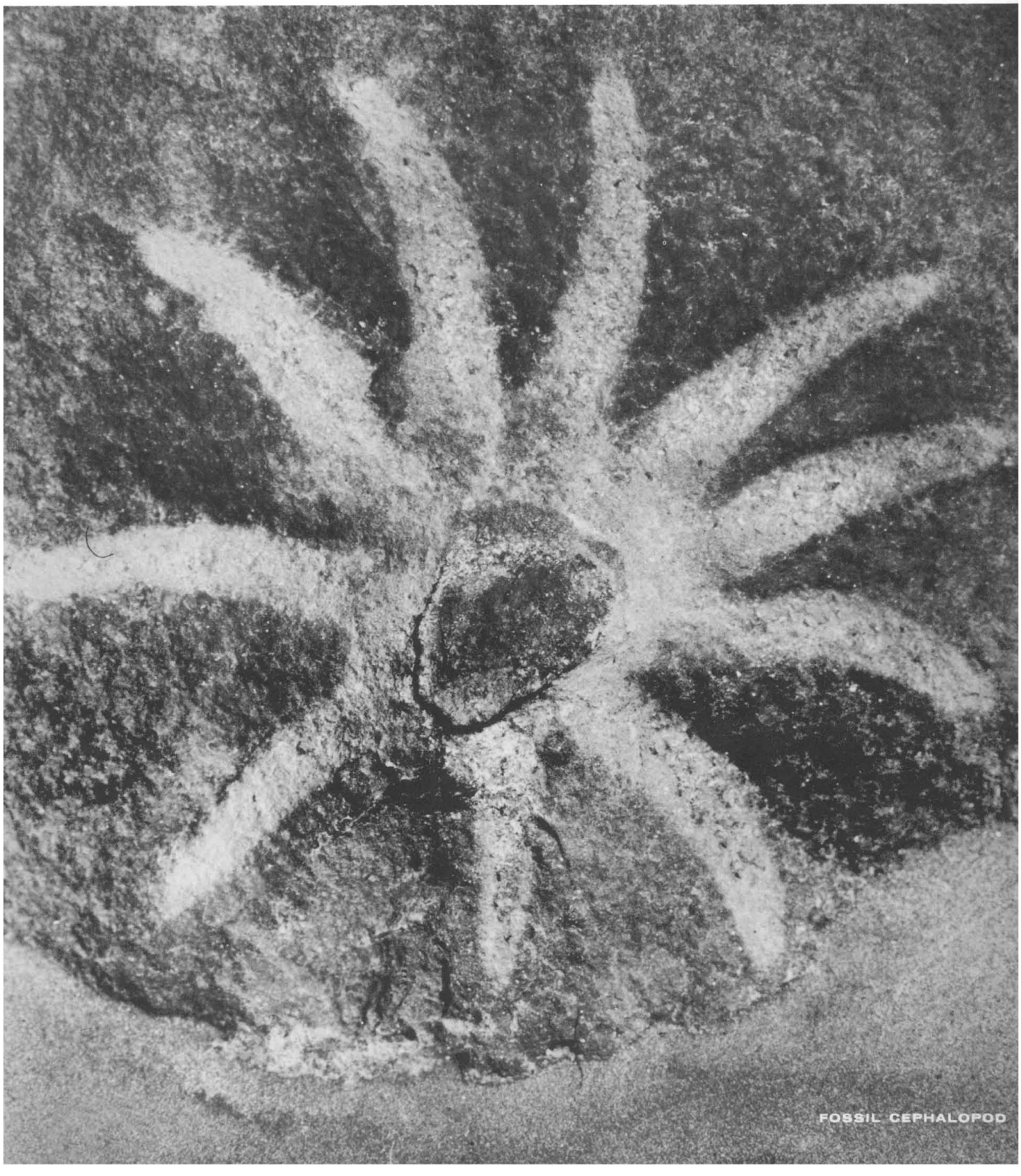
SCIENCE

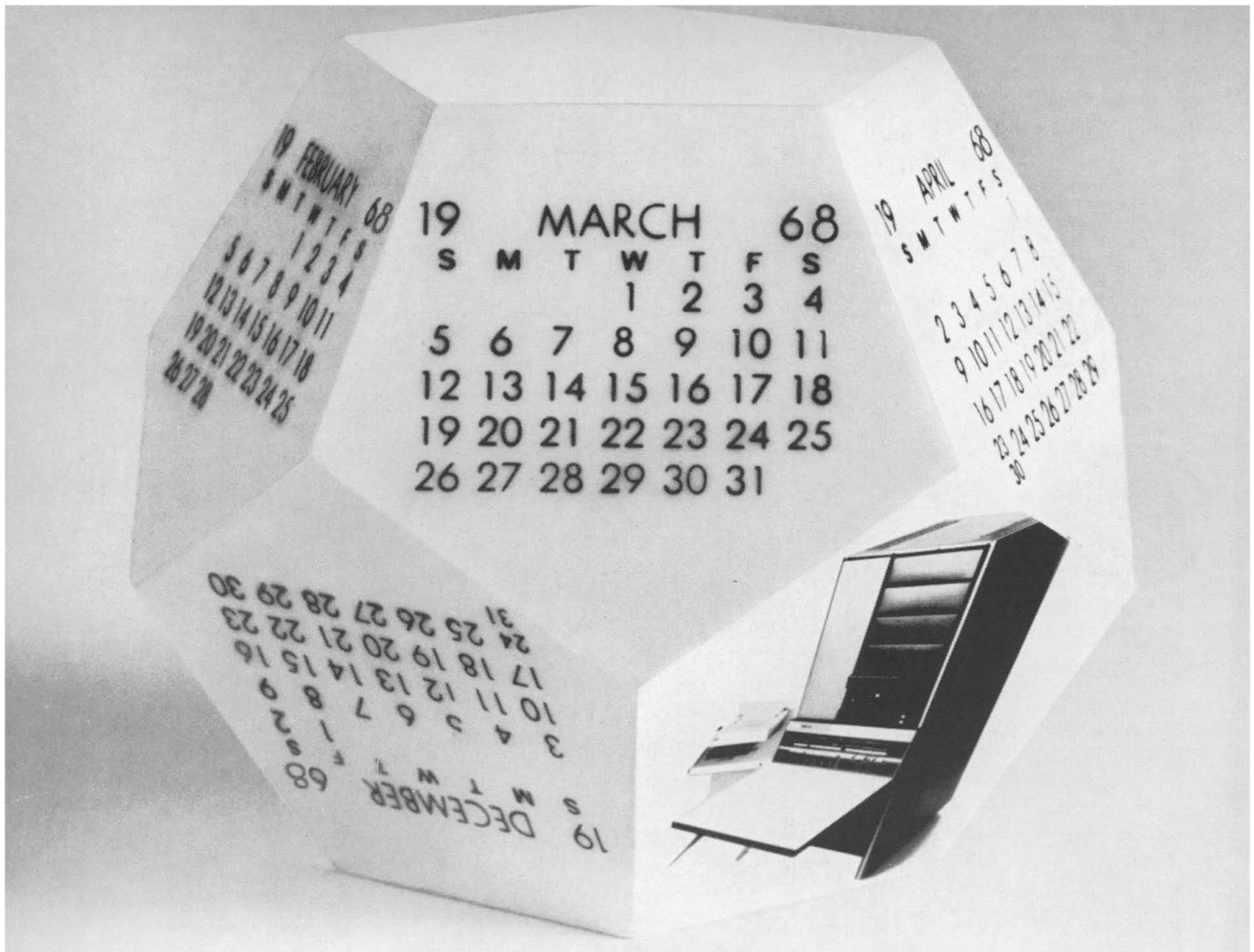
2 February 1968

Vol. 159, No. 3814

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



FOSSIL CEPHALOPOD



We'll deliver a PDP-9 computer in 90 days. Seriously.

Ninety day delivery for a computer with the power of the PDP-9 may be another industry first. Ninety days for hardware and software. Complete. Ready to use.

And not just any computer. PDP-9 is the hottest on-line computer in its class, by far. Since its introduction a year ago, it has outsold and outperformed all other computers in its price range, all others with similar word lengths, all others with comparable memory. Backlog is higher than ever, but now, so are the production schedules.

8K core memory, 1 usec, expandable to 32K. 18 bit word. 200 nanosec adder. High speed control memory. Real time clock. Optional parity bit and power failure protection. Its standard configuration offers 3 types of I-O facilities, high speed paper tape reader and punch — and teletype.

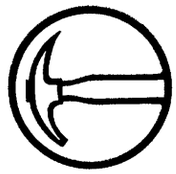
With the PDP-9 ADVANCED System Software package, you can program real-time data collection and complex analysis in FORTRAN IV or macro assembly language. Both languages produce compatible and relocatable object codes. You can call MACRO-9 subroutines from the FORTRAN programs and vice versa. There are two monitors, an I-O programming system, a peripheral interchange program, a debugging system, an editor, and a relocating link loader.

In 90 days from receipt of order. Maybe sooner.

digital
COMPUTERS · MODULES

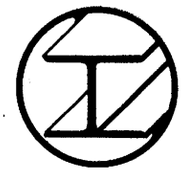
DIGITAL EQUIPMENT CORPORATION, Maynard, Massachusetts 01754. Telephone: (617) 897-8821 • Cambridge, Mass. • New Haven • Washington, D.C. • Parsippany, N.J. • Princeton, N.J. • Rochester, N.Y. • Long Island, N.Y. • Philadelphia • Huntsville • Pittsburgh • Chicago • Denver • Ann Arbor • Houston • Albuquerque • Los Angeles • Palo Alto • Seattle • Carleton Place and Toronto, Ont. • Montreal, Quebec • Reading and Manchester, England • Paris, France • Munich and Cologne, Germany • Oslo, Norway • Stockholm, Sweden • Sydney and West Perth, Australia • Modules distributed also through Allied Radio

AGRICULTURAL
Na–.00032
K–.0007
Ca–.0001
Mg–.000025

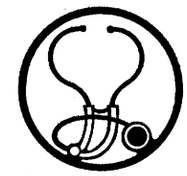


GEOLOGICAL
Au–.0035
Ag–.0010
Te–.015
Pt–.032

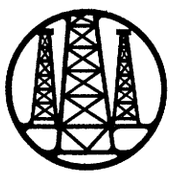
POLLUTION
Zn–.00035
Cr–.00030
Ni–.0050
As–.4



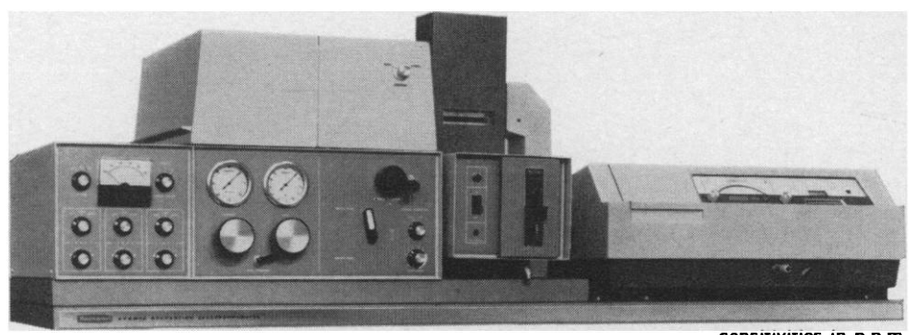
METALLURGICAL
Ni–.0050
Sn–.25
Al–.12
Tr–.012



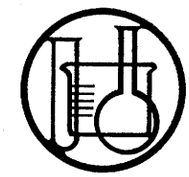
CLINICAL/MEDICAL
Ca–.0001
Fe–.0011
Li–.001
Zn–.00035



PETROLEUM
Fe–.0011
Ni–.0050
Pb–.012
V–.025
Cu–.00030



sensitivities in p.p.m.



CHEMICAL
Cr–.00030
Mn–.00015
Ni–.0050
Si–.050
Te–.015

Talk about sensitivity!

This will test your metal to the limits of Atomic Absorption today: Beckman's multi-purpose, completely automated Model 979 AA Spectrophotometer. Check its detection limits for your area of application. Then make us prove it.

Get the facts from AA to Z–our sales representative will be glad to tell you about the "sensitivity gap" between Beckman and others. Ask him about the exclusive Laminar Flow Burner that permits the Model 979 to deliver 5 to 20 times greater sensitivity *in your field of inquiry* than any comparable instrument. Ask him where your area of application fits into the 979's wide wavelength range of from 190-770 mμ (190-852 mμ optional). Have him show you how our precision optical system can assure you the accuracy you need to resolve those perplexing analytical problems. And don't forget to pin down your Beckman man on the automation question. Make him show you how the Automated Sample Changer can hasten your analytical determinations without sacrificing accuracy. Here's a real toughy to close with–ask our man to explain what our instrument is doing in so many different fields of inquiry.

Go ahead, ask him–our instruments are sensitive, but our salesmen aren't! For openers, write for Data File 501 H.

The people out front in background and back-up...

