward-flow adaptors 5 SAMPLE APPLICATOR-distributes the sample evenly over the bed surface to insure sharp zones for critical separations and protects as ASCENDING CHROMATOG-RAPHY-The 2.5 cm well as stabilizes the bed 6 SELECTED CONSTRUCTION MATERIALS column is easily adapted by insert-ing TWO UPWARD FLOW ADAPTORS -to avoid destruction of sensitive biologic materials THE STANDARD SEPHADEX LABO-RATORY COLUMN FOR DESCENDING CHROMATOG-RAPHY Available Sephadex Columns and Accessories Size Type Internal Diameter Lenath LABORATORY COLUMNS Sephadex Column K 15/30 1.5 cm 30 cm Sephadex Column K 15/90 1.5 cm 90 cm Sephadex Column K 25/45 2.5 cm 45 cm Sephadex Column K 25/100 2.5 cm 100 cm JACKETED COLUMNS Sephadex Column K 25/45 "jacketed" 2.5 cm 45 cm Sephadex Column K 25/100 "iacketed" 2.5 cm 100 cm UPWARD-FLOW ADAPTORS **Upward-Flow Adaptors** To fit all columns of 2.5 cm internal diameter

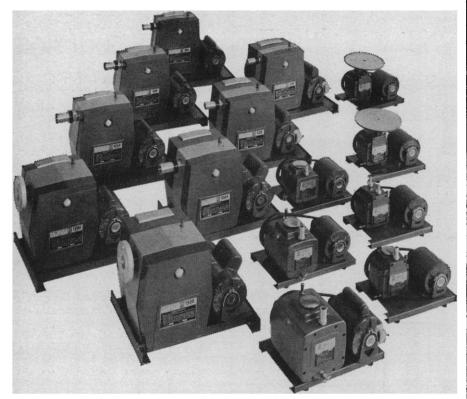
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ordinated program of lesson writing, materials development, test development, and program evaluation, the entire sequence is keyed to statements of what the student is expected to be able to do after each lesson or group of lessons. Lessons in which the student is asked to transfer his knowledge to new problems, discuss a problem with other students, or explore a new environment are built into the lesson stream.

Turning from the technical and pedagogic problems of lesson preparation for individualized instruction, we have concerned ourselves with forming a basis for deciding what should be taught in the elementary school science program, how the objectives should be taught, and the criteria of performance which the children should be expected to meet.

The lessons currently in use are based upon the AAAS process lessons and the lessons of the Science Curriculum Improvement Study of the University of California at Berkeley. It is proposed that the next step in curriculum development might go beyond the process objectives which enable the student to organize information and events over broad areas of science and general experience. The lessons of the SCIS (Science Curriculum Improvement Study) are in the domain which we have in mind. These lessons teach highly general basic concepts using experiences which are familiar to the student and which can be brought into the elementary school laboratory. Our proposal is that this program, integrating process goals and developing concepts of wide application and generality, be extended and at each point in the program we select those concepts which will most contribute to future learning and comprehension in science.

Concept learning in the elementary school has a special meaning in our lesson plan. By concept formation is meant that the student can identify a class of objects or events when shown a sample of objects or events (for example, when shown three triangles the student should be able to say that they are all triangles), and that the student can distinguish instances and non-instances of the concept (for example, which of the following figures are not triangles). This type of learning is emphasized because it is evident that children can gain command over many hundreds of concepts and that these concepts are resistant to forgetting.



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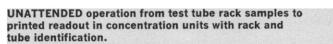
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Laboratory experiences are used as the basis for concept formation because of the observed persistence which children show in manipulative exercises; because we avoid many of the learning problems which arise when we attempt to teach scientific ideas with purely graphic or verbal means; because of the opportunity for selfinitiated exploration which the laboratory materials provide; and because the properties to be observed cannot be fully displayed except in the laboratory setting.

Vocabulary plays an important role in the curriculum in order that the students can use a verbal sequence in applying the concepts to future problems; so that the instructor or the instructional materials can call forth the concept by the appropriate word; and so that at some point new principles can be taught by verbally indicating the relationship between previously mastered concepts. By building concepts upon verifiable, repeatable experiences we can ensure that the individual citizen can make a reasonable interpretation of events which have a scientific context. If properly chosen, the concepts will show a minimum interference of early learning with future learning.

In order to illustrate the steps which must be taken to implement the suggested program, a scheme of course design will be suggested; current experimental work in individualized education will be described insofar as it pertains to the theme of the talk. In particular, a comparison of grade school children and college freshmen will be reported.

Lawrence Lowery tested the reliability of a unit prepared by the Elementary School Science Project, and measured children's attitudes toward science, the nature of science, and the scientist. The tests consist of three parts which use the projective technique—Word Association Test, an Apperception Test, and a Sentence Completion Test. Reliability of the test was determined in two ways: (i) scoring between types, and (ii) the ranking of the same individuals 8 weeks later with no science being taught in the interim.

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### The Algebraic Eigenvalue Problem

By J. H. WILKINSON, National Physical Laboratory, England. Since the advent of electronic computers a very large number of algorithms have been proposed for the solution of the algebraic eigenvalue problem. In this book the relationships between these algorithms are studied, and descriptions of both stable and unstable algorithms provided. Two related problems, the solution of linear equations and the calculation of zeros of polynomials, are also covered, and the techniques of error analysis which are developed are applicable to a wide range of computations. Illus. \$17.60

### Melting and Crystal Structure

By A. R. UBBELOHDE, Imperial College, London; President, Faraday Society. This book aims to focus attention on liquids considered as "melts." Quasi-crystalline models and anticrystalline models related to them may often be better suited to describe liquids not too near their critical points than the quasi-gaseous analogy. Many new avenues for research on fluid condensed states of matter involve this approach, and the book has been written to stimulate and serve in their exploration. 95 figures. \$10.10

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though these tests proved out, they are not to be used separately since all three are necessary before one may draw conclusions.

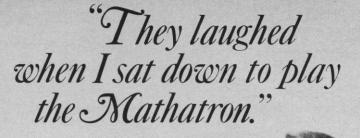
The final session of Section Q's program consisted of contributed papers (30 December). Paul Wittey (Northwestern University) summarized 15 annual studies of television-viewing habits of children and youth. Favorite programs and total viewing time were reported. Gains in vocabulary, changes in reading habits, relation to succession in school, and undesirable outcomes were among conclusions discussed. Philip H. DuBois reported on the statistical procedures by which statistical controls may be substituted for experimental controls in educational situations. The method involves (i) development of a hypothesis relating gain in proficiency to measurable traits; (ii) measurement of pertinent variables, including initial and final level of proficiency; and (iii) estimation of the relation between the primary variable and gain. Melvin P. Robbins (University of British Columbia) reported on a study which tested the Delacato conception for certain cognitive abilities in children. His study fails to support the Delacato hypothesis. R. J. Tritschler (IBM) reviewed the many problems faced by librarians in cataloging and retrieving printed materials. The potential solution through the use of computers was presented.

> FREDERIC B. DUTTON, Secretary

### National Association of Biology Teachers (Q8)

Four sessions comprised the core of the NABT program. In the session, "Specific techniques in biology," Nicholas Eigsti (Ball State University) used yellow-green soybeans to show how genetic ratios can be taught as an open-ended experiment. Darwin Thorpe (Compton, California, College) showed how he used 35-mm slides to make vertebrate dissections more efficient. To show evolution, Marion S. Baran (Riverside-Brookfield High School, Illinois) explained how he innovated with plastic refrigeration containers to raise Drosophila. One of the problems with electrophoresis is its high cost. Sister Mary Ivo (Chicago Archdiocese) showed how she utilized simple and inexpensive equipment.

Another session, "BSCS and re-





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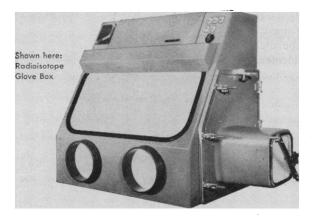
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search participation program," had Paul Geisert (Oak Park and River Forest, Illinois, High School) demonstrating his "think box," a skull into which students are encouraged to place questions. M. Cassandra Hickey (Medford, Massachusetts, High School) talked about her guide sheets which she used to help her students understand better the BSCS Yellow Version. In Oregon at Twality Junior High School, Arthur Biederman used his students as part of a NSF research participation ground squirrel study. And Gladys Kleinman (Rutgers University) explained her inquiry-oriented methods course to train nonscience oriented elementary teachers.

In a session, "Teacher training and resource use in biology," Tom Mertins and Jerry Nisbet (Ball State University) explained that their NSF summer institute stressed cytology, genetics, and biochemistry to fill the void of most secondary teachers. Kenneth Bandelier (New Haven, Indiana, High School) reported on his research which showed that teachers seldom made use of community resources. The necessity of keeping records of an organization, which can be made available for research, was stressed by Myrl Lichtenwalter (Wells High School, Chicago.)

In the last session, Alfred Novak (Stephens College) proposed a model college program for training future biology teachers, and Charles Ostrander (Merced, California, College) showed his device for obtaining immediate evaluation of student response to prepared questions. And finally, John Cunningham (Florida State University) explained how biological examples can be used to build science concepts in elementary students.

One of the most interesting and wellattended sessions was an "how-to-doit" session where 20 teachers simultaneously demonstrated their pet ideas.

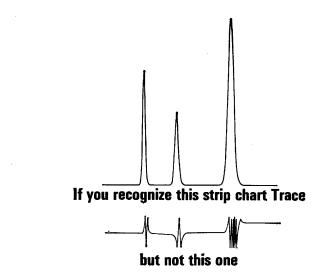
The highlight of the sessions was the NABT luncheon; Ralph Gerard (University of California, Irvine) talked on brains and learning.

HARRY K. WONG, Program Chairman

### **Education** (Q)

### National Science Teachers Association (Q9)

The NSTA and the Central Association of Science and Mathematics Teachers (Q5) (CASMT) coopera-18 FEBRUARY 1966



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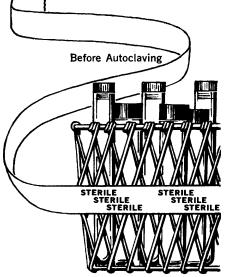
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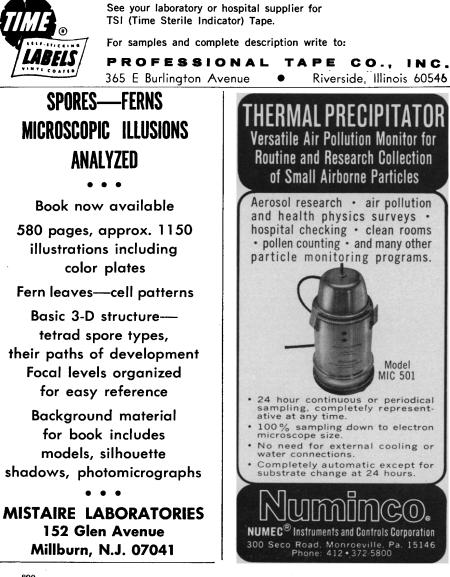
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tively planned sessions that were concerned with the rapidly changing patterns of science education at all levels, from the primary grades through college.

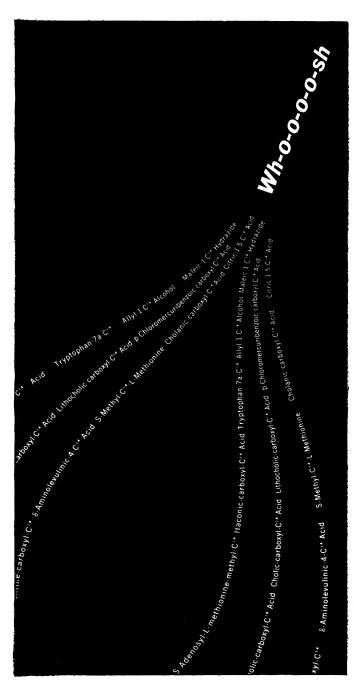
Sessions on science in the elementary school emphasized the great need for involving individual students in the process of science to achieve effective learning and for more open-ended experiments to help children understand the nature of science. One lecture presented methods for using closed circuit TV for observing and evaluating teaching techniques.

We should give more attention to the preparation of teachers and helping them keep up to date in science. The most important thing that a teacher should develop in college is a sound philosophy—of science, of science teaching, and of life in general. This philosophy is not usually what is taught in formal classes, but what is learned in the many classroom and life situations on the campus.

The session on science in the junior high school dealt specifically with achieving balance in teaching the physical sciences. One speaker showed how the earth and space sciences can serve as a unifying theme for teaching science. There is a lack of adequate emphasis on the laboratory in junior high school and a need for providing more adequate facilities and equipment.

Problems of teaching science in the junior college were also discussed. There is a need for more interplay between administrators and professors in 4-year colleges and their counterparts in the junior colleges. In some colleges an alarming trend away from emphasizing scientific literacy for general education is indicated through the decreased emphasis on science for general education and the increased emphasis on the separate disciplines.

There is an encouraging improvement in the academic quality of junior college teachers, often placing them on equal intellectual footing with the professors in the 4-year college. The junior college science staff is making commendable efforts to solve the problems of the wide range of ability levels among students and relieving the pressures of rapidly increasing enrollments. Although professors in junior colleges are giving an increasing amount of attention to research, teaching is their primary function and interest. This, together with the fact that the best teachers are teaching introductory as well as more advanced courses, creates a fa-



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INTERNATIONAL ICO EQUIPMENT CO. 300 Second Avenue · Needham Heights, Mass. 02194 vorable situation for providing students with a sound introduction to science.

Several groups met to discuss specific topics related to science teaching in junior college. A report of these discussion groups is available on request from NSTA, 1201 Sixteenth Street, NW, Washington, D.C. 20036.

One of the problems facing teachers and administrators is that of effecting changes in teaching techniques and content in the classroom. In-service education and new techniques for evaluation provide excellent opportunity for accelerating these changes. One speaker discussed the role of education in our society and the potential assistance for change available at all levels of instruction through federal funds. In the future it is probable that increasing attention will be given to implementing changes and encouraging schools at every level to improve their instructional programs.

ALBERT F. EISS, Associate Executive Secretary

## Information and Communication (T)

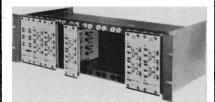
## Current Issues in Communication of Science II: The Scientific Meeting and Related Publications

The panel on Scientific Meetings (27 December 1965) observed that there are many purposes for scientific meetings; among the most constructive uses by scientists are: Reporting and learning about new research developments; surveying the state of the art of an area; personal contact, both professional and social; and building interdisciplinary bridges. These purposes are accomplished to varying degrees by the many types of meetings now offered.

However a great deal of both direct financial outlay and valuable time is now consumed by meetings. This has reached the point where the value of present meeting activities is being questioned with increasing seriousness. There is not any good method of evaluation and it is rather widely assumed or estimated that the return on total expenditure is small. The planning and sponsorship of meetings is moving from the scientific and professional societies toward the federal government and trade associations.

More clarity of objectives is needed in planning most meetings as is more care in setting structure in accordance

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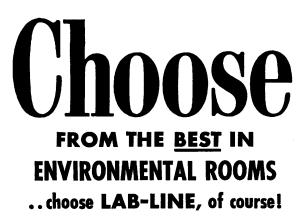


with objectives. In addition, the structure of systems of meetings sponsored by major societies and other organizations ought to be examined with objectives in mind. More carefully documented study of meetings with these matters in mind should prove valuable and the cost of such studies certainly should be returned manifoldly by the reduced expenditures and increased yield of value from meetings.

> RICHARD KENYON, Program Chairman

### State of the Art and the Prospects for Data Gathering, Storage, Transformation, and Retrieval

The field of information transfer is in a phase of transition. In the session, 29 December 1965, on "Data gathering, storage, transformation, and retrieval," Walter M. Carlson (Department of Défense) presented recent findings that show local and informal transfer (faceto-face and telephone communication, personal and office files, and others) predominate markedly in frequency of use over formal transfer involving national or regional libraries, bibliographic services, document-retrieval systems, and journals. Carl F. J. Overhage (M.I.T.) then outlined the program of research (Information Transfer Experiments) recommended by last summer's Planning Conference to improve informal transfer and introduce into formal transfer some of the convenience and quick responsiveness that have heretofore characterized informal but not formal transfer. The Intrex program calls for a melding of the concepts of library and multiple-access (for example "time-sharing") computer and, in accordance with Carlson's philosophy, an emphasis on the needs and points of view of the users of information. In the final talk, J. C. R. Licklider (IBM) focused attention upon the prospects for "on-line information networks" in which systems similar to Intrex in various parts of the country (or of the world) will be interconnected through telecommunication channels. He adduced support for the ideas that the technological bases (storage, transmission, processing, display, and so forth) for such systems are rapidly coming into being and that much of the research and development during the next few years aimed at a "national information system" should be directed toward on-line networks in which "content" as well as document-retrieval (that



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The MOST COMPLETE line of Plastic Laboratory Ware available from ONE source is, "bibliographic-control") information exists, and is used, in computer-processible form. Discussion ranged over a broad field—browsing in a semiautomated information system, "negotiating" retrieval specifications through conversational man-computer interaction; cost of storing the contents of the Berkeley library in computer-processible form; an experimental on-line information network for universities.

> J. C. R. LICKLIDER, Program Arranger

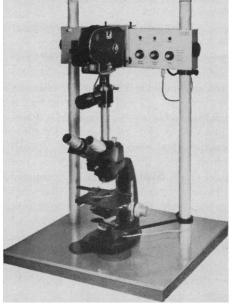
## Society of Technical Writers and Publishers (T2)

During a panel discussion, "Strengthening the scientist's communicative (30 December 1965), H. C. skills" McDaniel (Westinghouse Electric Corporation, Pittsburgh) noted that the course this country will pursue for the next few years will be determined largely by the rate of technological advancement, and that the private citizen must be kept informed so that he can make intelligent decisions. Scientists possess at least two vocabularies-the common English vocabulary, and the specialized technical and scientific vocabulary. In communicating research results, the audience determines word choice. It is not enough to use only words the reader can understand; these must also be words he cannot misunderstand. Manuscripts should be free of bias, particularly if this relates to conclusions. The more objective the analysis, the more useful the results.

In examining "the valued decision" within the framework of today's complex society, Harold Hornby (Ames Laboratory, National Aeronautics and Space Administrations, Sunnyvale) analyzed factors such as criteria for value judgments, evaluation of alternative approaches, mechanisms for assuring objectivity, and today's planning vis-à-vis tomorrow's anticipated requirements. It was shown how these criteria relate to the universality of science and to the strengthening of the concept of total education.

Improved methods of scientific reporting were considered by Carl M. Johnson (U.S. Navy Electronics Laboratory, San Diego). Noting that much time, effort, and money have gone into the retrieval of scientific literature, Johnson suggested that at least equally important should be improvement of the material being retrieved, so that it can be quickly comprehended by the read-

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er and readily found in the document center. The QRC (quick reader comprehension) reporting technique was cited as an example of an effective information retrieval method now being used successfully at the Navy Electronics Laboratory and elsewhere.