Beckman

INSTRUMENTS, INC.
SCIENTIFIC INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA • 92634

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

2 February 1968
Vol. 159, No. 3814

SCIENCE

LETTERS Obstacles to Population Control: *A. J. Jaffe; A. Sweezy; K. Davis*; Malononitrile Is Toxic: *R. Henderson*; Curator Coates: *R. T. Cox*; Early Days at Woods Hole: *D. J. Zinn; R. W. Dexter*; Parkinsonia Rampant: *S. A. Hoenig* 481

EDITORIAL Science Policy Confrontation 487

ARTICLES Ionospheric Composition and Reactions: *T. M. Donahue* 489

Biosynthesis of Surface Lipids: *P. E. Kolattukudy* 498

Public Health Asks of Sociology . . . : *E. S. Rogers* 506

NEWS AND COMMENT LBJ's New Budget: Another Tight Year for Research and Development 509

Gardner's Resignation: The Crunch between Expectations and Resources 511

International Cancer Research: New Horizons for Epidemiology 513

BOOK REVIEWS *The Wind and Beyond* and *The USAF Scientific Advisory Board*, reviewed by *I. B. Holley, Jr.*; other reviews by *L. J. Cole, P. B. Hamilton, C. Zirkle, R. F. Flint, M. A. B. Bég*; Books Received 517

REPORTS Parametric Pumping: Separation of Mixture of Toluene and *n*-Heptane: *R. H. Wilhelm*, and *N. H. Sweed* 522

Kornerupine: Its Crystal Structure: *P. B. Moore* and *J. M. Bennett* 524

Ten-Armed Fossil Cephalopod from the Pennsylvanian of Illinois: *R. G. Johnson* and *E. S. Richardson, Jr.* 526

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

Solid-State Energy-Dispersion Spectrometer for Electron-Microprobe X-ray Analysis: *R. Fitzgerald, K. Keil, K. F. J. Heinrich* 528

Superconductivity and Antiferromagnetism in Boron-Rich Lattices: *B. T. Matthias* et al. 530

Osmotic Pools in *Escherichia coli*: *D. Rogers* 531

Lipoperoxidation of Lung Lipids in Rats Exposed to Nitrogen Dioxide: *H. V. Thomas, P. K. Mueller, R. L. Lyman* 532

Circadian Oscillation Controlling Hatching: Its Ontogeny During Embryogenesis of a Moth: *D. H. Minis* and *C. S. Pittendrigh* 534

Vascular Smooth Muscle: Quantitation of Cell Thickness in the Wall of Arterioles in the Living Animal in situ: *S. Baez* 536

Morphogenetic Interaction of Presumptive Neural and Mesodermal Cells Mixed in Different Ratios: *S. Toivonen* and *L. Saxen* 539

Phytostat for Continuous Culture and Automatic Sampling of Plant-Cell Suspensions: *R. A. Miller* et al. 540

Interferon: Production by Chick Erythrocytes Activated by Cell Fusion: *M. A. Guggenheim, R. M. Friedman, A. S. Rabson* 542

Anhydrous Uric Acid: Nature and Occurrence of a New Form in Urinary Calculi: *R. Shirley* and *D. J. Sutor* 544

Renal Adenyl Cyclase: Anatomically Separate Sites for Parathyroid Hormone and Vasopressin: *L. R. Chase* and *G. D. Aurbach* 545

Fish: Serologic Evidence of Infection with Human Pathogens: *W. A. Janssen* and *C. D. Meyers* 547

Phenol Oxidases of a Lozenge Mutant of *Drosophila*: *E. E. Peeples, D. R. Barnett, C. P. Oliver* 548

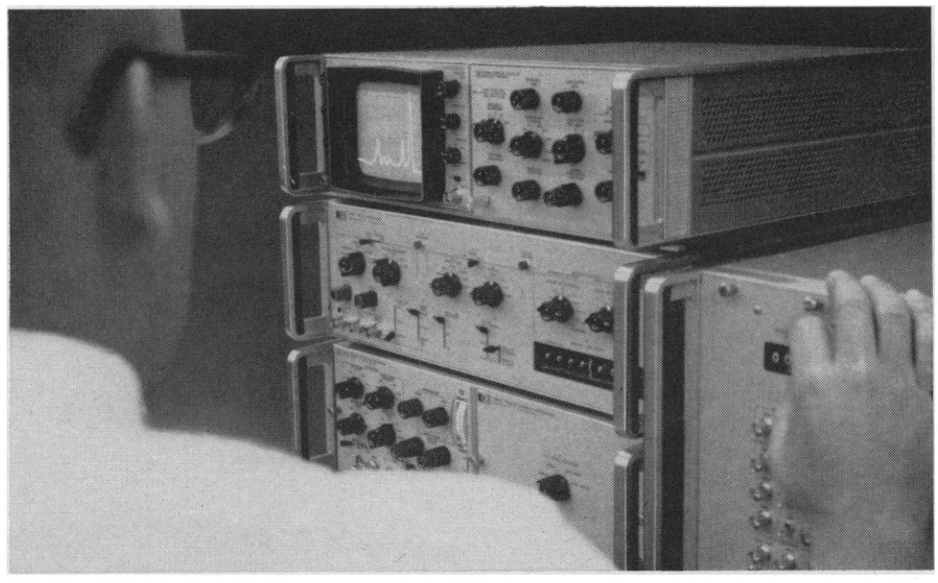
Technical Comments: Modulation of Elicited Behavior: *P. Badia, P. Lewis, R. H. Defran* 552

MEETING REPORTS Rickettsiae and Rickettsial Diseases: *E. Weiss* et al.; Calendar of Events 553

COVER

Ten-armed fossil (*Jeletzkya douglassae* Johnson & Richardson) described as the oldest known representative of an extant squid group. This fossil consists of the complete tentacular crown and a fragile shell. The arms bear hooks in double rows. Actual size: diameter of crown, 30 millimeters; length of arm, 9.5 to 10.5 millimeters. See page 526. [R. G. Johnson and Eugene S. Richardson, Jr., University of Chicago and Museum of Natural History, Chicago, Illinois]

The all-new 100 MHz ADC multichannel analyzer...



...at your service

Designed from the bench up to meet all your measurement requirements, the Hewlett-Packard 5400A Multichannel Analyzer offers unique benefits in three operating modes: Pulse Height Analysis, Sampled Voltage Analysis and Multichannel Scaling. Now you can have a multichannel analyzer whose service to you is the most complete in the industry—compact size through IC design, multi-mode versatility, unparalleled speed and accuracy for its class. Before you decide on a multichannel analyzer for your own lab projects, check these 5400A features:

- 100 MHz clock rate ADC, with dead time only 13 μsec (1024 channels), 3.4 μsec (128 channels).
- linearity, integral within 0.1% over entire range and differential within 1% over entire range.
- 100 nanosec multiple pulse resolution for the Multichannel Scaling Mode.
- complete I/O flexibility, allowing the addition of peripherals *whenever you want,* not just when purchasing your instrument. Quick-change interface cards in a unique "card cage" let you switch easily to magnetic tape readout, punched paper tape, digital printout or typewritten copy.

These, PLUS brand new ease-of-use benefits that make the 5400A the best cost-for-performance buy available: annunciator lights that tell you pertinent controls for each operational mode; analog display and analog output for an X-Y plotter as standard equipment; human-engineered thumbwheel switches for channel selection.

And topping off the benefit list is price: $9500, for 1024-word memory. ($750 less for 512-word memory.)

To find out more details about adding new capabilities to your lab, while cutting time losses and errors at the same time, call your local HP field engineer or write Jim Sheldon, Hewlett-Packard, Palo Alto, California 94304; Europe: 54 Route des Acacias, Geneva.

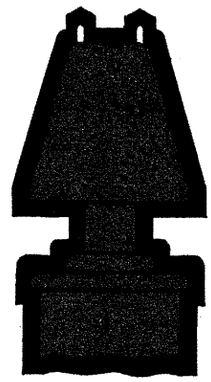
HEWLETT hp PACKARD

NUCLEAR INSTRUMENTS

02720

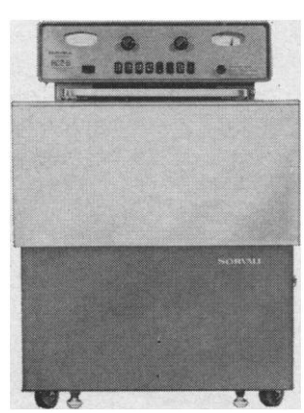
SORVALL angle and horizontal rotors come right to the point...

...ON GYRO-ACTION DIRECT DRIVE

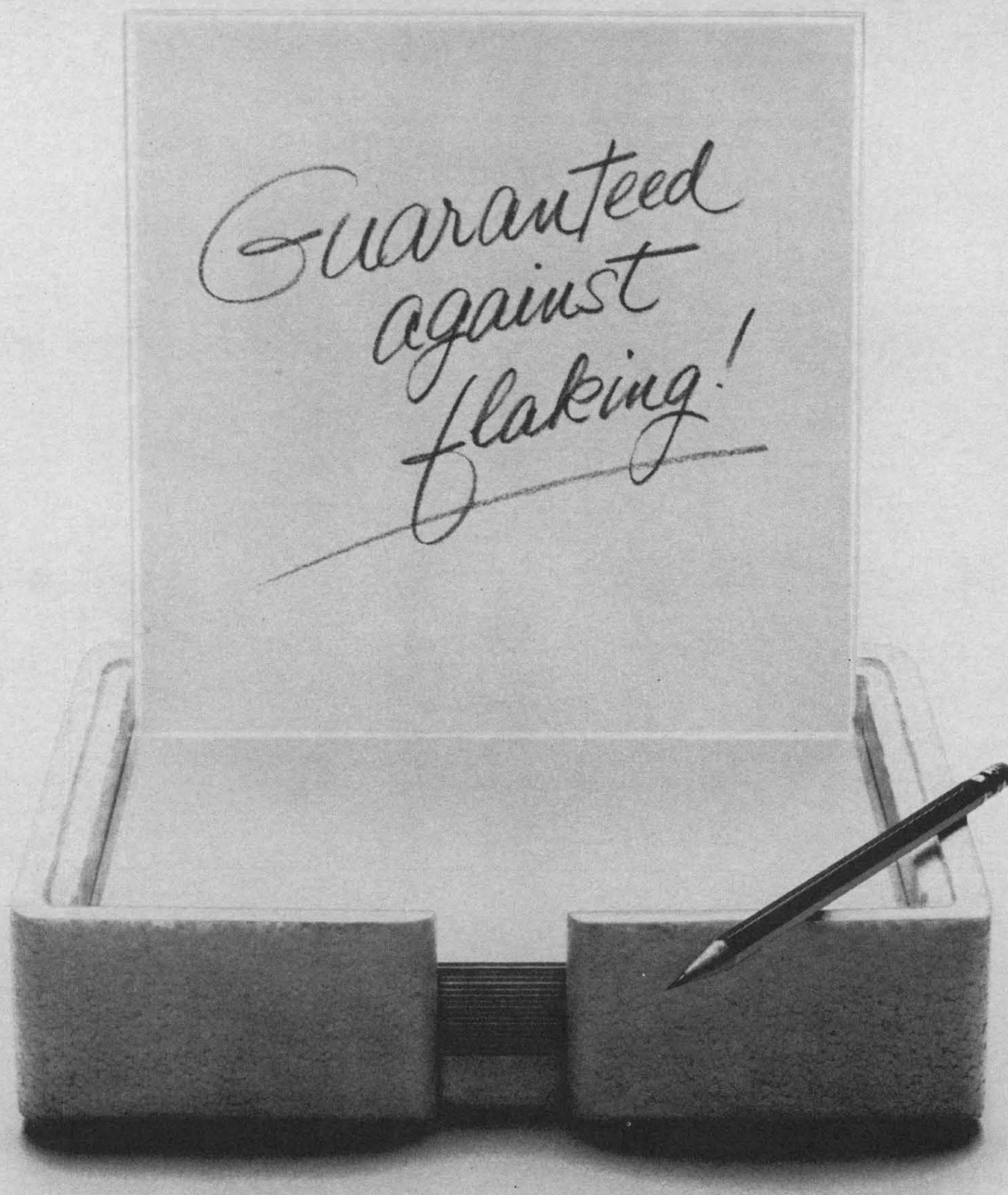


Patented, Gyro-Action Direct Drive is one of the main reasons so many researchers and technologists specify SORVALL centrifuges. This drive permits the rotor maximum freedom of action, and gives smoother acceleration, run, and deceleration, than any other drive in the low-speed to superspeed range. Precipitate resuspension problems during braking are eliminated. This drive allows for a certain margin of rotor load imbalance. Many rotor loads need only visual equalization prior to centrifugation. Rotors are merely set down onto this drive and a positive "coupling" is obtained without use of any tools. Illustrated here is the RC2-B Superspeed Automatic Refrigerated Centrifuge (49,500 x G). Other SORVALL centrifuges with this exclusive feature are SS-3 Automatic and the SS-4 Manual (34,800 x G), the RC-3 Automatic Refrigerated (6,975 x G), and the GLC-1 General-Laboratory Automatic (4,950 x G). For the many other advantages, just write: Ivan Sorvall, Inc., Norwalk, Connecticut 06852.

SORVALL®



For additional information, ask for Bulletin SC-2GRC-2



We can put that in writing, right on our TLC plates.

Most pre-coated thin-layer chromatography plates are so loose and powdery that just the slightest touch will remove their coating. That's most definitely not the case with E. Merck (Darmstadt) pre-coated plates for TLC.

Their coating is completely smooth, homogenous, and truly abrasion-resistant. They never flake or scratch. You can even write on them (as we have done above) without disturbing the coating. That's why they can be packed and shipped directly on top of each other in compact, convenient polystyrene containers. And if any TLC plate reaches you in less-than-perfect condition, we'll replace it, unconditionally.

The unique organic binder in E. Merck (Darmstadt) Analytical and Preparative plates permits the use of all conventional spray reagents, strong polar solvents, stains and charring techniques. They are available with aluminum oxide, cellulose powder and silica coatings, with or without fluorescent indicators, in sizes ranging from 5x10 cm. to 20x20 cm. Prices are the lowest of any pre-coated system currently offered. May we send you a free sample and more information?

Just write: TLC Division, Brinkmann Instruments, Cantiague Road, Westbury, New York 11590.

E. MERCK, DARMSTADT, DIVISION
BRINKMANN INSTRUMENTS

first module* of a new spectroscopy system...

the Heath "700" Scanning Monochromator... just $1195...reserve yours now!

*** others coming in '68**

- *UV-VIS Source module*
- *Sample Cell module*
- *Photomultiplier module*
- *Log-Linear Current module*
- *Photographic module*
- *Atomic Absorption/Fluorescence/ Flame Emission module*

New Design Concepts

• **Digital Operation** . . . through unique digital scanning system, wavelength drive of the "700" is easily programmed and synchronized to chart recorder.

• **Modular Versatility** . . . the "700" is one of the basic building blocks of an integrated series of modules for spectroscopic techniques . . . each features open-ended design for your modifications.

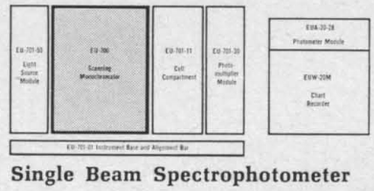
• **Optimum Performance** . . . precision where it counts in optics, mechanics, electronics . . . example: the "700" has better than one Angstrom resolution and ± one Angstrom tracking accuracy.

• **Low Cost** . . . in keeping with the Heath philosophy of optimum value, you get more performance per dollar invested.