Supervision as the key to effective communication was discussed by James W. Souther (University of Washington, Seattle). It was pointed out that the supervisor-the university professor guiding the work of graduate students, or the scientist-supervisor in industry or government directing the work of scientists-exerts a powerful influence on scientific writing. No longer can we afford supervisors who do not meet their responsibilities with respect to strengthening the communicative skills of those who work for them. If science supervisors are to exert a positive influence, they must understand the kinds of problems science writers must solve, must identify the informational needs and the reading habits of the anticipated audience, and must establish procedures for effectively directing the writing of scientists.

The panel was cosponsored by AAAS (Section T) and the Society of Technical Writers and Publishers. Gunther Marx (IIT Research Institute, Chicago) arranged the session and presided at the meeting.

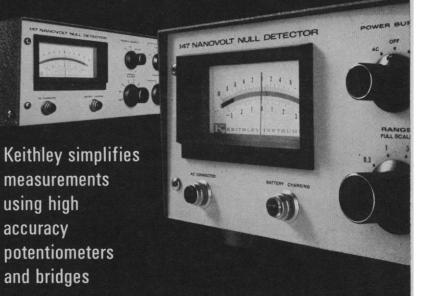
> GUNTHER MARX, Program Chairman

#### Statistics (U)

Section U sponsored or cosponsored 28 sessions at the 1965 AAAS meetings in Berkeley. The largest group of meetings (18) were the December sessions of the Fifth Berkeley Symposium on Mathematical Statistics and Probability.

The address at the vice-presidential session was given by Oscar Kempthorne on "The classical problem of inference —goodness of fit." Arrangements for this address were made after it was learned that Dr. Fry would not be able to attend. Neyman, first chairman of Section U and organizer of the Berkeley Symposium, presided.

The 18 sessions of the Berkeley symposium included 65 papers on subjects such as weather modification, information processing and cognition, medical diagnosis by computer, astronomy, demography, genetics, and other topics. The earlier meetings of the Berkeley Symposium were held in June and additional sessions were held in January



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1966. The papers will be published by the University of California; papers on weather modification and discussions will form a separate volume.

A major problem in the epidemiology of mental disorder is that no single set of statistics can be taken as truly representing either incidence or prevalence. At a session arranged for the Population Association by Everett Lee (University of Pennsylvania) results obtained from various sources were critically examined. Enough agreement as to some of the most important differentials appears to establish important elements in this area.

A session, "Experiments on operating information systems," arranged by Ezra Glaser (National Institute of Health) discussed the actual problems encountered at the Patent Office and elsewhere in developing search systems and other information procedures.

Other sessions cosponsored by Section U included the symposium on Measuring Quality in Education (with Section Q and others), Computers and Universities (with Section P and others), a session on Statistical Methods of Bioassay arranged for the Biometric Society (ENAR) by Douglas Robson (Cornell) and two sessions arranged by the Biometric Society (WNAR). The Section also cosponsored the two sessions arranged by the Society of Systematic Zoology on "Biological data retrieval and computer analysis."

> MORRIS ULLMAN, Secretary

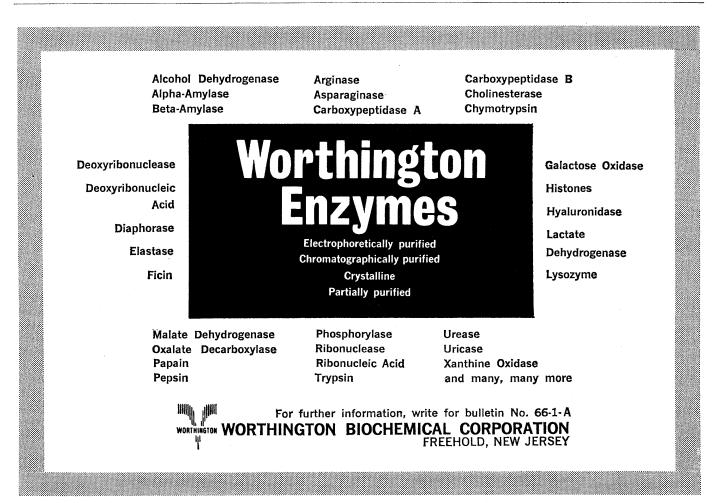
#### Biometric Society, Eastern

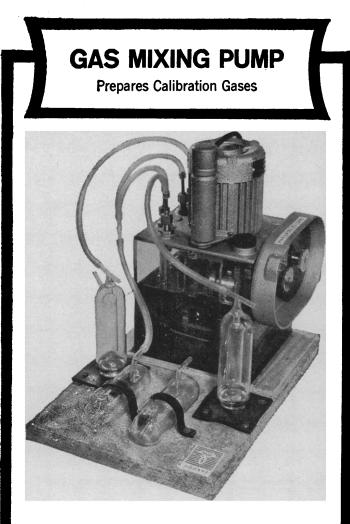
#### North American Region (U3)

The session on bioassay placed emphasis on the use of prior information in the statistical design and analysis of routine assays. Variances among previous slope and intercept estimates for the Standard Preparation provided the basis for deciding the number of doses of Standard and Test Preparations to include in a parallelline assay. A numerical illustration comparing variances of potency estimates based on a single dose of Test Preparation and 0, 1, or 2 doses of a Standard antibiotic showed that for a fixed total number of observations the 1-point assay, using prior esti-

mates of both slope and intercept for the Standard, was less accurate than the 2- and 3-point assays. The problem of nonparallelism between Standard and Test dosage-response curves was examined and formulas were presented for confidence interval estimates of dose-specific potency values. In quantral response assays where the probit slope  $(1/\sigma)$  is known a priori, the LD<sub>50</sub> can be estimated homoscedastically by an "up and down method" in which animals are tested singly in sequence at dose levels which change by  $c_{\sigma}$  units in each trial. If an animal does not respond then the dose is increased for the next animal-otherwise the dose is decreased. The experiment is terminated after a fixed number of trials following the first change in direction of dosage increment. The  $LD_{50}$  is then estimated by the maximum likelihood method. For c = 1, errors of  $\pm 2\sigma/3$ in setting the dose increment value were shown to have a negligible effect with respect to variance and bias of the  $LD_{50}$  estimate.

> D. S. ROBSON, Program Chairman



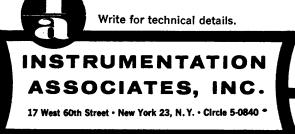


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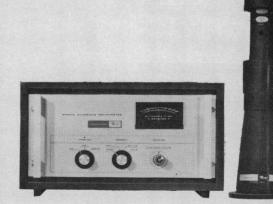
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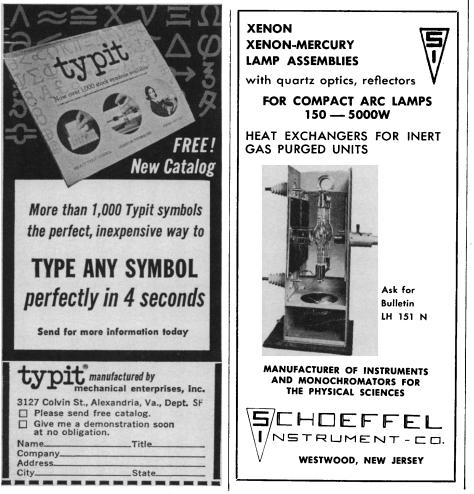


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### Science in General (X)

#### Sigma Delta Epsilon (X3)

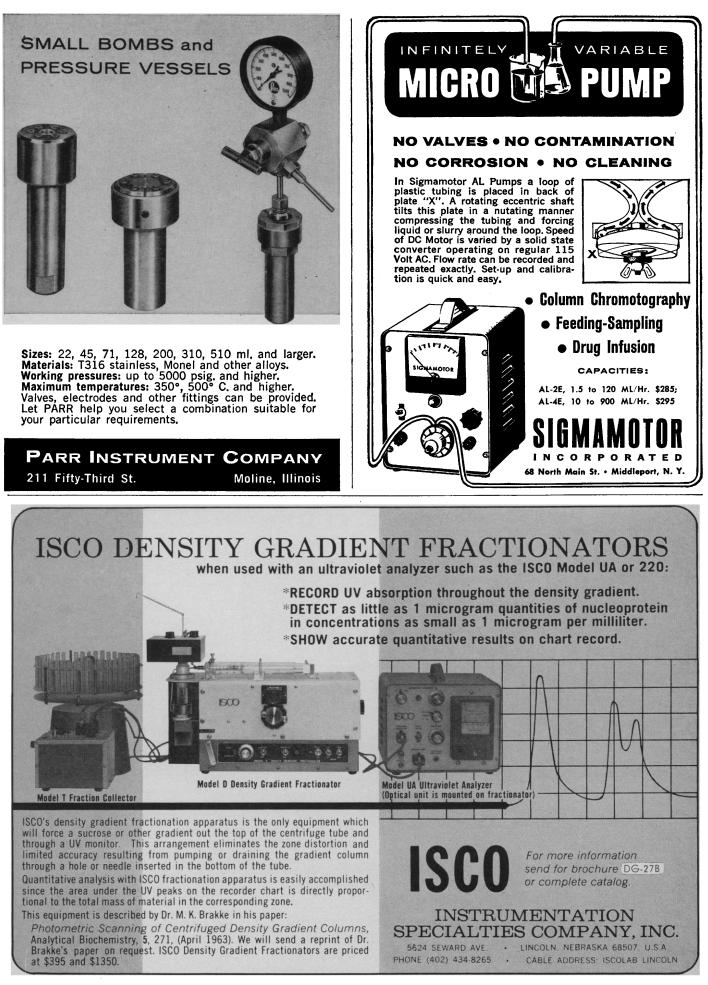
A luncheon for all women in science was held in the Women's Faculty Club of the University of California in Berkeley on 28 December 1965. Mary L. Willard (Pennsylvania State University; past president and national honorary member of Sigma Delta Epsilon) was the speaker. She gave a very interesting talk on criminalistics and called on members of the audience to act as visual aids to illustrate her stories.

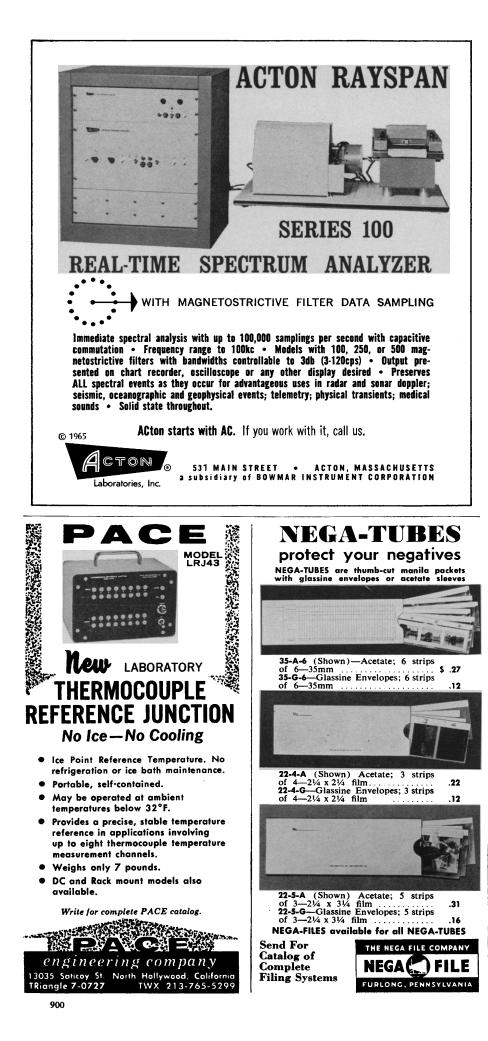
The annual dinner and Grand Chapter meeting was held on 29 December 1965. National honorary membership was conferred on four members of the Fraternity; Helen Dyer and Mary E. Maver, in absentia; Mary Rogick, posthumously; and Anna Rachel Whiting, in person. Whiting, at present a consultant to the Oak Ridge National Laboratories, Biology Division, gave a brief talk on her studies on the genetics of Habrobracon wasps through the use of x-ray irradiation at various stages of the wasps' development. She plans now to study the effect of weightlessness on the genetics of this species by sending wasps into space on a Gemini flight.

Eleanor Alexander Jackson, one of the recipients of the 1965 grants-inaid, reported on her attempts to cultivate M. leprae on media used for the growth of M. tuberculosis. She has been able to grow the organism from freshly excised leproma nodules sent to her from Brazil and to produce lepromalike lesions with them in newborn rats.

At the business meeting money was appropriated for three additional grants-in-aid for 1966, a check for \$200 was contributed to UNESCO to help finance science education in Nigeria, and the Miles College project was extended for the new fiscal year. Amendments to the constitution and bylaws were adopted to implement the change in fiscal year. The possibility of creating a new office, that of business manager for the fraternity was discussed and the present treasurer appointed to fill the office until it can be properly established at the next meeting of the Grand Chapter. Finally, national officers were elected and installed to take office 1 July 1966, the beginning of the new fiscal year, present officers will function until 30 June 1966.

> HARRIET M. BOYD, National Secretary





#### **Forthcoming Events**

#### March

1-2. Dairy Engineering, natl. conf., Michigan State Univ., East Lansing. (C. W. Hall, Agricultural Engineering Dept., Michigan State Univ., East Lansing)

1-3. Space Maintenance and Extra-Vehicular Activities, natl. conf., Orlando, Fla. (M. B. Goldman, Mail No. 302, Martin Co., Baltimore, Md. 21203)

1-10. Industrial Development in the Arab Countries, regional symp., Kuwait. (Intern. Agency Liaison Branch, Office of the Director General, Food and Agriculture Organization, Via delle terme di Caracalla, Rome, Italy)

2-4. Air Pollution Medical Research, AMA conf., Los Angeles, Calif. (Dept. of Environmental Health, American Medical Assoc., 535 N. Dearborn St., Chicago, III. 60610)

2-4. Plasmadynamics, conf., Monterey, Calif. (American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

2-4. Scintillation and Semiconductor Counters, 10th symp., Washington, D.C. (W. A. Higinbotham, Brookhaven Natl. Laboratory, Upton, L.I., N.Y.)

3-4. Louisiana Soc. for Electron Microscopy, 3rd annual symp., New Orleans. (W. R. Goynes, Southern Regional Research Laboratory, Box 19687, New Orleans)

3-5. **Pb-Zn-Barite-Fluorite** Symp., New York, N.Y. (C. H. Behre, Jr., Behre Dolbear & Co., 11 Broadway, New York 10004)

3-5. Central **Surgical** Assoc., Chicago, Ill. (C. E. Lischer, 457 N. Kingshighway, St. Louis 8, Mo.)

4-5. Cineradiology, 5th symp., Rochester, N.Y. (R. Gramiak, Div. of Diagnostic Radiology, Univ. of Rochester Medical Center, Rochester 14620)

4-6. American Assoc. of **Pathologists** and **Bacteriologists**, 63rd annual mtg., Cleveland, Ohio. (P. Fitzgerald, Downstate Medical Center, 450 Clarkson Ave., Brooklyn 3, N.Y.)

5-10. International Acad. of **Proctology**, 18th annual conv., Miami Beach, Fla. (A. F. Cantor, 147-41 Sanford Ave., Flushing, N.Y. 11355)

6-11. American Soc. of Photogrammetry, Washington, D.C. (C. E. Palmer, 5917 Brookview Dr., Brookland Estates, Alexandria, Va.)

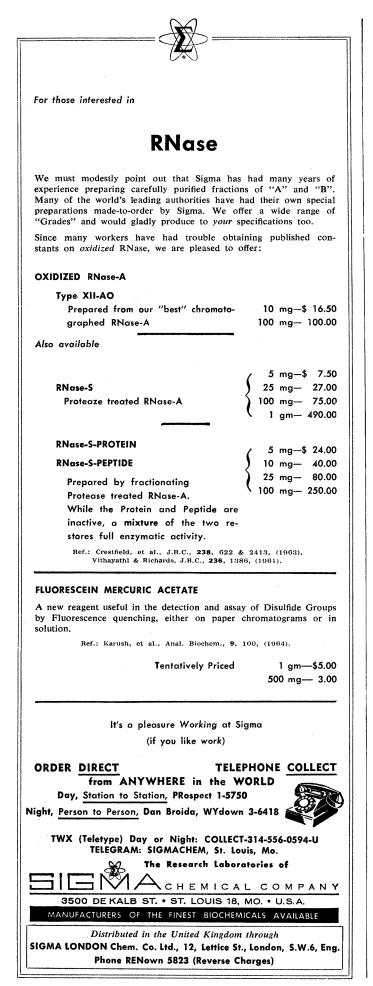
7-9. Fundamental Cancer Research, 20th annual symp., Univ. of Texas, Houston. (M. Mandel, Dept. of Biology, M. D. Anderson Hospital and Tumor Inst., Univ. of Texas, Houston 77025)

7-9. Electric Propulsion, 5th conf., American Inst. of Aeronautics and Astronautics, San Diego, Calif. (A. T. Forrester, Electro-Optical Systems, Inc., 300 N. Halstead St., Pasadena, Calif. 91107)

7-9. **Space**, 3rd congr., Cocoa Beach, Fla. (R. M. Barnes, PAA-Guided Missiles Range Div., Bldg. 423, MU 111, Patrick Air Force Base, Fla.)

7-11. American Soc. for Metals, western metal and tool exposition and conf., Los Angeles, Calif. (The Society, Metals Park, Ohio)

7-11. Society of Plastics Engineers, 22nd



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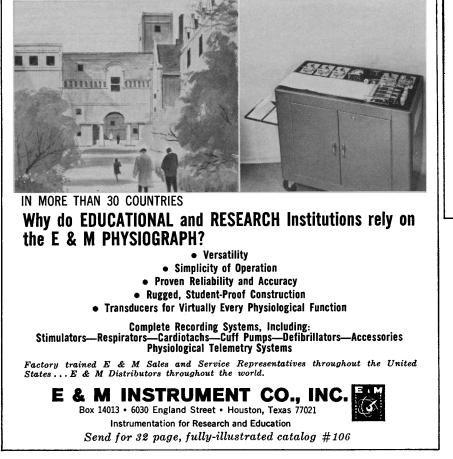
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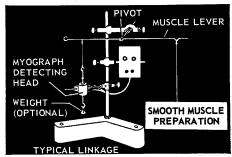
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annual technical conf., Montreal, P.Q., Canada. (G. L. Bata, Union Carbide Canada, Ltd., P.O. Box 700, Pointe-aux-Trembles, P.Q.)