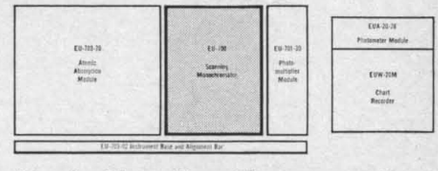
Design Features Of The Heath "700"

• **Precision Optics;** Czerny-Turner type, 350mm, f/7. Blazed 30,000 line grating, UV-VIS zero order to 10,000 Angstroms first order; ground, coated mirrors; 1 Angstrom resolution • **Electronic Scanning Control;** remote control unit; 9 fixed rates to 20 Angstroms/Sec.; variable from external sources; integrated-circuit digital pulses control wavelength drive in 0.1 Angstrom steps; bi-directional slewing at 5,000 Angstroms/min. • **Recorder Readout;** "700" synchronizing pulses electronically lock Heath Chart Recorder to wavelength drive for direct readout in Angstroms/inch, any scan rate; 12 ratios • **High Mechanical Stability;** precision base castings; tracking ± one Angstrom; exact alignment • **Variable Slit Width;** bilateral slits symmetrical to optical axis; ganged entrance and exit slits; readout directly in microns on 4-digit counter • **Purgable** with dry nitrogen; extends range below 2,000 Angstroms in UV region • **Versatile;** precision face plates each side accept sources, cell compartments, other modules • **Auxiliary Programming;** accessory limit switches can program scanning to desired ranges • **Low Cost;** cost per use ratio so low that multiple installations are easily justified; the "700" costs just $1195; accessory modules are proportionately low in cost.

Examples Of Heath's Modular Design



Single Beam Spectrophotometer



Atomic Absorption, Fluorescence & Flame Emission Spectrophotometer

The Heath "700" Monochromator is a basic module of these and a whole series of future instruments. Accessories shown will be available in 1968. The EUW-20M recorder is available now. This modular design assures research-quality performance, low cost, state-of-the-art equipment, and encourages modification to your exact needs.

RESERVE YOUR "700" NOW

Orders will be filled in sequence of reservations

Return coupon to indicate your requirements. No purchase order necessary until we have confirmed your delivery date. You may cancel your reservation if desired.

HEATH

HEATH COMPANY, Dept. 560-19
Benton Harbor, Michigan 49022

☐ Please reserve _____ Heath "700" Monochromators for earliest delivery.
(quantity)

☐ Please send free data sheets.

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Prices & specifications subject to change without notice. EK-245

the Melabs membrane osmometer

No other instrument offers as many advantages for measuring molecular weights of macromolecules: from proteins to polymers.

The new Melabs membrane osmometer is the most versatile, simple and convenient instrument ever designed for measuring osmotic pressures of solutions of large molecules (20,000 to 1,000,000 number average). No other membrane osmometer offers these advantages for biomedical and polymer applications:

☐ Simplified design for easy operation and maintenance. Melabs uses a direct-reading strain gauge detection system—eliminates servo systems and air bubbles. More compact, less complex and less trouble.

☐ Wide temperature ranges. 5° C to well over 100° C in Model CSM-2, 30° C to well over 100° C in Model CSM-1. Built-in *variable temperature control* over entire range in both instruments.

☐ Wide pressure ranges. Four selectable ranges, 0-5 cm water, 0-10 cm water, 0-50 cm water, 0-100 cm water.

☐ Performs equally well using *water* or *organic* solvents. Only stainless steel, Teflon®, and the membrane contact sample.

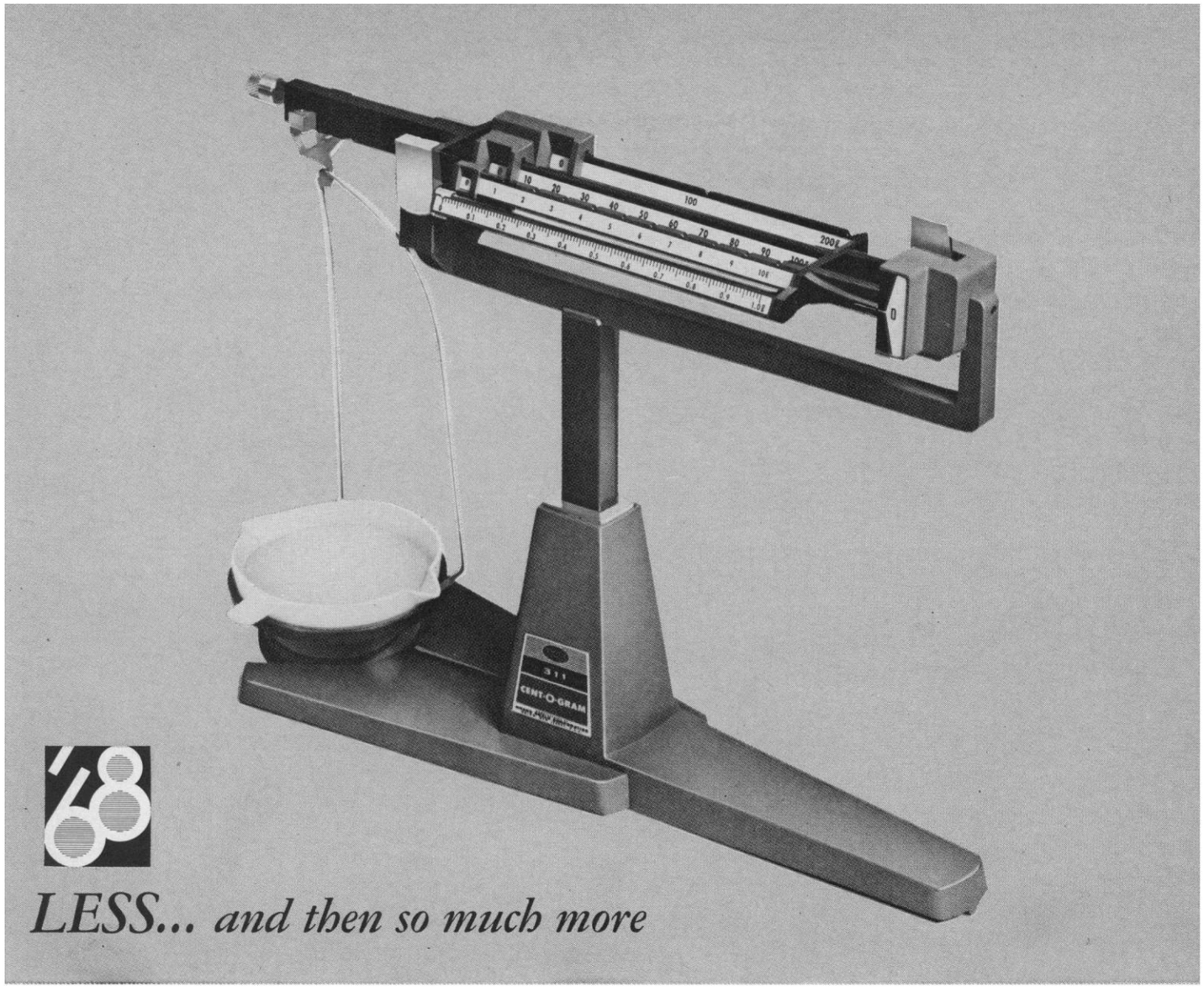
☐ Competitively priced. In most instances, Melabs osmometers will be lower-priced than comparable instrumentation.

Additional details: sample size, 0.5 ml. Response speed, 5-30 minutes. Accuracy, ±0.5% full scale, any range. Recorder output, 0-1 mv dc.

For complete information, please write to Melabs, Scientific Instruments Department, 3300 Hillview Road, Palo Alto, California.

In Europe, write Melabs, S.A., 43 Rue De Namur, Brussels, Belgium.

Melabs®



LESS... and then so much more

First let us tell you what you don't get any more when you buy the new, redesigned Cent-O-Gram:

- Out-of-level conditions' effect on accuracy
- Levelling screws and spirit level
- Attachment weights
- Beam arrest mechanism
- The fun of counting a pointer's swings
- All gone . . . all victims of Ohaus design engineering

But Ohaus design engineers are innovators too. Their constant goal: greater speed, accuracy and stability in balances for busy laboratories and classrooms.

Here's what they have done to make the redesigned Cent-O-Gram 311 the best balance of its kind available today:

- Designed a balance with accuracy that is unaffected by out-of-level conditions
- Developed a new base that is more stable than any we have ever produced
- Added life-long "Alnico" magnets for magnetic damping and faster weighings
- Added a 200 g beam and sliding poise to do away with the inconvenience of attachment weights
- Built an ingenious specific gravity stand that is self-storing in the base when not in use
- Created an entirely new C-type pan bow for unrestricted access to the pan
- Restyled the pan to include a handle and two pouring spouts . . . and made it from high-impact polypropylene for resistance to heat and corrosion

That's what is new about the Ohaus Cent-O-Gram.

You could say that we saved a few dollars with what we took away, but after all, we do have to pay our design engineers. And, of course, there are those new extras. Teachers and chemists who have seen the new balance guessed its price should be $60.00 to $70.00. Would you believe only $39.50! Contact your favorite laboratory supply house . . . they'll verify it.

For additional specifications on the Dial-O-Gram 311, and other new balances, please write.

OHAUS SCALE CORPORATION
1050 COMMERCE AVENUE ◻ UNION, NEW JERSEY ◻ 07083

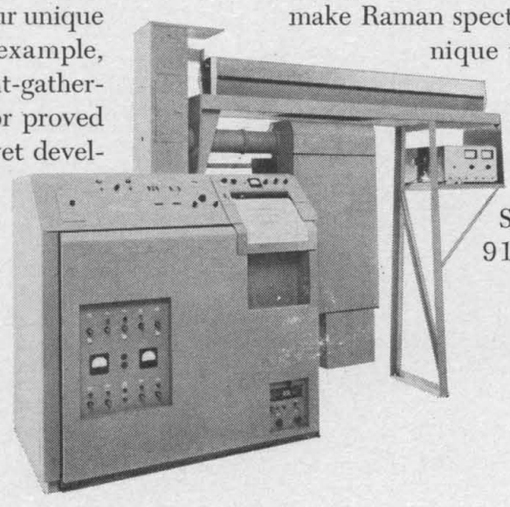
OHAUS

But in no way does Raman replace your IR equipment. On the contrary, our CARY 81 Raman Spectrophotometer with laser source gives you a whole new spectrum of molecular information. It simply illuminates areas IR instruments can't. Symmetrical vibrations of molecules, for example, are easily and conveniently observed; and depolarization measurements aid in band assignments.

This sounds as if the laser itself has finally made Raman spectroscopy a convenient and dependable analytical approach. This is partly true; it greatly reduces fluorescence problems. But even with a laser source, the Raman effect is notoriously weak. Success in measuring this effect still hinges on the monochromator, and, to some degree, on our unique image-slicer. With the 81, for example, we weren't satisfied until the light-gathering power of the monochromator proved 15 times greater than anything yet developed. Then and only then were we able to examine many samples which are difficult to excite. Some were as small as one μl and included both strongly colored materials and aqueous solutions.

The laser, of course, does offer the important advantage of being a flexible source. With the 81, you can excite a sample from *two* points of view. A right-angle view simplifies polarization studies and also lets you observe low frequency modes, down to 20 cm^{-1} (e.g., lattice and torsional vibrations and rotational transitions). Or, you can easily direct the laser beam down the center of the capillary sample tube. This coaxial view (unique with the 81), has high sampling efficiency, and allows you to study weak bands in detail and make fast routine scans.

Together, the laser and the CARY monochromator make Raman spectroscopy an essential research technique that can no longer be overlooked.



Find out how the CARY 81 lets you fully exploit the advantages of Raman. Write CARY Instruments, a Varian Subsidiary, 2724 S. Peck Road, Monrovia, California 91016. Ask for Data File E701-28.

CARY® 81

Infrared has blind spots that only Raman can see

digicord

$445

Digicord . . . the new Photovolt digital readout pH meter with expanded scale accuracy.

Only $445 . . . not much more than standard laboratory pH meters, but dramatically better in performance and efficiency.

Readout . . . snap action number display readable to ±0.001 pH or ±0.1 mv. Repeatability, stability and full range linearity all within ±0.002 pH.

photovolt

Design . . . all solid state, printed circuit board. Housed in compact, chemically resistant case.

Electrodes . . . especially developed to match the speed and high performance of the Digicord. Accepts all standard electrodes, including metal and specific ion.

Options . . . outlets for recorder, automatic temperature compensator and polarizing current.

PHOTOVOLT CORPORATION, 1115 Broadway, New York, N.Y. 10010. phone (212) 989-2900

how to select a Hewlett-Packard DC Power Supply for your application

Until recently, DC power supplies were limited to the role of "battery substitutes" in the lab — and not always satisfactory ones at that. But because of the solid state reliability and remote control versatility of modern DC power supplies, you may now consider one essential for your next application. To this end, Hewlett-Packard offers the following guidelines for helping you select the right power supply.

1. **Voltage Output:** A power supply with a voltage rating about 10% higher than that required is recommended. This provides the necessary flexibility for testing and adjusting analytical and other systems.

2. **Current Output:** For optimum performance, the current rating of the selected power supply should equal or exceed the maximum instantaneous (not average) output demanded by the load. Built-in fast-acting protection circuits of Hewlett-Packard instruments limit the output current to a preselected value; this protects both the power supply and the load from damage.

3. **Output Mode:** Most hp power supplies are designed to provide either a constant voltage or a constant current output. However, many hp power supplies are designed to operate in *either* mode and to automatically switch (cross over) from one mode to the other at any preselected point in the output range. If flexibility in operating mode is desired, these more versatile hp power supplies are recommended.

4. **Specifications:** Most applications will call for well regulated power supplies, these fluctuate less than 0.01% for a maximum change in input AC line voltage or output load resistance. With no change in load or line conditions, a well regulated supply will drift less than 0.03% in eight hours and experience an output change of less than 0.01%/°C change in room temperature. Ripple and noise are functions of internal filtering and isolation; 200μv RMS is typical of well regulated hp supplies (for a 24V output, this is less than 10 parts per million). Performance specifications a factor of 10 or more better are available from more precise units — while moderate regulation (a factor of 10 or more below the numbers given above) is typical of units with output ratings above 2 kW.

5. **Ask for our 1968 Catalog/Handbook:** In this new edition there are many other guidelines for selecting the right power supply for your specific application. Send for it. It contains specifications, definitions, explanations, illustrations, and applications for the complete hp line of DC power supplies. You may call your local hp field sales engineer for assistance or write Hewlett-Packard Company, 100 Locust Avenue, Berkeley Heights, New Jersey 07922. Europe: 54 Route des Acacias, Geneva.