7-12. Inter-American Nuclear Energy Commission, 6th mtg., Washington, D.C. (J. D. Perkinson, Jr., Pan American Union, Washington 20006)

8-3. World Meteorological Organization, commission for synoptic meteorology, 4th session, Wiesbaden, Germany. (WMO, 41, avenue Giuseppe Motta, Geneva, Switzerland)

9-11. Ethics in Medical Progress, Ciba Foundation symp., London, England. (Ciba Foundation, 41 Portland Pl., London W.1)

9-13. Teaching Machines and Programmed Instruction, intern. symp., Nürtingen, Germany. (Arbeitsgemeinschaft Programmierte Instruktion, Inst. für Kybernetik, Pädagogische Hochschule Berlin, Malteserstr. 74-100, 1 Berlin 46)

10-11. Heat Transfer to Non-Newtonian Fluids, 12th annual heat transfer conf., Oklahoma State Univ., Stillwater. (J. D. Parker, Dept. of Mechanical Engineering, Oklahoma State Univ., Stillwater 74075) 11-13. National Council of Teachers of

Mathematics, San Diego, Calif. (J. D. Gates, 1201 16th St., NW, Washington, D.C. 20036)

11-13. National Wildlife Federation, annual mtg., Pittsburgh, Pa. (T. L. Kimball, 1412 16th St., NW, Washington, D.C. 20036)

12-13. Linguistics, 11th natl. conf., Linguistic Circle of New York, N.Y. (L. Pap, State Univ. College, New Paltz, N.Y. 12561)

14-16. Society of **Toxicology**, annual scientific mtg., Williamsburg, Va. (C. S. Weil, Mellon Inst., 4400 Fifth Ave., Pittsburgh, Pa. 15213)

14-16. Wildlife and Natural Resources, 31st North American conf., Pittsburgh, Pa. (C. R. Gutermuth, Wildlife Management Inst., Wire Bldg., Washington, D.C.) 14-20. Obstetrics and Gynecology, 8th

Australian congr., Hobart. (J. F. Correy, 173 Macquaire St., Hobart)

14-6 May. Extraordinary Administrative Aeronautical Radio Conf., 2nd session, Geneva, Switzerland. (Intern. Telecommunication Union, Place des Nations, Geneva)

15-16. Flame Resistant Polymers, conf., London, England. (Secretary, Plastics Inst., 6 Mandeville Pl., London, W.1)

15-18. Optical Soc. of America, spring mtg., Washington, D.C. (M. E. Warga, 1155 16th St., NW, Washington, D.C. 20006)

17-19. Isobaric Spin in Nuclear Physics, intern. conf., Florida State Univ., Tallahassee. (D. Robson, Dept. of Physics, Florida State Univ., Tallahassee)

18–19. Rural Health, conf., Colorado Springs, Colo. (B. L. Bible, 535 N. Dearborn St., Chicago, Ill. 60610)

18-20. American **Psychosomatic** Soc. annual mtg., Chicago, Ill. (W. A. Greene, The Society, 265 Nassau Rd., Roosevelt, N.Y. 11575)

20-23. Solar Energy Soc., 2nd annual mtg., Boston, Mass. (F. Edlin, Arizona State Univ., Tempe 85281)

21-24. Aerospace Instrumentation, 4th intern. symp., College of Aeronautics, 18 FEBRUARY 1966

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Cranfield, England. (E. K. Merewether, ISA Aerospace Industry Div., 4515 Canoga Ave., Woodland Hills, Calif.)

21-25. Institute of Electrical and Electronics Engineers, intern. conv., New York, N.Y. (IEEE, 345 E. 47 St., New York)

22-23. **Biomagnetics**, 3rd intern. symp., Univ. of Illinois, Chicago. (M. F. Barnothy, Univ. of Illinois, 833 S. Wood St., Chicago)

22-23. Modern Concepts of Cardiovascular Diseases. conf. and workshop, Reno, Nev. (G. T. Smith, Laboratory of Patho-Physiology, Univ. of Nevada. Reno 89507)

22-24. Measurement and Applications of Neutron Cross Sections, conf., Washington, D.C. (W. W. Havens, Dept. of Physics, Columbia Univ., 538 W. 120 St., New York 10027)

22-31. American Chemical Soc., spring mtg., Pittsburgh, Pa. (ACS, 1155 16th St., NW, Washington, D.C.) 23-25. Institute of Mathematical Sta-

23-25. Institute of Mathematical Statistics, Purdue Univ., Lafayette, Ind. (G. E. Nicholson, Jr., Univ. of North Carolina, Chapel Hill).

23-25. Modern Methods of Weather Forecasting and Analysis. Chicago, Ill. (J. R. Fulks, U.S. Weather Bureau, 5730 S. Woodlawn Ave., Chicago)

24-26. Biomathematics and Computer Science in the Life Sciences, symp., Houston, Tex. (Dean, Div. of Continuing Education, Univ. of Texas Graduate School of Biomedical Sciences, Texas Medical Center, Houston 77025)

24-26. Pediatric and Adolescent Gynecology, conf., New York Acad. of Sciences, New York. (W. R. Lang, Jefferson Medical College of Philadelphia, 1025 Walnut St., Philadelphia, Pa.)

24-26. Pollution and Marine Ecology, conf., Galveston, Tex. (S. M. Ray, Texas A&M Univ. Marine Laboratory, Galveston 77550)

24–27. International Assoc. for **Dental Research**, 44th general mtg., Miami, Fla. (G. H. Rovelstad, U.S. Navy Dental School, Natl. Naval Medical Center, Bethesda, Md. 20014)

25-26. National Assoc. of **Biology Teachers**, western regional conv., Los Angeles, Calif. (The Association, Professional Building, Great Falls, Mont.)

26-2. Stress Analysis, 3rd intern. conf., Berlin, Germany. (H. Kotthaus, Verein Deutscher Ingenieure, Prinz-Georg Str. 77/79, 4 Düsseldorf 10)

26-27. Arizona Chest Disease Symp., Tucson. (E. A. Oppenheimer, P.O. Box 6067, Tucson 85716)

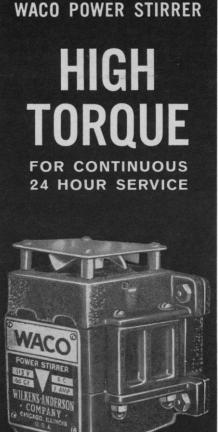
27-30. American Assoc. of **Dental** Schools, Miami Beach, Fla. (R. Sullens, 840 N. Lake Shore Dr., Chicago, Ill.)

28-30. Great Lakes Research, 9th conf., Chicago, Ill. (B. M. McCormac, IIT Research Inst., 10 W. 35 St., Chicago 60616)

28-31. Collegium Intern. Neuro-Psychopharmacologicum, 5th biennial mtg., Washington, D.C. (M. K. Taylor, 3636 16th St., NW, Washington 20010)

29-31. Airborne Infection, 2nd intern. conf., Illinois Inst. of Technology, Chicago. (E. K. Wolfe, U.S. Army Biological Laboratories, Fort Detrick, Frederick, Md.)

29-31. Applied Meteorology, 6th natl. conf., Los Angeles, Calif. (B. N. Charles, Booz-Allen Applied Research, 6151 W. Century Blvd., Los Angeles 90045)



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29-31. Chemical Soc., anniversary mtgs., Oxford, England. (General Secretary, Burlington House, London W.1)

29-31. Surface-Active Substances, intern. conf., Berlin, East Germany. (Inst. für Fettchemie, Deutsche Akademie der Wissenschaften zu Berlin, Rudower Chaussee 5, 1199 Berlin-Adlershof)

29-31. Symbolic and Algebraic Manipulation, symp., Assoc. for Computing Machinery, Washington, D.C. (J. E. Sammet, I.B.M. Corp., 545 Technology Sq., Cambridge, Mass. 02139)

29-1. American Assoc. for Contamination Control, 5th annual technical mtg., Houston, Tex. (W. T. Maloney, The Association, 6 Beacon St., Boston, Mass. 02108)

29-1. Ultraviolet and X-ray Spectroscopy of Laboratory and Astrophysical Plasma, conf., Abingdon, England. (Inst. of Physics and the Physics Soc., 47 Belgrave Sq., London, S.W.1, England)

30. Oral Cancer, 4th symp., St. Francis Hospital, Poughkeepsie, N.Y. (M. A. Engelman, 1 E. Academy St., Wappingers Falls, N.Y.)

30-1. Magnetohydrodynamics, 7th symp., Princeton, N.J. (R. G. Jahn, Guggenheim Laboratories, Forrestal Research Center, Princeton, N.J. 08540) 31-2. Michigan Acad. of Science, Arts,

31-2. Michigan Acad. of Science, Arts, and Letters, Wayne State Univ., Detroit. (E. A. Wunsch, Dept. of English, Univ. of Michigan, Ann Arbor)

#### April

1-2. Alabama Acad. of Science, Birmingham-Southern College, Birmingham. (W. B. DeVall, Dept. of Forestry, Auburn Univ., Auburn, Ala.)

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tice, Boston, Mass. (M. F. Cahal, Volker Blvd. at Brookside, Kansas City 12, Mo.)

4-6. Atomic Energy Soc. of Japan, annual mtg., Tokyo. (M. Masamoto, Japan Atomic Energy Research Inst., 1-1, Shibatamura-cho, Minato-ku, Tokyo)

4-6. Exobiology, conf., Ames Research Center, Moffett Field, Calif. (Letters and Science Extension, Univ. of California, Berkeley 94720)

4-6. American Assoc. of **Physical Anthropologists**, Berkeley, Calif. (F. E. Johnston, Dept. of Anthropology, Univ. of Pennsylvania, Philadelphia 19104)

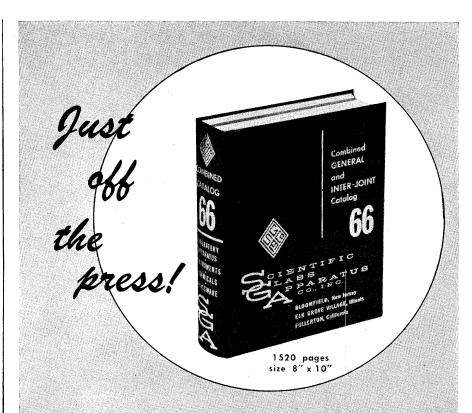
4-7. Federation of European **Biochem**ical Soc., 3rd mtg., Warsaw, Poland. (T. Klopotowski, Polish Biochemical Soc., Freta 16, Warsaw)

4–7. Advances in Water Quality Improvement, conf., Univ. of Texas, Austin. (Special Lecture Series, Engineering Laboratories Bldg. 305, Univ. of Texas, Austin 78712)

4-8. International **Biological Program**, 2nd general assembly, Paris, France. (F. W. G. Baker, 2 via Sebenico, Rome, Italy)

4-10. **Psychology**, 10th inter-American congr., Lima, Peru. (Intern. Soc. of Psychology, 2104 Meadowbrook Dr., Austin, Tex.)

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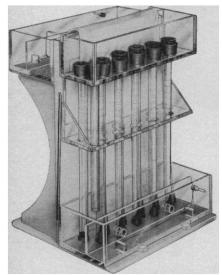


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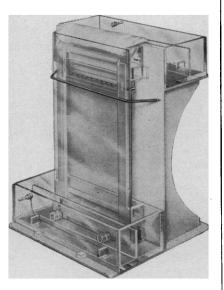
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Essentials of Earth History: An Introduction to Historical Geology. William Lee Stokes. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1966. 480 pp. Illus. \$8.95.

Estimation Theory. Ralph Deutsch. Prentice-Hall, Englewood Cliffs, N.J., 1965. 285 pp. Illus. \$13.

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Failure-Tolerant Computer Design. William H. Pierce. Academic Press, New York, 1965. 256 pp. Illus. \$8.50.

Ferromagnetism and Ferromagnetic Domains. D. J. Craik and R. S. Tebble. North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 349 pp. Illus. \$14. Volume 4 of the Series of Monographs on Selected Topics in Solid State Physics, edited by E. P. Wohlfarth.

The Fundamentals of Mathematical Analysis. vol. 2. G. M. Fikhtengol'ts. Translated from the Russian edition (Moscow, 1960) by Ann Swinfen. Ian N. Sneddon, Translation Ed. Pergamon, New York, 1965. 540 pp. Illus. \$9.50.

Fundamentals of Physics. Henry Semat. Holt, Rinehart, and Winston, New York, ed. 4, 1966. 765 pp. Illus. \$9.95.

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The Geology of Scotland. Gordon Y. Craig, Ed. Archon Books, Hamden, Conn., 1965. 572 pp. Illus. \$20. Chapters were contributed by G. Y. Craig, P. McL. D. Duff, E. H. Francis, T. N. George, A. Hallam, M. R. W. Johnson, E. L. P. Mercy, J. B. Sissons, F. H. Stewart, E. K. Walton, C. D. Waterston, and Janet Watson.

Geology of the Himalayas. Augusto Gansser. Interscience (Wiley), New York, 1964. 305 pp. Illus. Maps.

The Growth of Crystals from the Melt. J. C. Brice. North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 202 pp. Illus. \$8.50. A volume in the Series of Monographs on Selected Topics in Solid State Physics, edited by E. P. Wohlfarth.

The Hydrocyclone. D. Bradley. Pergamon, New York, 1966. 346 pp. Illus. \$20. Monographs in Chemical Engineering.

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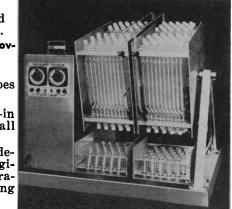


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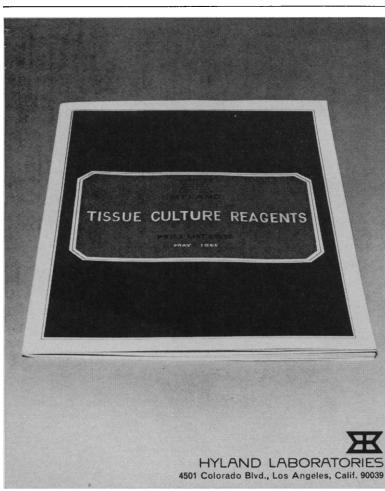
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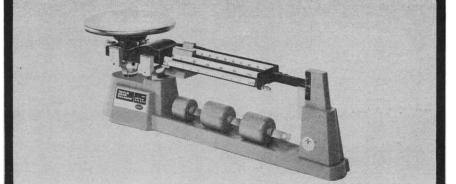
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Industrial Stroboscopy. Gilbert Kivenson. Hayden, New York, 1965. 292 pp. Illus. \$9.95.

Integral Transforms and Operational Calculus. V. A. Ditkin and A. P. Prudnikov. Translated from the Russian edition (Moscow, 1961) by D. E. Brown. Ian N. Sneddon, Translation Ed. Pergamon, New York, 1965. 541 pp. Illus. \$15.50. International Series of Monographs in Pure and Applied Mathematics, vol. 78.

Interpretive Spectroscopy. Stanley K. Freeman, Ed. Reinhold, New York, 1965. 301 pp. Illus. \$17.50. Five papers: "Ultraviolet absorption spectroscopy" by W. F. Forbes; "Infrared absorption spectroscopy" by Maurizio Gianturco; "Far infrared spectroscopy" by James E. Stewart; "Mass spectrometry" by Henry A. Bondarovich and Stanley K. Freeman; and "Proton nuclear magnetic resonance spectroscopy" by Ajay K. Bose.

Introduction a l'Optique Corpusculaire. Noël J. Félici. Gauthier-Villars, Paris, 1965. 136 pp. Illus. Paper, F. 33. La Physique dans l'Industrie et au Laboratoire, edited by M. Louis Weil.

An Introduction to Chemical Industry. John Manning. Pergamon, New York, 1965. 282 pp. Illus. Paper. \$3.95. Commonwealth and International Library of Science.

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Introduction to General Topology. Sze-Tsen Hu. Holden-Day, San Francisco, 1966. 240 pp. Illus. \$8.50. A volume in the Holden-Day Series in Mathematics, edited by Earl A. Coddington and Andrew M. Gleason.

Investigations in the Field of Organolead Chemistry. L. C. Willemsens and G. J. M. van der Kerk. International Lead Zinc Research Organization, New York, 1965. 145 pp. Illus. Paper.

Lie Groups for Physicists. Robert Hermann. Benjamin, New York, 1966. 203 pp. Illus. \$12.50. Mathematical Physics Monograph Series, edited by A. S. Wightman.

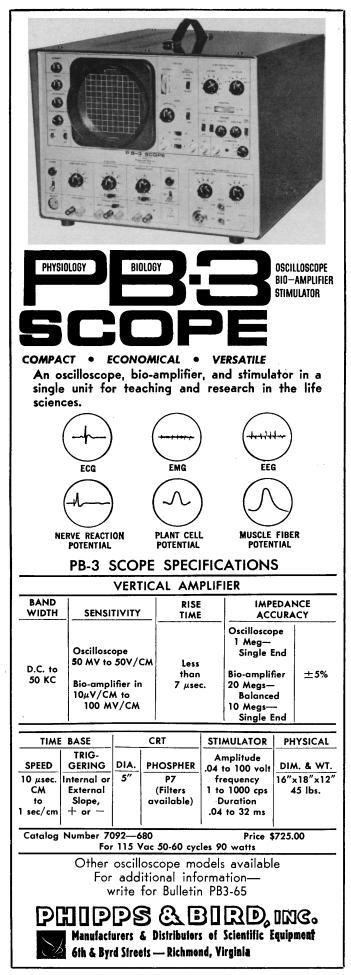
Linear Analysis of Electronic Circuits. Glenn M. Glasford. Addison-Wesley, Reading, Mass., 1966. 592 pp. Illus. \$15. Addison-Wesley Series in Electrical Engineering.

Mathematical Analysis: A Special Course. G. Ye. Shilov. Translated from the Russian edition (Moscow, 1961) by J. D. Davis. D. A. R. Wallace, Translation Ed. Pergamon, New York, 1965. 497 pp. Illus. \$13. Volume 77 of the International Series of Monographs in Pure and Applied Mathematics.

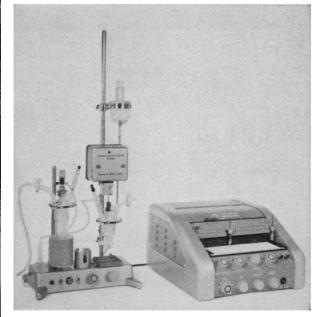
Methods of Thermodynamics. Howard Reiss. Blaisdell (Ginn), New York, 1965. 237 pp. Illus. \$8.50. A Blaisdell Book in the Pure and Applied Sciences.

Mineral Studies. E. Wm. Heinrich, Ed. Mineral Studies. E. Wm. Heinrich, Ed. Mineralogical Soc. of America, Washington, D.C., 1965. 305 pp. Illus. Paper, \$3.25. Twenty-one papers. The volume is dedicated to Paul Francis Kerr on the occasion of his retirement.

Molecular Symmetry: An Introduction to Group Theory and Its Uses in Chemistry. David S. Schonland. Van Nostrand,



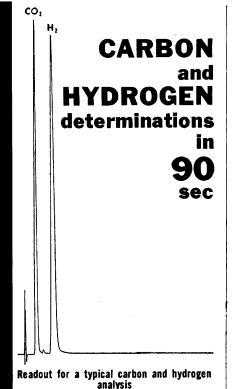
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cules. Richard Stevenson. Saunders, Philadelphia, 1965. 200 pp. Illus. \$5.75. Studies in Physics and Chemistry Series.