HEWLETT hp PACKARD

POWER SUPPLIES

21805

Even more versatile:

Sargent's new Model XVI Recording Polarograph®

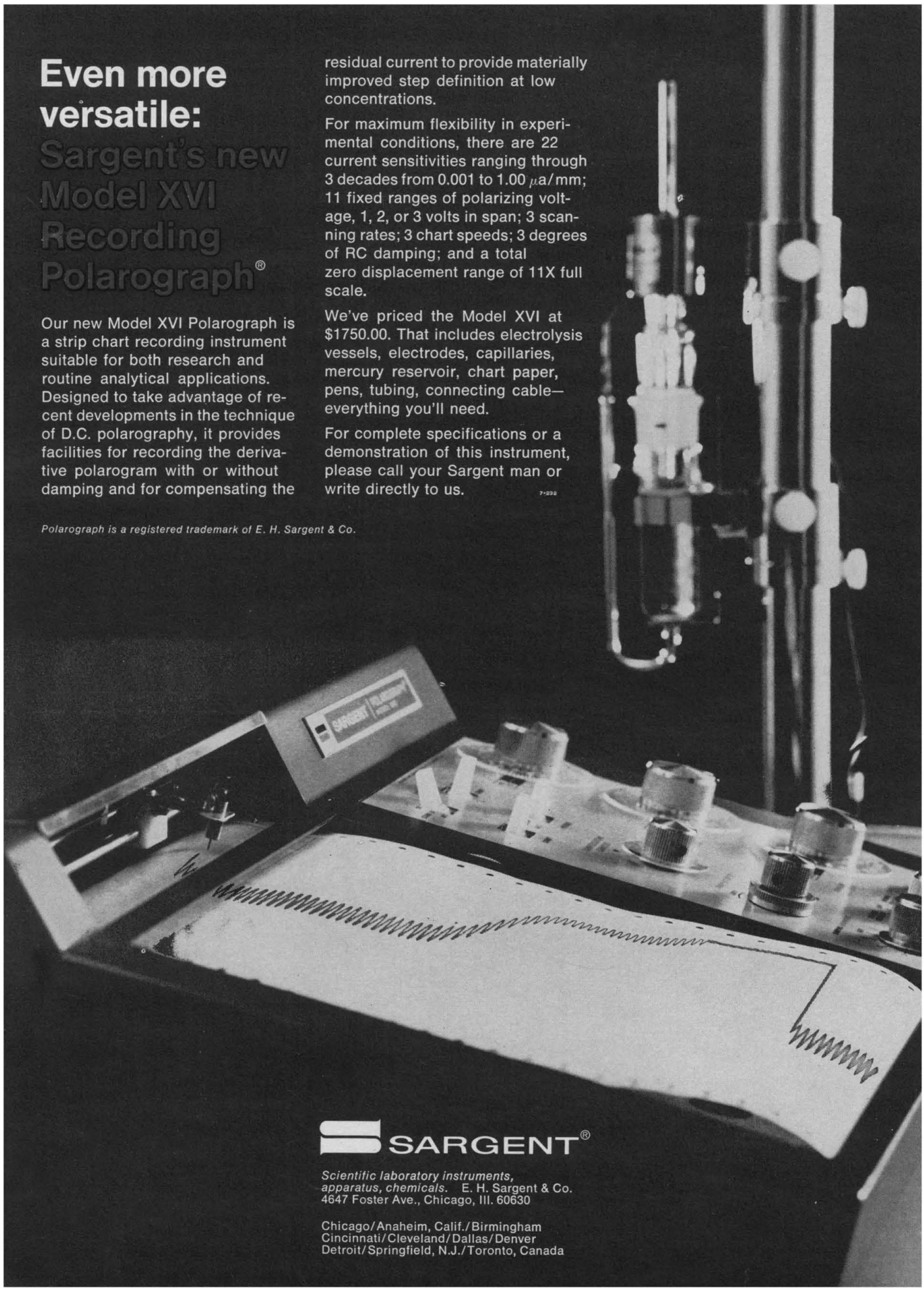
Our new Model XVI Polarograph is a strip chart recording instrument suitable for both research and routine analytical applications. Designed to take advantage of recent developments in the technique of D.C. polarography, it provides facilities for recording the derivative polarogram with or without damping and for compensating the residual current to provide materially improved step definition at low concentrations.

For maximum flexibility in experimental conditions, there are 22 current sensitivities ranging through 3 decades from 0.001 to 1.00 μa/mm; 11 fixed ranges of polarizing voltage, 1, 2, or 3 volts in span; 3 scanning rates; 3 chart speeds; 3 degrees of RC damping; and a total zero displacement range of 11X full scale.

We've priced the Model XVI at $1750.00. That includes electrolysis vessels, electrodes, capillaries, mercury reservoir, chart paper, pens, tubing, connecting cable—everything you'll need.

For complete specifications or a demonstration of this instrument, please call your Sargent man or write directly to us. 7-232

Polarograph is a registered trademark of E. H. Sargent & Co.



SARGENT®

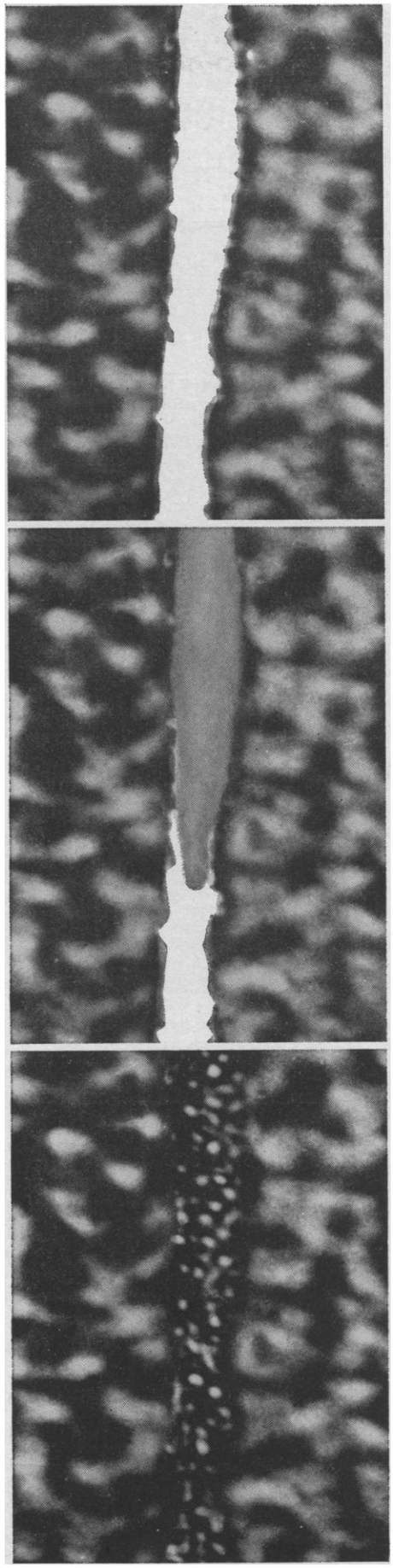
Scientific laboratory instruments, apparatus, chemicals. E. H. Sargent & Co.
4647 Foster Ave., Chicago, Ill. 60630

Chicago/Anaheim, Calif./Birmingham
Cincinnati/Cleveland/Dallas/Denver
Detroit/Springfield, N.J./Toronto, Canada

Fluxless fusion means fast connections at Western Electric.

Do you really need vats of muriatic acid, pots of paste, jars of powder or cores of rosin to solder pieces of metal together? Plus time to heat each part and then to melt the solder? No. At Western Electric's Engineering Research Center we've discovered that if you force hot solder between cold metals held tightly together, they'll stick fast — without pickling, flux, or even much heat.

The pressure between parts and the flow of molten solder exclude corrosive gases. The molten solder itself raises temperatures quickly with little thermal shock. The injected melt both cleans and wets the surfaces. And, if necessary, a die mold gives precise shape and rapid cooling.



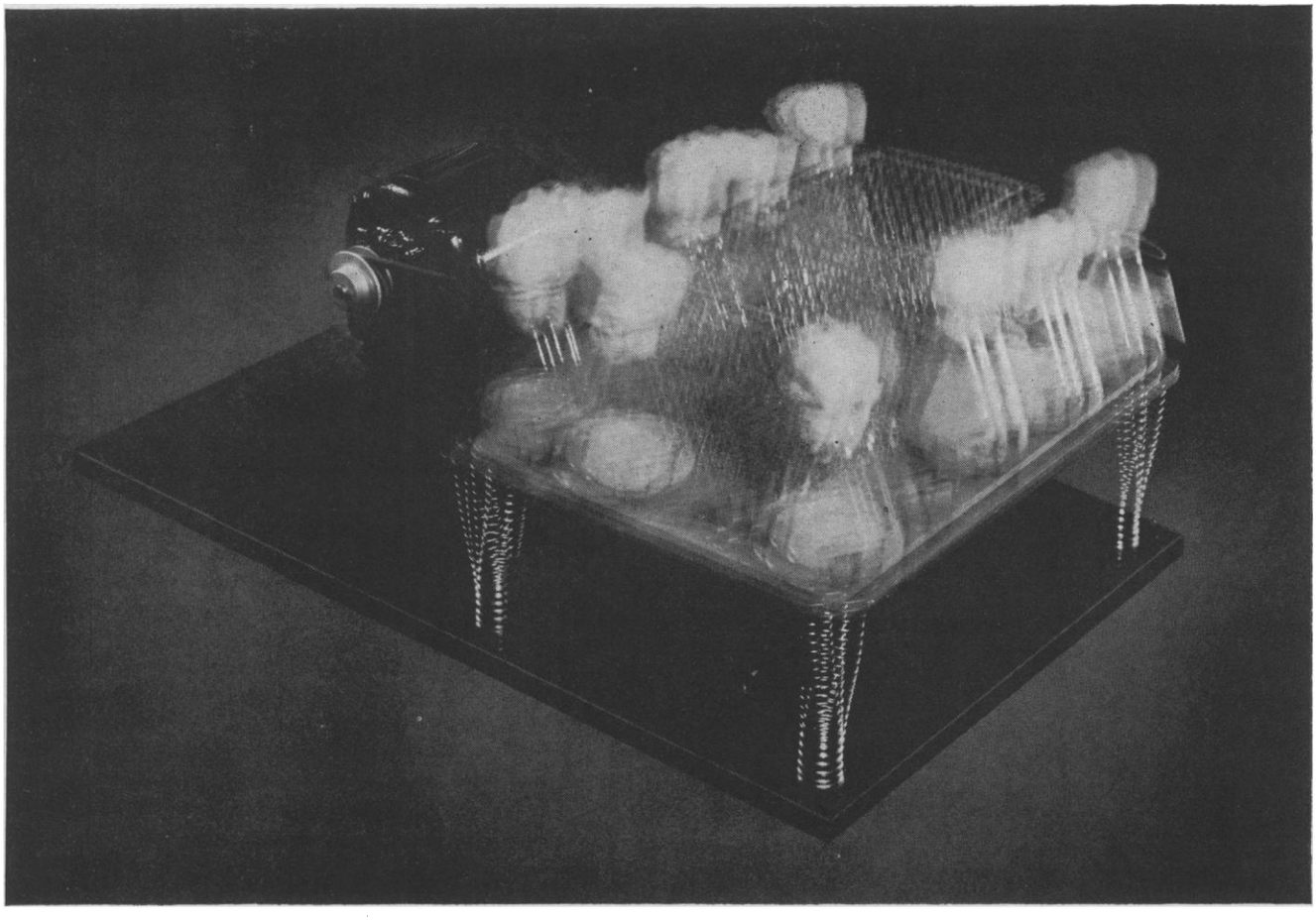
In these photomicrographs molten solder is forced between two copper wires spaced about 0.1 mil apart.

Actual joining times range from 1/10th to 1 second, far faster than hand-soldering. The small amount of energy required safeguards sensitive materials. Equipment is simple, inexpensive, and easy to maintain. Precision control is maintained even over wide latitudes of operation.

Experiments with a dozen basic metals, some 15 methods of application, and all sorts of wires, leads, parts and pieces prove the new method offers a more economical and flexible means to mass-produce electrical and mechanical connections. If you consider the billions of connections we make each year for the Bell System, and how reliable each must be, fluxless methods of metal joining offer great potential.

Western Electric
MANUFACTURING & SUPPLY UNIT OF THE BELL SYSTEM

this 17-year-old shaker has been running for 51 years!*



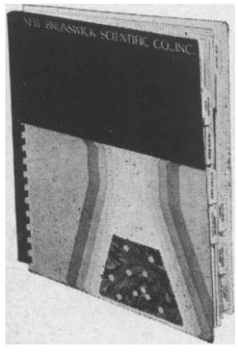
*Now retired as an NBS heirloom.

While other equipment was sleeping, this New Brunswick shaker worked overtime. It ran almost 24 hours a day for 17 years . . . day-in, day-out . . . at the Rutgers University College of Agriculture. This Model "C" sustained three times more shaking action than those machines that are switched off after a normal 8-hour day. Simple multiplication shows that this workhorse provided 51 years of service . . . and it's still operational!

During the intervening years, NBS has developed a score of new shakers. Some are simply for shaking, others are for controlling environment as well as agitation. All feature uniform, continuous motion — either gyrotory or reciprocal. And they all shake and shake and shake for a long, long time.

A new complete NBS Catalog has just been published. We'll be happy to send a copy to you on request.