Newer Redox Titrants. A. Berka, J. Vulterin, and J. Zyka. Translated by H. Weisz. Pergamon, New York, 1965. 255 pp. Illus. \$10.

Nonclassical Ions. Reprints and commentary. Paul D. Bartlett. Benjamin, New York, 1965. 573 pp. Illus. Paper, \$6.95; cloth, \$12. This volume, which is published in the Frontiers in Chemistry Series, edited by Ronald Breslow and Martin Karplus, contains 75 papers, reprinted from various journals, and published during the years 1937 to 1964.

Non-Linear Transformations of Stochastic Processes. P. I. Kuznetsov, R. L. Stratonovich, and V. I. Tikhonov, Eds. Translated by O. M. Blunn. J. Wise and D. C. Cooper, Translation Eds. Pergamon, New York, 1965. 496 pp. Illus. \$20. Thirty-nine papers: Some Problems of the Theory of Stochastic Processes (7 papers); The Effect of Noise on Certain Non-Linear Elements (8 papers); The Effect of Fluctuations on Oscillator Operation (12 papers); Random Function Excursions (6 papers); and Optimum Filtration (6 papers).

Numerical Mathematics. Jerome C. R. Li. Edwards, Ann Arbor, Mich., 1966. 657 pp. Illus. \$10.

**Open Channel Flow.** F. M. Henderson. Macmillan, New York, 1966. 544 pp. Illus. \$14.95. Macmillan Series in Civil Engineering, edited by Gene Nordby.

**Petrogenesis of Metamorphic Rocks.** Helmut G. F. Winkler. Translated from the German by N. D. Chatterjee and E. Froese. Springer-Verlag, New York, 1965. 220 pp. Illus. Paper, \$4.95.

**Physical Acoustics: Principles and Meth**ods. vol. 3, pt. B, Lattice Dynamics. Warren P. Mason, Ed. Academic Press, New York, 1965. 356 pp. Illus. \$12. Seven papers: "Use of sound velocity measurements in determining the Debye temperature of solids" by George A. Alers; "Determination and some uses of isotropic elastic constants of polycrystalline aggregates using single-crystal data" by O. L. Anderson; "The effect of light on the mechanical properties of alkali halide crystals" by Robert B. Gordon; "Magnetoelastic interactions in ferromagnetic in-sulators" by R. C. LeCraw and R. L. Comstock; "Effect of thermal and phonon processes on ultrasonic attenuation" by P. G. Klemens; "Effect of impurities and phonon processes on the ultrasonic attenuation of germanium, crystal quartz, and silicon" by Warren P. Mason; and "At-tenuation of elastic waves in the earth" by L. Knopoff.

**Plastic Analysis and Design.** vol. 1, *Beams and Frames.* C. E. Massonnet and M. A. Save. Translated from the French. Blaisdell (Ginn), New York, 1965. 393 pp. Illus. \$10.50.

**Potential Scattering**. V. DeAlfaro and T. Regge. North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 215 pp. Illus. \$8.

**Preparations** of Metals for Painting. Samuel Spring. Reinhold, New York, 1965. 326 pp. Illus. \$12.

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N. Matveyev. Translated from the Russian. Leon F. Landovitz, Translation Ed. Reinhold, New York, 1966. 429 pp. Illus. \$12.50.

**Problems in Undergraduate Physics.** vol. 2, *Electricity and Magnetism.* S. P. Strelkov, I. A. El'tsin, and S. E. Khaikin. Translated from the third Russian edition (Moscow, 1964) by D. E. Brown. D. ter Haar, Translation Ed. Pergamon, New York, 1965. 212 pp. Illus. \$5.50. **Problems in Undergraduate Physics**.

**Problems in Undergraduate Physics.** vol. 4, Molecular Physics, Thermodynamics, Atomic and Nuclear Physics. V. L. Ginzburg, L. M. Levin, M. S. Rabinovich, and D. V. Sivukhin. Translated from the revised Russian edition (Moscow, 1960) by D. E. Brown. D. ter Haar, Translation Ed. Pergamon, New York, 1965. 244 pp. Illus. \$5.50.

**Programming, Games, and Transporta**tion Networks. Claude Berge and A. Ghouila-Houri. Translated from the French edition (Paris, 1962) by Maxine Merrington and C. Ramanujacharyulu. Methuen, London; Wiley, New York, 1965. 270 pp. Illus. \$8.75.

Radiative Contributions to Energy and Momentum Transport in a Gas. Douglas H. Sampson. Interscience (Wiley), New York, 1965. 194 pp. Illus. \$8.50. Interscience Tracts on Physics and Astronomy, vol. 26, edited by R. E. Marshak. Rolling Mills. A. I. Tselikov and V. V.

Rolling Mills. A. I. Tselikov and V. V. Smirnov. Translated from the Russian edition by M. H. T. Alford. W. J. McG. Tegart, Translation Ed. Pergamon, New York, 1965. 415 pp. Illus. \$25.

Semiconductor Surfaces A. Many, Y. Goldstein, and N. B. Grover. North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 512 pp. Illus. \$17.50. Sound Control and Thermal Insulation

Sound Control and Thermal Insulation of Buildings. Paul Dunham Close. Reinhold, New York, 1966. 510 pp. Illus. \$17.

**Space Communications Techniques.** Richard F. Filipowsky and Eugen I. Muehldorf. Prentice-Hall, Englewood Cliffs, N.J., 1965. 351 pp. Illus. \$11.95. Space Technology Series, edited by C. W. Besserer and Floyd E. Nixon.

Structural and Tectonic Principles. Peter C. Badgley. Harper and Row, New York, 1965. 541 pp. Illus. \$13.95.

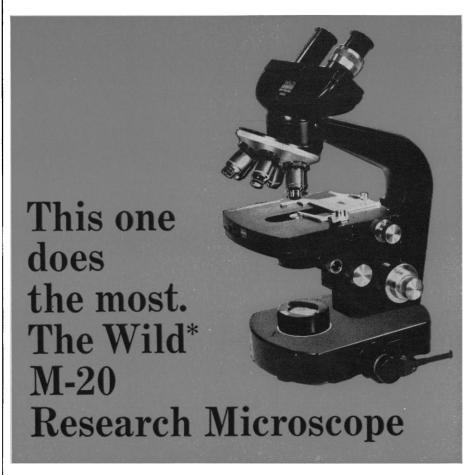
The Structure of Small Molecules. W. J. Orville-Thomas. Elsevier, New York, 1966. 199 pp. Illus. \$9.50. Principles of Modern Chemistry: A Guide to Advanced Study Series, vol. 1, edited by W. F. Forbes and W. J. Orville-Thomas.

Symbolic Logic and the Real Number System: An Introduction to the Foundations of Number Systems. A. H. Lightstone. Harper and Row, New York, 1965. 237 pp. Illus. \$7.50. Harper's Series in Modern Mathematics, edited by I. N. Herstein and Gian-Carlo Rota.

Tables of Generalized Airy Functions for the Asymptotic Solution of the Differential Equations  $(py')' + (q^{*er})y=f$ . L. N. Nosova and S. A. Tumarkin. Translated from the Russian edition (Moscow, 1961) by D. E. Brown. Pergamon, New York, 1965. 123 pp. Illus. \$5.

York, 1965. 123 pp. Illus. \$5.
The Theory of Stochastic Processes. D.
R. Cox and H. D. Miller. Wiley, New York, 1965. 408 pp. Illus. \$11.50.
Traité de Tectonique. Jean Goguel. Masson Baris ed 2 1065 462 nr Hus E 62

Traité de Tectonique. Jean Goguel. Masson, Paris, ed. 2, 1965. 463 pp. Illus. F. 68. 18 FEBRUARY 1966 Some things any optical microscope can do. Other things some can do. A few things a few can do.



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## **Inorganic Chemistry**

*By* C. S. G. PHILLIPS, *and* R. J. P. WIL-LIAMS, both of Oxford University Volume I 1965 704 pp. illus. \$8.00 Volume II April 1966 700 pp. illus. \$8.00

## The Second Law:

An Introduction to Classical and Statistical Thermodynamics By HENRY A. BENT, University of Minnesota 1965 450 pp. 70 line drawings \$6.00

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## NEWS AND COMMENT

(Continued from page 808)

\$6000 to \$11,000, depending on previous training. (H. S. Kaplan, Stanford University School of Medicine, Palo Alto, California 94304)

## **Meeting Notes**

The 2nd international **biophysics** congress will be held in Vienna, 5–9 September, sponsored by the International Organization for Pure and Applied Biophysics. Contributed papers on all areas of biophysics will be considered for presentation. Abstracts deadline: 15 May. (Secretariat, Mrs. E. Weidenhaus, Vienna Academie of Medicine, Alserstrasse 4, Vienna 9)

The American Meteorological Society will sponsor a conference on **marine meteorology**, 7–10 September, in Virginia Beach, Virginia. Papers are invited on exchange processes between atmosphere and oceans, weather systems over the oceans, oceanic physical influences, and applications of meteorology to operations in ocean areas. Abstracts: 200 words; deadline: 15 March. (J. R. Stinson, U.S. Navy Weather Research Facility, Naval Air Station, Norfolk, Virginia 23511)

A conference on **coherence and quantum optics** is scheduled at the University of Rochester, New York, 22– 24 June. Emphasis will be on statistical properties of electromagnetic fields and the interactions of fields under conditions where coherence effects play a role. The sponsors are the University, the Air Force Office of Scientific Research, and the Air Force Cambridge Research Laboratory. Abstracts: 1000 words; deadline: *10 March*. (E. Wolf, Department of Physics and Astronomy, University of Rochester, Rochester, New York 14627)

Papers are invited on fundamental and practical **applications of x-ray analysis** for a conference scheduled for 10-12 August in Denver. The sponsor is the metallurgy division of Denver Research Institute. Abstracts: 200 to 400 words, in duplicate; deadline: 11 April. Final manuscripts, in duplicate, and the author's consent to publish in the copyrighted proceedings of the conference, are required by 11 July. (Metallurgy Division, Denver Research Institute University of Denver, Colorado)

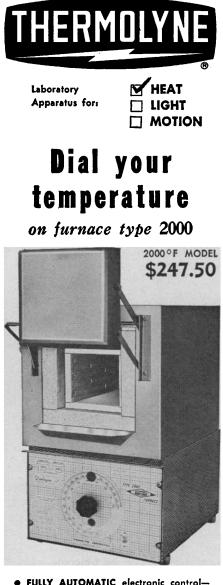
The Air Force Systems Command aerospace medical division and research and technology division will sponsor a symposium on **bionics** 3–5 May in Dayton, Ohio. Main emphasis will be on areas related to cybernetics; topics to be discussed include biological control and information-processing systems, artificial intelligence, pattern recognition, self-organizing and learning systems, and automata theory. (H. L. Oestreicher, Aerospace Medical Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433)

A symposium on **underwater physiology** will be presented 23–25 March in Washington. The program includes reports on studies of man, animals, tissues, cells, and the effects of gases under conditions encountered at depths of more than 250 feet. (K. W. Hannah, National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, D.C. 20418)

An international conference on **lens design** with large computers will be held 5-8 July in Rochester, New York. The meeting will provide opportunity to evaluate and compare the performances of various programs for large computers and to synthesize information offered by these programs concerning the physics of optical systems. Although emphasis will be on optical design with large computers, papers about work done with small machines and simple programs will also be welcome. (Institute of Optics, University of Rochester, Rochester, New York 14627)

The 1966 Laurentian Hormone conference is scheduled for 28 August to 2 September in Mont Tremblant, Quebec. The program will include sessions on thyroid physiology, steroid hormones, peptide hormones, insulin and the pancreas, and hormones and metabolism. Participation will be limited. Deadline for applications: 20 April. (J. Sanford, 222 Maple Avenue, Shrewsbury, Massachusetts 01545)

North Dakota State University, Fargo, will present a research conference on the **biological sciences**, 31 March to 1 April. The meeting will be cosponsored by AIBS. Topics to be covered will include the probability of life in outer space, protein nutrition, environmental research problems, radiation biology, and bionics. (K. L. Larson, Department of Agronomy, North Dakota State University, Fargo)



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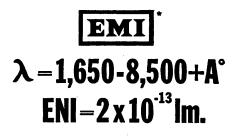
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### **Publications**

The Engineering Manpower Commission has published the results of a survey of engineering students who graduated from college in 1965. The information was gleaned from questionnaires, completed by the placement directors of 186 engineering schools, regarding some 20,000 graduates. The survey indicates that the demand for new engineering graduates is high; some 87 percent had definite educational, job, or military commitments by graduation. About one of every four for whom information was available is going to graduate school; and salaries for those who accepted jobs averages \$634 a month, 31/2 percent higher than for 1964 graduates. (The Placement of Engineering Graduates 1965. Engineering Manpower Commission of Engineers Joint Council, Department P, 345 East 47th Street, New York 10017. \$1)

A base map of the Atlantic Continental Shelf and Slope has been published by the U.S. Geological Survey to help geologists record data from submerged lands. It incorporates more than 1.8 million soundings showing the topography of the ocean floor from Nova Scotia to Florida at a scale of 1 inch to 16 miles. The map was compiled from U.S. and Canadian data, supplemented with data collected by a team aboard the research vessel Gosnold during several cruises. The map is divided into three sheets which can be joined to form a single map. (Map Showing Relation of Land and Submarine Topography; miscellaneous map I-451. U.S.G.S., Washington, D.C. 20242; \$1.50 set)

A recent NSF publication discusses the numbers of scientists and engineers who immigrated to the United States during fiscal years 1962 and 1963. The report says that the majority came from the United Kingdom, Canada, and Germany, and that 7000 of 10,000 were engineers. The report also includes information on the migration of scientists and engineers prior to their immigration to the U.S. Data are based on special tabulations prepared for NSF by the Immigration and Naturalization Service. (Scientists and Engineers from Abroad, Fiscal Years 1962 and 1963, Reviews of Data on Science Resources. Vol. 1. Number 5. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402; 5 cents)





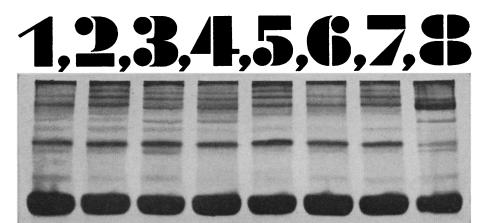
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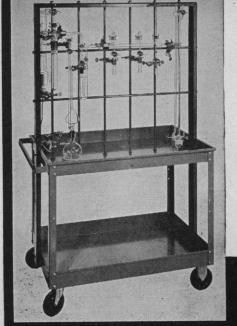
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#### Scientists in the News

Atomic Energy Commission chairman **Glenn T. Seaborg** has been awarded the 1966 Gibbs medal of the Chicago section of the American Chemical Society. The award was given to Seaborg for his outstanding contributions to pure and applied chemistry and for contributions to scientific and academic administration and to government service.

The new Home Secretary of the National Academy of Sciences is Merle A. Tuve, director of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

South Dakota State University appointed **Duane Acker** dean of the college of agriculture and biological sciences, effective 1 February. He was associate dean of agriculture at Kansas State University.

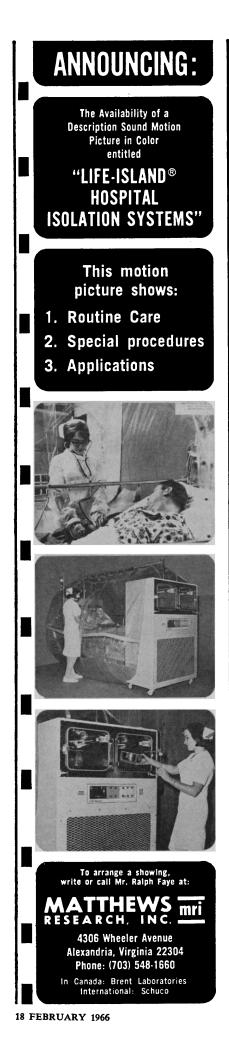
Edmund S. Nasset, professor emeritus of physiology at the University of Rochester, has become visiting professor of physiology at George Washington University medical school, Washington. The appointment will last through August.

**Ralph E. Knutti,** who retired last July as director of the National Heart Institute, has been appointed executive officer of Universities Associated for Research and Education in Pathology, an organization formed recently to encourage cooperation in that field among universities and other scientific institutions. The association's headquarters is 9650 Rockville Pike, Bethesda, Maryland.

**Peyton Rous** of New York City, a pioneer American researcher in the field of cancer, was named the main recipient of Germany's highest medical award—the Paul Ehrlich and Ludwig Darmstaedter prize. Rous, 86, a member emeritus of The Rockefeller University in New York, will receive the award in ceremonies in Frankfurt in March.

John A. Saxton, director of the United Kingdom Scientific Mission and scientific counsellor at the British Embassy in Washington, will return to England this spring to become director of the Radio and Space Research Station of the Science Research Council, in Slough.

SUBSIDIARY



Piet C. Gugelot, director of the Institute for Nuclear Physics, Amsterdam, Netherlands, has been named scientific director of NASA's Space Radiation Effects Laboratory, Newport News, Virginia, effective 1 January. Virginia Associated Research Center operates the laboratory under contract with NASA Langley Research Center.

Victor H. Weisskopf has returned to his position as Institute professor of physics at MIT, after a 5 years' leave of absence during which he was director general and scientific director of the European Organization for Nuclear Research (CERN), Geneva, Switzerland. He will be succeeded at CERN by Bernard Gregory of France, who has been a directorate member for research.

**Robert C. Seamans, Jr.** has been appointed as deputy administrator of NASA. He will retain his position as associate administrator for an indefinite period.

#### **Recent Deaths**

Saul Adler, 71; head of the parasitology department of Hebrew University, Jerusalem; 25 January.

**Dirk Brouwer**, 63; Munson professor of natural philosophy and astronomy at Yale University and director of the Yale Observatory; 31 January.

Harold C. M. Case, 75; retired professor and head of the department of agricultural economics at the University of Illinois; 3 January.

Israel L. Chaikoff, 63; professor of physiology and formerly co-chairman of the department, University of California, Berkeley; 25 January.

Ellsworth C. Dougherty, 44; lecturer in comparative nutrition and a specialist at the agricultural experiment station at the University of California, Berkeley; 21 December.

George Wicker Elderkin, 86; professor emeritus of art and archeology at Princeton University; 19 December.

**Clarence B. Hilberry**; president emeritus of Wayne State University; 10 January.

G. Albert Hill, 73; former professor of chemistry at Wesleyan University; 28 December.

**Robert Hodes**, 51; professor of physiology at Mount Sinai medical school; 27 January.

Albert W. Hull, 85; retired assistant director of the General Electric Research Laboratory; 22 January.

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