Write for Catalogue No. 228



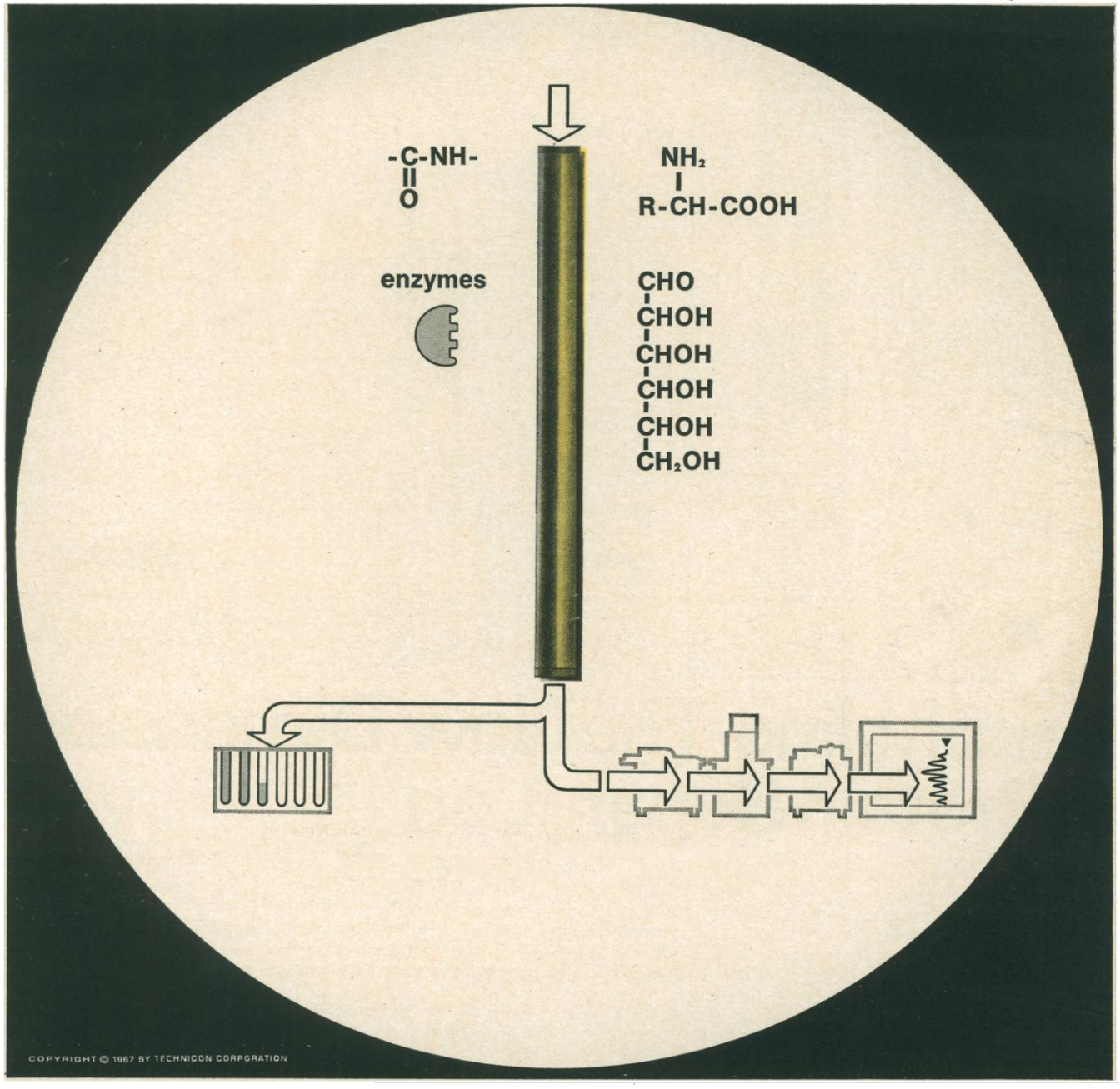
NEW BRUNSWICK SCIENTIFIC CO., INC.

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

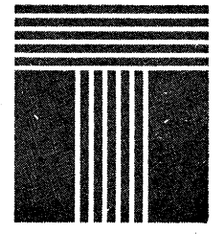
33A

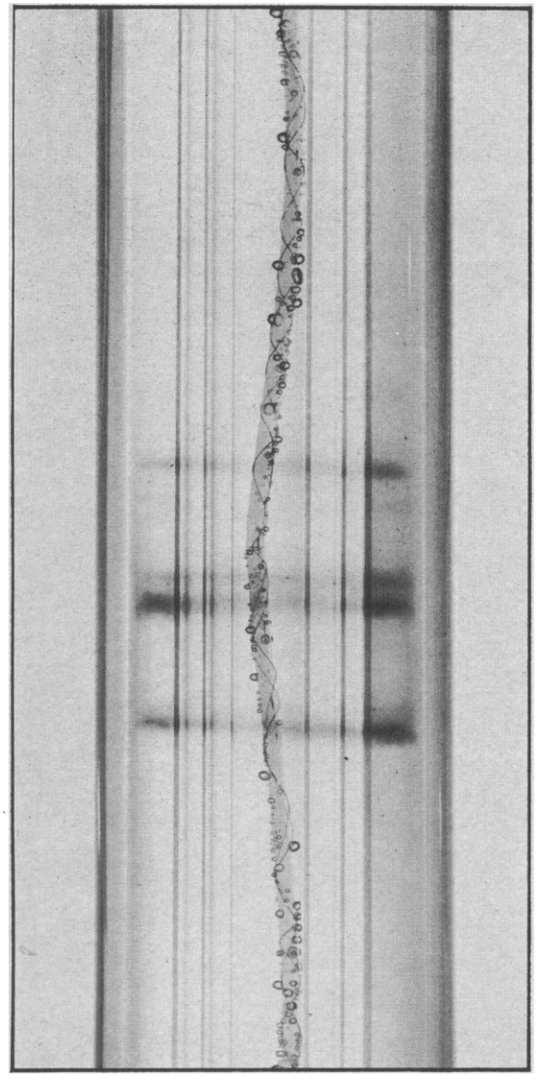
One automatic system for all:

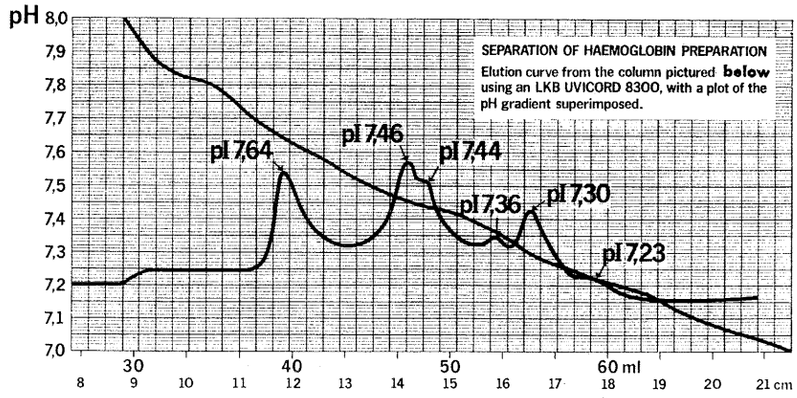
Amino acids • carbohydrates • peptides • enzymes in liquid chromatography.

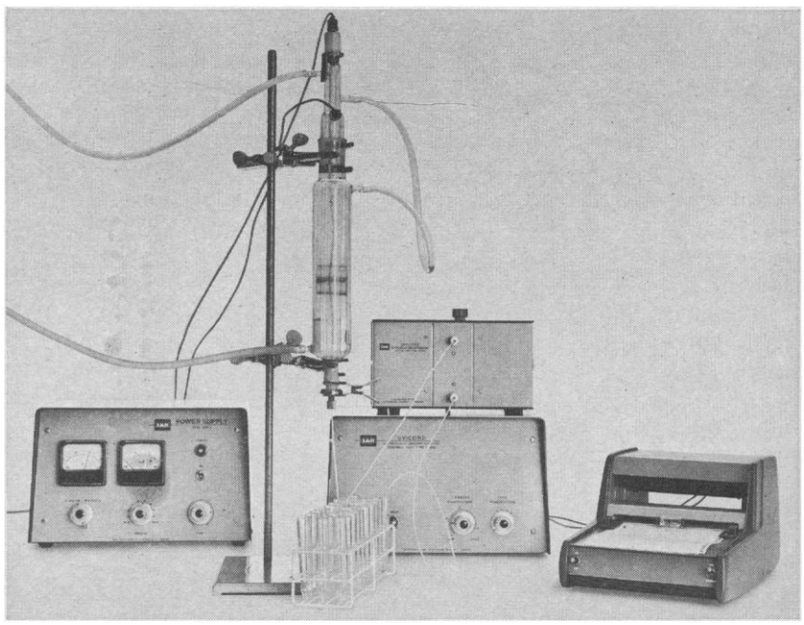


■ Technicon's basic chromatography system is completely automated from indexed sample presentation to recorded peaks. Requires a simple change of reagent and resin to separate... ■ Amino Acids: 90 minutes. New unattended 40 sample sequential loading. ■ Peptides: 5 hr. analysis with in-system hydrolysis for complete peptide identification. Quantitates ninhydrin positives and negatives. ■ Carbohydrates: 15 peak chromatogram, 4½ hrs. Unmatched resolution and sensitivity. Samples down to 1 μg. ■ Enzymes: Only minute portions of the fraction to quantitate and assay. Automated method for a wide variety of enzymes. For details write Dept. A, Technicon Corporation, Ardsley, New York 10502.









Ampholine-The New Dimension in Protein Separation

For enzymes—bacterial toxines—myoglobin—haemoglobin and serum proteins.
LKB presents a new high-resolving, easily operated and accurate method of separating proteins in a combined density and natural pH gradient in relation to their isoelectric points. LKB introduces the new carrier ampholytes which create the natural pH gradient; they have been specially developed for use in this new separation method called "ELECTROFOCUSING." New Electrofocusing columns designed to allow the elution of both gradient and separated compounds with a minimum of disturbance play an important part in this new technique for protein separation.
Electrofocusing, which is the concentration of proteins in narrow bands (see the separation above), when a voltage is applied to a mixture of carrier ampholytes and protein sample, occurs due to the voltage creating a natural pH gradient in a system stabilized against convection by a density gradient.
The Isoelectric Point (pI) is the pH value at which an ampholytic substance (e.g. a protein), is uncharged; at this value, which is relative for each protein, there is no migration.

We shall be glad to be at your service for further technical information and assistance. Write to-day for further information on this outstanding aid in protein chemistry.

LKB

LKB INSTRUMENTS INC. • 12221 PARKLAWN DRIVE • ROCKVILLE Md. 20852

OTHER HEADQUARTERS FOR SALES AND SERVICE

SWEDEN
LKB-Produkter AB
Fack
Stockholm—Bromma 1

UK
LKB Instruments Ltd.
232 Addington Rd.
S. Croydon, Surrey CR2 8YD

NETHERLANDS
LKB-Produkten N.V.
Zeekant 35,
The Hague

DENMARK
LKB Instrument A/S
Amagerbrogade 34,
Copenhagen S

to shorten the period during which people are finding means to achieve their new family-size desires. Creating new goals in the first place, or influencing them to the point of canceling population growth, is a function of the conditions, not of the contraceptive services. It follows that an effective population policy requires command over the social and economic conditions governing individual reproductive decisions.

Sweezy holds that family planning "prepares the way" for other measures. If so, why has it not prepared the way in countries that have long practiced contraception? The only case Sweezy cites—India's current desire to intensify its sterilization effort—is ironic, because the usual interpretation of this move is that it signifies the failure, not success, of India's family-planning program. In making this point, he holds that other approaches to population control have little chance anyway, in which case it is of no value to have family planning "prepare the way." Of course, the argument that other measures will not be accepted hardly proves that family planning alone will succeed. It may be that human societies are not ready to control their populations and that family planning is a convenient way of escaping from the problem while seeming to cope with it.

I do not say that family planning per se "stands in the way." I have consistently supported efforts to make contraceptives available. The family-planning emphasis in population control, however, has been self-defeating in two ways. First, it has not fully provided private birth control, by neglecting single women, denying all women the right of abortion, being cool to sterilization, and giving priority to religious taboos rather than biological effectiveness in recommending contraceptives. Second, having thus temporized in regard to private birth control, it has sidetracked population policy by confusing population control with private birth control, which it claims to provide. On both counts political expediency has been bought at the price of ineffectiveness. If, by "full" support of family planning, Sweezy means a blind belief that it alone is the answer to the population problem, he exemplifies the kind of commitment which, in my view, is blocking the development of efficient measures.

KINGSLEY DAVIS
Department of Demography, University of California, Berkeley

Malononitrile Is Toxic

Abelson's editorial, "Meeting needs for heavy elements" (5 Jan., p. 37) contains the statement that malononitrile is an effective nontoxic substitute for HCN. This does not agree with other references on the toxicity of this compound. Williams states (*1*): "The toxicity of malononitrile is about the same as that of HCN, molecule for molecule, but if malononitrile were completely converted to HCN it should be twice as toxic." Cyanide is one of the metabolic products from malononitrile in mammalian tissue. Fassett, in a chapter on cyanides and nitriles, states in relation to malononitrile (*2*): "Based on the above facts, the precautions and medical therapy should be the same as for cyanide. Skin contact and inhalation of dust or vapor should be prevented."

RICHARD HENDERSON
Olin Mathieson Chemical Corporation, 275 Winchester Avenue, New Haven, Connecticut

References

1. R. T. Williams, *Detoxication Mechanisms* (Wiley, New York, 1959), p. 399.
2. *Industrial Hygiene and Toxicology*, F. A. Patty, Ed., (Interscience, New York, 1963), vol. 2, rev. ed. 2, p. 2028.

Curator Coates

Although Ruggieri provided an interesting description of the facilities, research in progress, and past and present staff members of the New York Aquarium and Osborn Laboratories of Marine Sciences (3 Nov., p. 675), I found missing the name of Christopher W. Coates, who was curator, aquarist, and, for many years until his recent retirement, director of the aquarium. He is inclined himself to undervalue his contributions to research and to disclaim any scientific training, but he is a very inquisitive and thoughtful observer and experimenter, with remarkable initiative, skill and practical knowledge, which he has always been ready to share with colleagues in research. It was during his association with the aquarium, and in large part on his initiative, that its field of research was extended beyond ichthyology into general physiology. His work deserves much more praise than I can give it in this brief comment. . . .

RICHARD T. COX
Department of Physics, Johns Hopkins University, Baltimore, Maryland 21218

Use the H-P High-Temperature Membrane Osmometer for $\overline{M}_n$ research on those polymers that just won't dissolve at lower temperatures

No membrane osmometer can be entirely satisfactory for the study of synthetic polymers unless it has good characteristics at temperatures above 65° C. The reason is that some polymers just won't dissolve at lower temperatures. That's why H-P developed the Model 502 Membrane Osmometer whose operating range extends to 130° C.

Several characteristics of the 502 account for its ability to produce consistently accurate $\overline{M}_n$ determinations during high-temperature operation. First the 502 is a dynamic osmometer, open on both sides of the membrane and therefore much less subject to the effects of temperature variations than osmometers whose membranes are contained in a closed system. Moreover, the 502 enjoys a temperature stability (±0.001° C per hour) that far surpasses that of any other membrane osmometer. In terms of control, the 502 can be ordered with a variable temperature controller that maintains a precision of ±0.2° C from 25° to 130° C, or with any of seven fixed thermostats for operation at 25°, 37°, 50°, 65°, 100°, 110° C, or 130° C.

Still another feature of the 502 for high-temperature work is its special sample chamber cover which is separately heated to prevent precipitation of the solution in the syphon valve system.

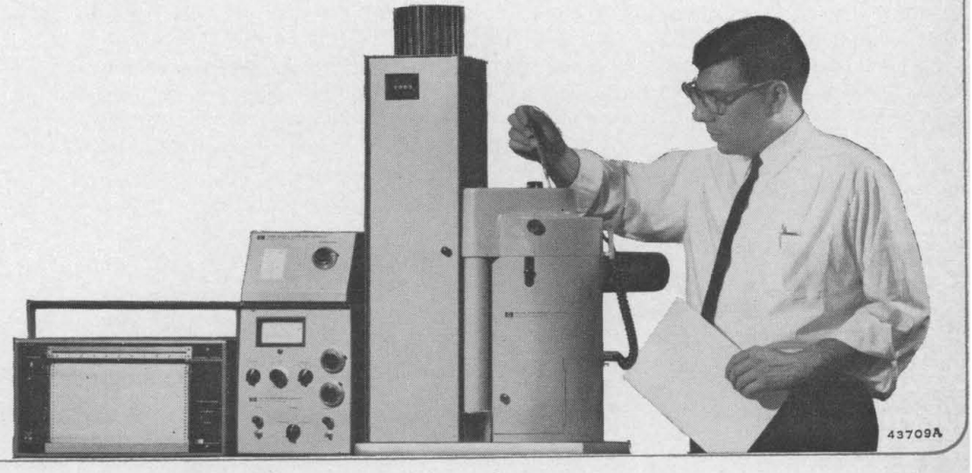
Regardless of the temperature at which you intend to use it, the 502 is capable of making $\overline{M}_n$ determinations in the range of 10,000 to 1,000,000 . . . has a basic sensitivity to changes in osmotic pressure as small as 0.01 cm of hydrostatic head . . . requires only 1 ml of sample including flushing . . . reaches equilibrium automatically in 5 to 30 minutes . . . reads out osmotic pressure on a built-in counter . . . and has an integral recorder output connection.

The H-P Model 502 Membrane Osmometer sells for $5,125.00. It is fully described in Data Sheet 5000, yours on request. Or call the nearest H-P sales office.

Hewlett-Packard, Route 41, Avondale, Pennsylvania 19311. In Europe: 54 Route des Acacias, Geneva, Switzerland. Elsewhere: 1501 Page Mill Road, Palo Alto, California 94304.

HEWLETT hp PACKARD

ANALYTICAL INSTRUMENTS



Early Days at Woods Hole

A fairly common misconception concerns the genesis of the Marine Biological Laboratory ("Woods Hole: now and then," Letters, 17 Nov.). Although the unique seaside instruction begun by Louis Agassiz at the Anderson School of Natural History on Penekese Island in 1873 was in essence the forerunner of all of the marine and freshwater biology laboratories in this country, it was not the direct ancestor of the Marine Biological Laboratory in Woods Hole. Conklin, Lillie, Dexter, and perhaps others, have testified clearly on this point. MBL was the immediate outgrowth of a seaside laboratory at Annisquam, Massachusetts, directed by Alpheus Hyatt, a student of Agassiz and curator of the Boston Society of Natural History. The Annisquam Laboratory, organized by the Women's Educational Association of Boston to serve the same purposes as the Agassiz School on Penekese, existed from 1880 to 1886. It became too small for its Annisquam quarters (Hyatt's home) and eventually moved to Woods Hole. This village was selected as the site for the first marine U.S. Fish Commission Station, thanks to the wisdom of Spencer F. Baird, secretary of the Smithsonian Institution.

It is not out of order and wholly in the Agassizian tradition to reemphasize Zullo's point in the communication following Nunnemacher's letter—that the current year around Systematics Ecology Program is "a necessity to the continued success of the MBL" in creating "another quiet but significant revolution in modern biology."

DONALD J. ZINN
Department of Zoology, University of Rhode Island, Kingston 02881

Carter ("Woods Hole: Summer mecca for marine biology," 15 Sept., p. 1288) and Nunnemacher (Letters, 17 Nov.) referred to Hermon C. Bumpus in connection with the founding of the Marine Biological Laboratory at Woods Hole and his pioneering work on the American lobster. Recently, I uncovered letters (Archives, Library of Harvard University) written by C. O. Whitman, first director of the MBL, to Frederic W. Putnam which set the stage for the Bumpus monograph. They read as follows:

"Wood's Holl (sic—the original spelling), Massachusetts. June 12, 1889—Do you suppose the U.S. Fish Commission would be able to offer any

pecuniary assistance to anyone who would undertake to work out thoroughly the development of the lobster? It is a good subject, but it would require some time—two years at least. I do not know that I can find a suitable person to do it, but I think I can."

Apparently Putnam promised a "small sum," not from the U.S. Fish Commission, however, but from the funds of the Massachusetts State Board of Fisheries and Game for which Putnam was a commissioner.

Whitman wrote to Putnam again on 26 June 1889, that "I have found a man who will undertake the lobster work. He will begin it and carry it along as far as possible. Now what will the 'small sum' be which you could give him? He is Prof. Bumpus of Olivet, Michigan, a fine young naturalist who takes hold of work most energetically and will undoubtedly do well. Give him all the encouragement you can."

In 1891 Bumpus published his classic study on "The Embryology of the American Lobster" (*J. Morphol.* **5**, 215) based upon his Ph.D. dissertation developed under the direction of Whitman at Clark University.

RALPH W. DEXTER
Department of Biological Sciences, Kent State University, Kent, Ohio

Parkinsonia Rampant

As a student of Parkinsonia (*1*), I would like to point out the potential for a new outbreak of this dread disease —in the universities. Over the past 15 years there has been a vast growth in federal funds for university science. This in turn led to a growth in the number of administrators, comptrollers, clerks, and others to handle this money and obey the regulations of "those people" in Washington. Of course the overhead rate went up too; what else did you expect?

Now the tide of federal funds appears to be receding; can we expect that universities will do with fewer administrators and comptrollers? Will there be a drop in the overhead? I predict an epidemic of Parkinsonia that will "curl your hair."

S. A. HOENIG
Department of Electrical Engineering, University of Arizona, Tucson 85721

Reference

1. C. N. Parkinson, *Parkinson's Law* (Houghton Mifflin, Boston, 1957).

2 February 1968, Volume 159, Number 3814 **SCIENCE**

Science Policy Confrontation

On 11 and 12 January, at the Paris headquarters of the Organization for Economic Cooperation and Development, the science policies of the United States were critically examined by the 20 other OECD countries. OECD science policy reviews have two purposes: to help the country being reviewed assess its own policies and to build up a useful body of knowledge concerning science policy for its member countries.

In preparation for the January confrontation, U.S. officials had to examine our own science policies and help the OECD secretariat prepare a descriptive account. Four external examiners then visited this country and prepared reports of their findings (*Science*, 12 January).

At the culminating confrontation, a team of American experts (Donald Hornig, Ivan Bennett, William Carey, Philip Handler, Congressman George Miller, Herman Pollack, and James A. Shannon) explained and defended American policies and discussed 20 issues on which they were quizzed by the four external examiners (H. G. B. Casimir, director of the Philips Research Laboratories; Théo Lefèvre, former Prime Minister of Belgium; Pierre Masse, chairman of the board of Electricité de France; and C. H. Waddington, professor in the Institute of Animal Genetics, Edinburgh) and other representatives of the OECD countries.

From the review the U.S. has gained the benefit of an objective and candid analysis of how its science policies look to a group of knowledgeable foreign critics. Much of what they had to say was complimentary. Some of it was envious. And some was fairly sharply critical. Disagreements, among the reviewers or between the reviewers and the U.S. representatives, provided points for fruitful discussion at the confrontation.

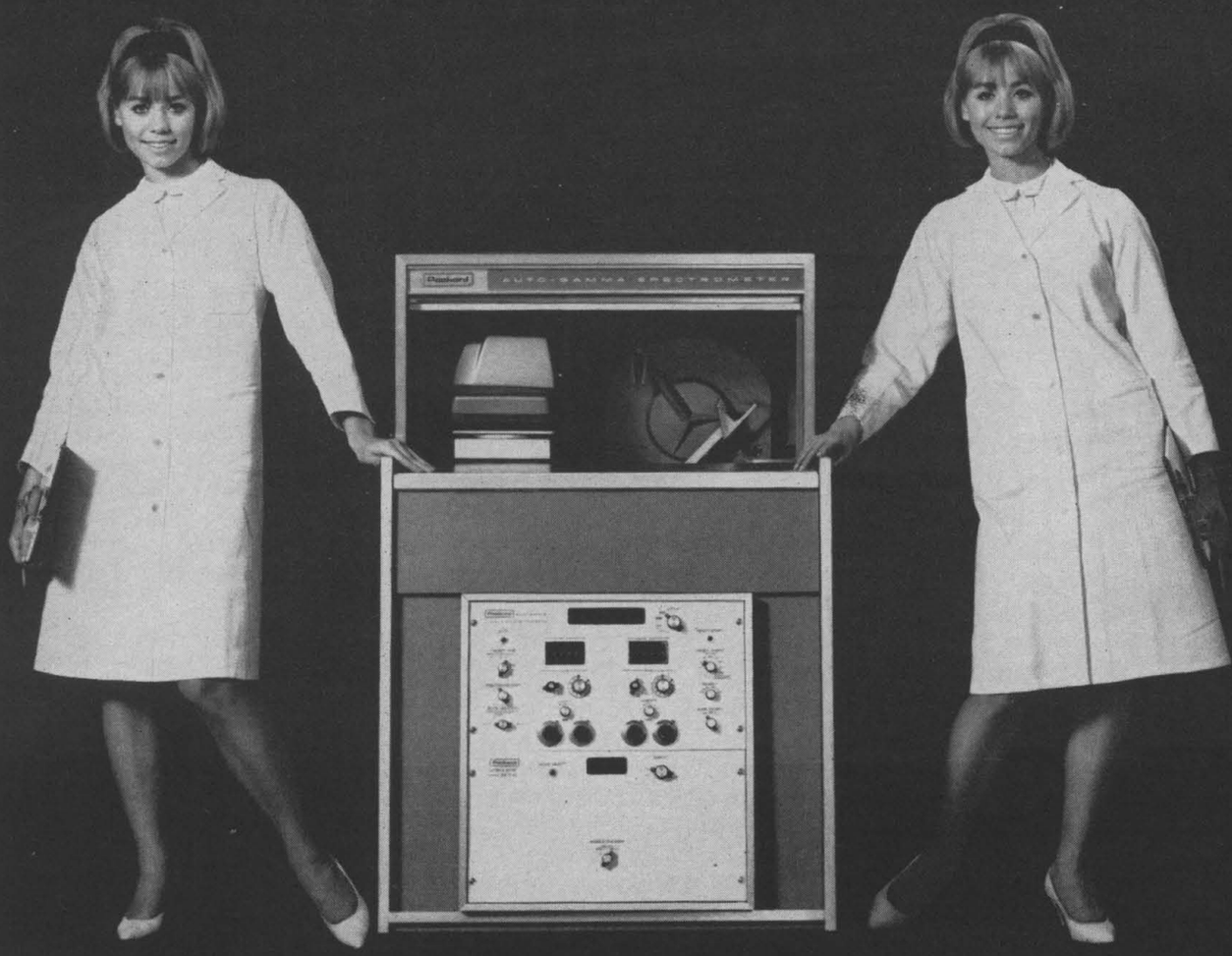
The role of science in governmental and economic affairs is basically much the same in all developed countries, but the forms of government of these countries differ and so do the details and the manner of development of their science policies. Much of the January discussion took shape from the fact that Europeans often do not appreciate the diversification of responsibility that exists in the U.S. and do not fully understand how Congress differs from the parliaments with which they are more familiar. Fellow delegates especially praised Congressman Miller's explanations of the way Congress works, and comments following the confrontation indicated that the American delegation had explained U.S. policies effectively and had cleared away some of the confusion and misinterpretation concerning these policies. *Le Figaro*, for example, quoted M. Lefèvre as saying that the American policies were an example to Europe and not a threat (as was implied in the written report) unless Europe chose not to understand their meaning.

When OECD was still the Organization for European Economic Cooperation it used the confrontation technique as a powerful instrument for securing cooperation in the use of Marshall Plan funds in the postwar restoration of the European economy. The technique has since been used to exchange information and criticisms concerning policies and practices in scientific and technical education. The January confrontation was the eighth in a series of science policy reviews. It provided an influential group of policy makers with an intensive seminar on U.S. policies and on their interpretation by different examiners. The published records will be available to a wider audience. The policy reviews are one of the means OECD is using to help member countries understand each other and their interrelationships more clearly.

—DAEL WOLFLE

NEW DUAL CHANNEL AUTO-GAMMA® SPECTROMETER

Now you can get two-channel gamma operation at the single-channel price



Model 5212 is a unique, automatic gamma counting system for either single or double-labeled samples. For two-channel analysis the system is automatically programmed to count each isotope sequentially, using a single scaler. Samples are changed automatically, and the data for each channel is recorded by a digital printer. Low, constant backgrounds are ensured by a patented 100-sample automatic changer. ▪ Though it has two-channel capability, Model 5212 is modestly priced . . . costs less than you would expect to pay for Packard's single-channel system. It is an ideal instrument for the laboratory where analysis of double-labeled gamma samples is becoming increasingly important, but volume of counting does not justify purchase of a full two-channel system. ▪ Model 5212 is one of Packard's complete line of gamma counting instruments, which range from manual, single-channel instruments to automatic, 400-channel systems for the most sophisticated analysis. Your Packard Sales Engineer can recommend a system exactly suited to your needs. Call him, or write for Bulletin 1064U to Packard Instrument Company, Inc. 2200 Warrenville Road, Downers Grove, Illinois 60515, or Packard Instrument International S.A., Talstrasse 39, 8001 Zurich, Switzerland.

Packard

plication occasionally encountered with *C. burnetii* vaccines. It was shown by Ormsbee that in guinea pigs immunized with either *C. burnetii* or *R. prowazekii*, agglutinins and complement fixing antibodies are localized in $7S_{\gamma 2}$ serum fraction, while antibodies causing passive cutaneous anaphylaxis were found in the $7S_{\gamma 1}$ fraction.

Live vaccines against Q fever and epidemic typhus fever have been tested on a large scale in human volunteers in the Soviet Union. Currently, a typhus vaccine which is a combination of attenuated living and killed organisms is favored although a recent vaccine prepared from a fraction of typhus soluble antigen shows considerable promise (Zdrodowsky, Golinevich). A new Q fever vaccine which is given orally evoked serologic conversions in a majority of human volunteers in recent field tests (Genig). Typhus vaccine booster responses in individuals previously sensitized 5 years earlier by either natural infection or primary vaccination are indistinguishable. The importance of determining the complement fixation titer of the Cox-type killed vaccine in order to recognize potent vaccines was emphasized (Murray).

Newly described or improved serologic procedures include a passive hemagglutination test in which cysteine is used to differentiate 19*S* and 7*S* typhus antibodies (Voronova), and a rapid hemolysis-inhibition test for neutralizing antibodies in human serums (Mikolajczyk). Studies with *R. quintana* grown in blood agar indicate that suspensions of the whole organism serve as complement-fixing antigens and give no cross-reactions with convalescent serums from other rickettsial diseases (Vinson).

Successful vaccines for *R. tsutsugamushi* have not yet been achieved, mainly because several distinctive serologic types occur in nature and sufficient antigenic mass is difficult to obtain. Group- and type-specific antigens have been prepared from various strains of *R. tsutsugamushi* grown in tissue culture (Shishido). Prophylactic immunization of mice against homologous and heterologous strains was accomplished with chemo-vaccines composed of a mixture of live rickettsiae and a rickettsiostatic amount of tetracycline (Kekcheeva).

The involvement of domestic animals and ticks in an extrahuman cycle of *R. prowazekii*, originally described by Reiss-Gutfreund, stimulated several investigators to try, not yet successfully, to confirm this finding and to evaluate what might be a potentially serious public health problem. Gaon reported that family outbreaks of epidemic typhus in Bosnia were associated with a prior occurrence of Brill-Zinsser disease, and that cattle, sheep, and *Dermacentor marginatum* and *Ixodes ricinus* ticks infesting them were not infected. Lambs, kids, camels, and donkeys, experimentally infected with *R. prowazekii* in Egypt by Ormsbee developed typhus agglutinins, but rickettsemia could not be demonstrated and ticks fed upon the animals were not infected. Burgdorfer showed that the ZRS strain of *R. prowazekii*, originally recovered from *Hyalomma truncatum* in Ethiopia, when inoculated intracoelomically, would not propagate in female *H. excavatum* and killed the majority of *D. andersoni*. *H. dromedarii* sustained the rickettsiae but transovarial transmission did not occur. Thus, the accumulating evidence suggests that involvement of livestock and ticks, if it does occur, is secondary to active dissemination of the louse-borne disease in the human population and the extrahuman cycle does not play an important role in perpetuating endemic foci of the disease.

The importance of maintaining constant surveillance for rickettsial diseases was exemplified by reports of previously unrecognized epidemiologic and ecologic features. Strains of *R. tsutsugamushi* recovered from small rodents and insectivores, as well as from three species of *Leptotrombidium* and two species of *Neotrombicula* chiggers, collected in foci of scrub typhus recently recognized in the Khasan district of the Primorie (north of Vladivostok) and in the Pjandge and Sorbo river valleys in Tadzikistan in the U.S.S.R., were described by Tarasevitch. In regions of Thailand where at least five, and possibly eight, antigenically distinctive strains of *R. tsutsugamushi* were enzootic, Elisberg found the majority of scrub typhus patients were infected coincidentally with mixtures of antigenic types.

New enzootic foci of Q fever in Croatia, Yugoslavia, were attributed by Hrabar to the introduction of flocks of infected sheep and goats traveling from neighboring Bosnia and Herzegovina. Reptiles were implicated as possible reservoirs of Q fever. *Coxiella burnetii* persisted in the internal organs of lizards and water snakes following experimental infection and *I. ricinus* were

infected after feeding on the lizards (Ač). Zhmayeva reported that three species of Ixodidae ticks could be simultaneously infected with *C. burnetii* and tick-borne encephalitis virus after feeding. Both agents were transferred transstadially and transovarially.

Marked antigenic heterogeneity was found among various strains of the etiologic agent of bovine tick-borne fever, recovered in the same and in different geographic regions of Finland (Tuomi). A new group of rickettsia-like agents recovered from laboratory guinea pigs was described by Bozeman.

The review papers presented at this meeting will be published in *Zentralblatt für Bakteriologie* (Referate); those dealing with ecological and epidemiological problems in *Journal of Hygiene, Epidemiology and Microbiology* (Prague); and the others in *Acta Virologica*. The success of a symposium of this nature can be judged by the breadth of the interests which it spanned and stimulated, from problems directly related to human welfare to basic aspects of rickettsiae as distinctive biological entities.

EMILIO WEISS
Naval Medical Research Institute, Bethesda, Maryland 20014

BENNETT L. ELISBERG
F. MARILYN BOZEMAN
Walter Reed Army Institute of Research, Washington, D.C. 20012

RICHARD A. ORMSBEE
CORNELIUS B. PHILIP
National Institute of Allergy and Infectious Diseases, Hamilton, Montana 59840

CHARLES L. WISSEMAN, JR.
PAUL FISET
University of Maryland, Baltimore 21201

DAVID PARETSKY
CORA M. DOWNS
University of Kansas, Lawrence 66044

WILLIAM J. VINSON
Harvard School of Public Health, Boston, Massachusetts 02115

Calendar of Events

National Meetings

February

11–12. Congress on **Medical Education**, 64th annual, Chicago, Ill. (C. H. William Ruhe, AMA Council on Medical Education, 535 N. Dearborn, Chicago 60610)

12–14. **Aircraft Design** for 1980, Washington, D.C. (Meetings Manager, 1290 Sixth Ave., New York 10019)

13–15. **Aerospace and Electronic Systems**, Los Angeles, Calif. (R. M. Emberson, 345 E. 47 St., New York 10017)

13–15. **Military Aircraft Systems**, Washington, D.C. (Meetings Manager, 1290 Sixth Ave., New York 10019)

13–16. American **Public Power** Assoc., Sacramento, Calif. (A. Radin, General Manager, Suite 830, 919 18th St., NW, Washington, D.C. 20006)

14–16. **Offshore Exploration** Conf., New Orleans, La. (M. F. Oberacker, Manager, Administration, OECON, P.O. Box 88, Palos Verdes Estates, Calif.)

15. **Commercial Application of Ultrasonics**, New York, N.Y. (J. N. Antonevich, Blackstone Corp., 1111 Allen St., Jamestown, N.Y. 14701)

16–17. American Psychopathological Assoc., **Neurobiological Aspects of Psychopathology**, New York, N.Y. (J. Zubin, 722 W. 168 St., New York 10032)

16. **Reliability Symp.**, 9th annual West Coast, Beverly Hills, Calif. (R. J. Green, TRW Systems, Building E2/6043, One Space Park, Redondo Beach, Calif. 90278)

16–18. **Repair and Regeneration**, symp., San Francisco, Calif. (Continuing Education in Health Sciences, Univ. of California, San Francisco Medical Center, Parnassus and Third Ave., San Francisco)

18–21. American Inst. of **Chemical Engineers**, 63rd natl. mtg., St. Louis, Mo. (L. L. Fellinger, Monsanto Co., 800 N. Lindbergh, St. Louis)

18–22. Society of **Economic Geologists**, New York, N.Y. (R. A. Laurence, P.O. Box 1549, Knoxville, Tenn. 37901)

18–22. Technical Assoc. of the **Pulp and Paper Industry**, 53rd annual mtg., New York, N.Y. (K. G. Chesley, TAPPI, 360 Lexington Ave., New York 10017)

19–20. **Engineering Project Investment Analysis**, Austin, Tex. (D. E. Griffith, Program Director, Taylor Hall 153, College of Engineering, Univ. of Texas, Austin 78712)

19–21. American College of **Surgeons**, sectional mtg., Dallas, Tex. (Communications Dept., 55 E. Erie St., Chicago, Ill. 60611)

19–21. **Biophysical Soc.**, 12th annual mtg., Pittsburgh, Pa. (I. Bendet, Local Arrangements Chairman, Biophysics Dept., Univ. of Pittsburgh, Pittsburgh 15213)

19–21. National **Space** Mtg., Cocoa Beach, Fla. (R. E. Freeman, Inst. of Navigation, Suite 912, 711 14th St., NW, Washington, D.C. 20005)

19–23. **Transportation Engineering** Conf., San Diego, Calif. (W. H. Wisely, 345 E. 47 St., New York, N.Y. 10017)

19–25. American Soc. of **Civil Engineers**, San Diego, Calif. (W. H. Wisely, ASCE, 345 E. 47 St., New York 10017)

21–22. **Industrial Pharmacy**, Austin, Tex. (W. L. Guess, Dept. of Pharmacy, College of Pharmacy, Univ. of Texas, Austin 78712)

21–25. Institute on **Diabetics**, 5th annual, Aspen, Colo. (C. L. Ginn, Executive Director, 1375 Delaware St., Denver, Colo. 80204)

22. **Renal Insufficiency**, centennial symp., Chicago, Ill. (University of Illinois Alumni Office, 715 S. Wood St., Chicago 60612)

22–24. American Acad. of **Forensic Sciences**, Chicago, Ill. (S. R. Gerber, Secretary-Treasurer, 2153 Adelbert Rd., Cleveland, Ohio 44106)

22–24. Central **Surgical** Assoc., Cleveland, Ohio. (B. L. Willman, 1402 S. Grand Blvd., St. Louis, Mo. 63104)

24–3. Canadian American **Medical-Dental** Assoc., 8th, Park City, Utah. (T. H. Trapasso, Secretary-Treasurer, 816 Ashmun St., Sault Ste. Marie, Mich. 49783)

25. **Psychoanalysis**, 6th annual scientific conf., New York, N.Y. (A. Blatt, Chairman Program Committee, 7 W. 96 St., New York 10025)

25–29. American Inst. of **Mining, Metallurgical, and Petroleum Engineers**, 97th annual mtg., New York, N.Y. (C. Hopkins, 345 E. 47 St., New York 10017)

26–28. American **Physical Soc.**, Boston, Mass. (W. W. Havens, Jr., Columbia Univ., New York 10027)

26–28. Association of **Asphalt Paving Technologists**, Atlanta, Ga. (L. L. Kole, Box 619, Ann Arbor, Mich. 48107)

26–28. Association of **Iron and Steel Engineers**, Western mtg., San Francisco, Calif. (T. J. Ess, 1010 Empire Bldg., Pittsburgh, Pa. 15222)

26–1. American Assoc. of **Junior Colleges**, 48th annual conv., Boston, Mass. (The Association, 1315 16th St., NW, Washington, D.C. 20036)

27. National **Multiple Sclerosis** Soc., New York, N.Y. (S. Lawry, Executive Director, 257 Park Ave., South, New York 10010)

27–28. National **Dairy Engineering** Conf., 16th annual, East Lansing, Mich. (D. R. Heldman, Dept. of Agricultural Engineering, Michigan State Univ., East Lansing 28823)

27–3. **Scintillation and Semiconductor Counter**, 11th symp., Washington, D.C. (R. M. Emberson, 345 E. 47 St., New York,v N.Y. 10017)

28. Commission on **Engineering Education**, 5th annual mtg., Washington, D.C. (Commission on Engineering Education, 1501 New Hampshire Ave., NW, Washington, D.C. 20036)

28–3. American College of **Cardiology**, annual mtg., San Francisco, Calif. (W. D. Nelligan, 9650 Rockville Pike, Bethesda, Md. 20014)

28–3. **Biology Teachers**, Anaheim, Calif. (J. P. Lightner, Secretary, 1420 N St., NW, Washington, D.C.)

29–2. **Cystic Fibrosis** and Related Human and Animal Diseases, symp., New York, N.Y. (National Cystic Fibrosis Research Foundation, 202 E. 44 St., New York 10017)

March

1–3. American Assoc. of **Pathologists and Bacteriologists**, 65th annual, Chicago, Ill. (J. L. Orbison, Univ. of Rochester Medical Center, 260 Crittenden Boulevard, Rochester, N.Y. 14620)

2–8. American **Concrete** Inst., Los Angeles, Calif. (W. A. Maples, Box 4754, Redford Station, Detroit, Mich. 48219)

4. **Industry's Future in the Ocean**, Miami, Fla. (J. LaCerda, 95 Merrick Way, Suite 715, Coral Gables, Fla. 33134)

4–5. **Goddard Memorial Symp.**, 6th annual, Washington, D.C. (G. D. Anderson, Honeywell ADG, 1611 N. Kent St., Arlington, Va. 22209)

4–6. American Inst. of **Aeronautics and Astronautics**, New Orleans, La. (J. Har-

ford, AIAA, 1290 Avenue of the Americas, New York 10019)

4–6. Society of **Research Administrators**, 2nd annual, Houston, Tex. (W. L. Cullison, Div. of Science and Technology, American Petroleum Inst., 1271 Avenue of the Americas, New York 10020)

4–6. Society of **Toxicology**, Washington, D.C. (C. S. Weil, Mellon Inst., 4400 Fifth Ave., Pittsburgh, Pa. 15213)

4–6. **Technology for Manned Planetary Missions**, New Orleans, La. (Meetings Manager, 1290 Sixth Ave., New York 10019)

4–7. **Neutron Cross Section and Technology** Conf., Washington, D.C. (D. T. Goldman, Natl. Bureau of Standards, Washington, D.C. 20234)

4–8. **Analytical Chemistry and Applied Spectroscopy**, Cleveland, Pa. (R. T. Oliver, Alcoa Research Labs., New Kensington, Pa.)

5–7. **Aviation-Electronics and Its Supporting Sciences**, Fort Monmouth, N.J. (Commanding General, U.S. Army Electronics Command, Attention AMSEL-RD-LN, Fort Monmouth 07703)

6–8. Fundamental **Cancer Research**, 22nd annual symp., Houston, Tex. (F. Goff, Special Projects, M. D. Anderson Hospital and Tumor Inst., Univ. of Texas, Houston 77025)

7–8. The **Doctor and His Hospital**, Inst. of Medicine of Chicago workshop, Chicago, Ill. (R. M. Potter, Secretary, Inst. of Medicine of Chicago, 332 S. Michigan Avenue, Chicago 60604)

7–8. Society of **Vacuum Coaters**, 11th annual, Miami Beach, Fla. (The Society, P.O. Box 3095, Cleveland, Ohio)

7–9. **Cerebellum in Health and Disease**, Dallas, Tex. (S. P. Cole, Coordinator, Univ. of Texas Southwestern Medical School at Dallas, 5323 Harry Hines Blvd., Dallas 75235)

7–9. Southern Soc. of **Anesthesiologists**, Dallas, Tex. (R. G. Zepernick, Mercy Hospital, New Orleans, La. 70119)

8–10. Colorado **Medical** Soc., Denver. (D. G. Derry, Colorado Medical Soc., 1809 E. 18 Ave., Denver 80218)

8–10. National **Wildlife** Federation, 32nd annual, Houston, Tex. (The Federation, 1412 16th St., NW, Washington, D.C. 20036)

9–10. American Psychiatric Assoc. Colloquium on Postgraduate **Teaching of Psychiatry**, New Orleans, La. (M. L. Enelow, 3439 Prytania St., New Orleans 70115)

10–12. American Soc. for **Abrasive Methods**, Philadelphia, Pa. (R. J. Mayer, ASAM, 330 S. Wells St., Chicago, Ill. 60606)

10–14. **Gas Turbine** Conf., Washington, D.C. (A. B. Conlin, Jr., Meetings Manager, 345 E. 47 St., New York 10017)

10–15. American Soc. of **Photogrammetry**/American Congr. on Surveying and Mapping, annual mtg., Washington, D.C. (W. B. Overstreet, 1819 Franwall Avenue, Silver Spring, Md. 20902)

11–13. American College of **Surgeons**, sectional mtg. for **Doctors** and **Nurses**, Williamsburg, Va. (Communications Department, 55 E. Erie St., Chicago, Ill. 60611)

11–13. New Tools for **Planning and Research Programming**, Commercial Chemical Development Assoc., Inc. annual mtg., New York, N.Y. (R. L. Chilenskas, Man-

ager of Commercial Development, M & T Chemicals Inc., New York, N.Y.)

11–14. **Canaveral Council of Technical Societies,** 5th space congr., Cocoa Beach, Fla. (E. P. Wynne, General Electric Co., Apollo Support Dept., P.O. Box 7011, Cape Canaveral, Fla. 32920)

11–14. Western **Metal and Tool** Conf. and Exposition, Los Angeles, Calif. (J. A. Fellows, Director of Technical Programming, Metals Park, Ohio)

12–14. **Fire Weather** Conf., Salt Lake City, Utah. (K. C. Spengler, 45 Beacon St., Boston, Mass. 02108)

13–15. **Instrumentation for the Iron and Steel Industry,** 18th natl. conf., Pittsburgh, Pa. (T. Schuerger, U.S. Steel Corp., Research Lab., Monroeville, Pa. 15146)

13–16. **Optical** Soc. of America, spring mtg., Washington, D.C. (M. W. Warga, Executive Secretary, 1155 16th St., NW, Washington, D.C. 20036)

14–15. Forum on **Geology of Industrial Minerals,** 4th annual, Austin, Tex. (W. L. Fisher, Bureau of Economic Geology, Univ. of Texas, Austin 78712)

14–16. Arizona Acad. of **General Practice,** Tucson. (P. R. Boykin, Executive Secretary, P.O. Box 441, Scottsdale, Ariz. 85252)

14–16. **Biomathematics and Computer Science** in the Life Sciences, 6th annual, Houston, Tex. (Office of the Dean, Univ. of Texas Graduate School of Biomedical Sciences at Houston, Division of Continuing Education, P.O. Box 20367, Houston 77025)

14–20. Marquette Univ. **Medical Alumni** Assoc., clinical conf., Palm Springs, Calif. (R. H. Herzog, Executive Secretary, The Association, 561 N. 15 St., Milwaukee, Wis. 53233)

15–16. State **Mental Health** Representatives, 14th annual, Chicago, Ill. (W. Wolman, Dept. of Mental Health, 535 N. Dearborn St., Chicago 60610)

18–20. **Lubrication and Lubricant Rheology,** symp., Ann Arbor, Mich. (W. O. Winer, Dept. of Mechanical Engineering, 225 West Engineering Bldg., Univ. of Michigan, Ann Arbor 48104)

18–20. American Acad. of **Pediatrics,** spring session, Atlanta, Ga. (G. E. Hughes, Secretary for Meetings, 1801 Hinman Ave., Evanston, Ill. 60204)

18–21. American **Physical** Soc., Berkeley, Calif. (W. Whaling, California Institute of Technology, Pasadena 91109)

18–21. American **Radium** Soc., annual mtg., Miami Beach, Fla. (J. L. Pool, Executive Secretary, Memorial Hospital, 444 E. 68 St., New York, N.Y.)

18–22. National Assoc. of **Corrosion Engineers,** 24th annual conf. and show, Cleveland, Ohio. (T. J. Hull, 980 M & M Building, Houston, Tex. 77002)

19–20. **Equipment Manuals** Symp., Washington, D.C. (National Security Industrial Assoc., 1030 15th St., NW, Washington, D.C. 20005)

19–20. **Ocean Sciences and Engineering of the Atlantic Shelf,** natl. symp., Philadelphia, Pa. (T. Evans, Conference Management Organization, Inc., Sheraton Park Hotel, 2660 Connecticut Ave., NW, Washington, D.C. 20008)

19–21. American **Railway Engineering** Assoc., Chicago, Ill. (E. W. Hodgins, Executive Secretary, 59 E. Van Buren St., Chicago 60605)

20. **Suicidology,** 1st natl. conf., Chicago, Ill. (E. S. Shneidman, Center for Studies of Suicide Prevention, National Inst. of Mental Health, 5454 Wisconsin Ave., Chevy Chase, Md. 20203)

20–23. American **Orthopsychiatric** Assoc., 45th annual, Chicago, Ill. (The Association, 1790 Broadway, New York 10019)

21–22. **Modulation Transfer Function,** Boston, Mass. (Society of Photo-Optical Instrumentation Engineers, P.O. Box 288, Redondo Beach, Calif. 90277)

21–23. Symp. on **Microwave Power,** 3rd symp., Boston, Mass. (C. Olsen, % Eimac, Division of Varian Assoc., 301 Industrial Way, San Carlos, Calif. 94070)

22–23. Montana **Medical Assoc.,** Helena. (L. R. Hegland, The Association, P.O. Box 1692, Billings, Mont. 59103)

22–23. **Socio-Economics of Health Care,** 2nd natl. congr., Chicago, Ill. (H. W. Doan, Dept. of Health Care Services, American Medical Assoc., 535 N. Dearborn St., Chicago 60610)

22–27. California **Medical** Assoc., San Francisco. (R. L. Thomas, 693 Sutter St., San Francisco 94102)

23. New Jersey **Post Graduate Anesthesia** Seminar, 9th annual, Cherry Hill. (P. A. Tucci, 22 The Fairway, Upper Montclair, N.J. 07043)

23–24. Missouri Soc. of **Anesthesiologists,** Kansas City. (G. W. N. Eggers, Jr., Univ. of Missouri Medical Center, Columbia 65201)

24–27. American Assoc. of **Dental**

Schools, 45th annual session, San Francisco, Calif. (D. E. Mattson, 211 E. Chicago Ave., Chicago, Ill. 60611)

24–29. American College of **Allergists**, 24th annual congr., Denver, Colo. (E. Bauers, 2160 Rand Tower, Minneapolis, Minn. 55402)

24–30. American Soc. of **Clinical Pathologists**, New Orleans, La. (L. H. Hoyt, Methodist Hospital, Indianapolis, Ind.)

25–27. **Operations Research** Symp., 2nd, Pittsburgh, Pa. (H. O. Teeple, TAPPI, 360 Lexington Ave., New York 10017)

25–27. **Simulation and Support** Conf., AIAA 2nd flight test, Los Angeles, Calif. (Meetings Manager, American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

25–28. National **Plant Engineering and Maintenance** Show and Conf., Philadelphia, Pa. (K. E. Knowles, 245 Park Ave., New York 10017)

25–28. **Organic Solid State Chemistry** Symp., Upton, N.Y. (G. Adler, Brookhaven National Lab., Upton, L.I., N.Y. 11973)

25–28. Southeastern **Surgical** Congr., Washington, D.C. (A. H. Letton, 340 Boulevard NE, Atlanta, Ga. 30312)

27. **Oral Cancer** Symp., 6th, Poughkeepsie, N.Y. (M. A. Engelman, One East Academy St., Wappingers Falls, N.Y. 12590)

27. Association for the Advancement of **Psychoanalysis**, New York, N.Y. (E. Schattner, Secretary, 147 E. 50 St., New York 10022)

27–28. **Railroad** Conf., Chicago, Ill. (Institute of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)

27–29. **Linear Free Energy Relationships**, 2nd conf., Irvine, Calif. (J. E. Leffler, Dept. of Chemistry, Florida State Univ., Tallahassee 32306)

28–30. American **Fertility** Soc., San Francisco, Calif. (H. H. Thomas, 944 S. 18 St., Birmingham, Ala. 35205)

28–31. Missouri State Medical Assn., Kansas City. (R. McIntyre, The Association, 515 E. High St., Jefferson City, Mo. 65101)

29. **Symbiosis**, symp., Fullerton, Calif. (L. A. Stevens, Div. of Life Sciences, Fullerton Junior College, 321 Chapman Avenue, Fullterton 92634)

29–30. **Rural Health**, 21st natl., Seattle, Wash. (B. L. Bible, 535 N. Dearborn St., Chicago, Ill. 60610)

29–31. American **Psychosomatic** Soc., Inc., Boston, Mass. (H. Weiner, Secretary-Treasurer, 265 Nassau Road, Roosevelt, N.Y. 11575)

29–31. American Soc. of **Group Psychotherapy and Psychodrama**, New York, N.Y. (H. B. Weiner, 1323 Avenue N, Brooklyn, N.Y. 11230)

29–31. American Soc. of **Internal** Medicine, Boston, Mass. (E. E. Daleske, 3410 Geary Blvd., San Francisco, Calif. 94118)

29–31. Arizona **Chest Disease** Symp., Tucson. (L. D. Hudson, P.O. Box 6067, Tucson 85716)

29–2. National **Science Teachers** Assoc., natl. conv., Washington, D.C. (R. H. Carleton, NSTA, 1201 16th St., NW, Washington, D.C. 20036)

30–3. American Soc. of **Abdominal Surgeons**, Chicago, Ill. (B. F. Alfano, 675 Main St., Melrose, Mass. 02176)

30–3. Technical Assoc. of **Pulp and Paper** Industry, 5th water conf., Portland, Ore. (The Association, 360 Lexington Ave., New York 10017)

31–3. **Erosion as Related to Air and Water Pollution,** Las Vegas, Nev. (R. B. Reams, Desert Research Inst., Univ. of Nevada, Reno 89507)

31–4. American Assoc. of **Cereal Chemists,** 53rd annual, and American **Oil Chemists** Soc., 58th annual, joint mtg., Washington, D.C. (R. J. Tarleton, 1955 University Ave., St. Paul, Minn. 55104)

31–4. **Materials Engineering** and **Sciences,** conf. and exposition, Philadelphia, Pa. (C. S. Grove, Jr., 5110 Brockway Lane, Fayetteville, N.Y. 13066)

31–5. American **Chemical** Soc., 155th spring natl. mtg., San Francisco, Calif. (A. T. Winstead, 1155 16th St., NW, Washington, D.C. 20036)

31–7. North American **Clinical Dermatologic** Soc., New Orleans, La. (E. F. Finnerty, The Society, 510 Commonwealth Ave., Boston, Mass. 02115)

International and Foreign Meetings

February

6–8. **Weed Control,** Inter-American conf., New Orleans, La. (J. B. Baker, Dept. of Botany and Plant Pathology, Louisiana State Univ., Baton Rouge)

7–9. Canadian Inst. of **Surveying,** annual mtg., Ottawa, Ont., Canada. (Secretary, The Institute, 157 McLeod St., Ottawa)

12–16. **Early Behavior and Brain Mechanisms,** London, England. (Ciba Foundation, 41 Portland Pl., London, W.1)

14–16. **Automatic Laboratory Techniques,** exhibition and conference, 2nd, London, England. (Southern Exhibitions Ltd., 11 Liverpool Terrace, Worthnigton, England)

14–16. International **Solid State Circuits** Conf., Philadelphia, Pa. (L. Winner, 152 W. 43 St., New York 10036)

17–21. South East Asia and Pacific Area League against **Rheumatism,** 1st cong., Bombay, India. (M. M. Desai, Indian Rheumatism Soc., Fetch Manzil, 457-59, Lamington Road, Bombay 4)

17–25. International Trade Exhibitions of **Building Material, Structural Elements and Interior Finishing,** Munich, Germany. (Munchener Messe-Und Ausstellungsgesell-Schaft MBH., Theresienhohe 13, 8 Munich 12)

19–23. Australian Conf. on **Electrochemistry,** Melbourne. (D. F. A. Koch, % Div. of Mineral Chemistry, Commonwealth Scientific and Industrial Research Organization, P.O. Box 124, Port Melbourne, Victoria, Australia)

20–21. New **Synthetic Fibers,** Rotterdam, Netherlands. (Secretariat, % Holland Organizing Centre, 16 Lange Voorhout, The Hague, Netherlands)

20–6. **Commonwealth Broadcasting,** 7th conf., Wellington, Wairakei, Auckland, New Zealand. (M. Stephens, Commonwealth Broadcasting Conference Secretariat, Broadcasting House, London, W.1, England)

22. **Pollution** Symp., Montreal, Canada. (K. Dunlop, Domtar Chemicals Ltd., 1155 Dorchester Blvd. W, Montreal)