The figures above illustrate CAT application in Fetal ECG analysis. The upper portion, taken directly from a plotting device, is a waveshape recorded from the fetal scalp with concurrent noise components, before being applied to the CAT 400B. The lower portions indicate the same ECG signals summed 50 and 100 times. Note the clear definition of the signal under investigation and the gradual dissipation of the background noise.

CAT 400B IS EQUALLY VALUABLE IN PROCESSING BIOLOGICAL DATA IN MANY OTHER RESEARCH FIELDS.

DIFCO LABORATORY PRODUCTS
BIOLOGICS  CULTURE MEDIA  REAGENTS

Media for Standard Methods
Culture Media Dehydrated and Prepared
Microbiological Assay Media
Tissue Culture and Virus Media
Bacterial Antisera and Antigens
Fluorescent Antibody Reagents
Endotoxins  Lipopolysaccharides
Clinical and Serological Reagents
Sensitivity Disks  Unidisks
Peptones  Hydrolysates  Amino Acids
Enzymes  Enrichments  Dyes  Indicators
Carbohydrates  Biochemicals

over 65 years' experience
in the preparation of Difco products assures
UNIFORMITY  STABILITY  ECONOMY
Complete Stocks  Fast Service

Descriptive literature available on request

DIFCO LABORATORIES
DETROIT 1  MICHIGAN  U.S.A.

---

NEW 22-SPEED INSTRUMENT DRIVE
.001512 rpm to 29.28 rpm

- 115-volt synchronous motor assures continuous operation.
- "Push-and-dial" knob selects any of 22 reproducible speeds from .001512 to 29.28 rpm.
- Precision gears throughout—may be shifted during operation.
- Each speed exactly 62.5% of next higher speed.
- 3½"-dia. output shaft extends 1" from front and rear.
- Minimum output torque at top speed 10 in.-oz.
- Dimensions 5¼" x 6½" x 6½" deep.
- $178 complete. $148 without motor and power cord. Write or call for complete information.

HENRY TROEMNER, INC.
Phone (215) 769-6386

---

NEW...in GAS CHROMATOGRAPHY

The N.I.L.—Beroza Carbon Skeleton Determinator*

A new attachment for the flame-ionization gas chromatograph.
Determines the chemical structure of unknown compounds in minute amounts.

FEATURES
- Rapid and simple analysis.
- Only a few micrograms required per analysis.
- Attachment easily installed and removed.

ANALYZES
Acids—Anhydrids—Alcohols
Aldehydes—Amides—Amines
Epoxides—Sulfides—Phenols
Nitro Compounds—Ketones
Halides—Ethers—Esters

EXAMPLES
Octyl Bromide  Octane
Hexyl Sulfide  Hexane
Octodecyl Alcohol  Heptadecane
(Next Lower Homolog)
Dodecyl Aldehyde  Undecane
(Next Lower Homolog)

Carbon Skeleton Determinator
Schematic of the CSD in Gas Chromatography Assembly

MODE OF OPERATION
Catalytically strips off oxygen, nitrogen, halogen and sulfur, saturates double and triple bonds, giving the carbon skeleton and/or the next lower homolog.
Since double and triple bonds are saturated, chromatographic patterns are easily interpreted and identification on the basis of retention time is much more reliable.

Basic References:

*Patent Pending
Reprints available on request

National Instrument Laboratories, Inc.
12300 Parklawn Drive, Rockville, Maryland
In Metropolitan Washington, D. C. Area  Phone: (301) 933-1144

---

SCIENCE, VOL. 143
cretion of substances from the epidermal cells to the surface of the leaves and for the absorption and transport of pesticides from the surface to the interior of leaves.

Other facets of entry and translocation that were dealt with were root uptake, polar transport, and plant and environmental characteristics which influence the behavior of herbicides in and on plants.

Conclusion

The remarks of Sir Robert Robinson, president of the congress, were of interest to everyone. He stressed the role of pesticides in increasing the world’s food supply and in fighting human disease. Annual crop losses are estimated at from 15 to 30 percent, or $20 to $30 billion. The world’s population now stands at some 3 billion, and it is expected to double by A.D. 2000. Food production must be doubled by 1980. In the area of disease, as recently as 1953 some 200 million people suffered from malaria and 2 million people died of it; these statistics, a matter of medical record, underline the importance of the continued use of DDT in bringing malarial mosquitoes under control. Sir Robert gave statistics on the safe use of pesticides in Great Britain. On farms in England there were 140 accidental deaths per year from 1956 to 1960, and none was caused by pesticides. During this period there were 20,000 nonfatal accidents on farms per year: only five of these were from toxins and none was from toxic residues on food. In the United States the Public Health Service has stated that the use of pesticides is compatible with public health. Sir Robert made it clear that the consequences of abandoning the use of pesticides, or the consequences of injudicious legislation against their use and development, might be disastrous.

The congress, attended by over 500 participants from 38 countries, was sponsored by the International Union of Pure and Applied Chemistry.

A. E. Dimond
Connecticut Agricultural Experiment Station, P.O. Box 1106, New Haven
H. T. Reynolds
Department of Entomology,
University of California, Riverside
W. B. Ennis, Jr.
Crops Protection Research Branch,
U.S. Department of Agriculture,
Beltsville, Maryland

10 January 1964
Sudden-Death Syndrome

One-third of all infants who die within the first year of life and after the immediate neonatal period appear immediately before death to be in good health; they die suddenly, and the cause of death is unexplained. This problem has frustrated coroners and medical investigators for 300 years.

A conference that concerned itself with this problem was held at the University of Washington School of Medicine, Seattle, on 9 and 10 September. The participating pathologists agreed: (i) that specific findings are scarce; (ii) that considerable pulmonary edema, sometimes frankly hemorrhagic, is often present; (iii) that petechial hemorrhages involving pleural, epicardial, and occasionally endocardial surfaces are often seen; and (iv) that the thymus is not pathologically enlarged and on histologic examination appears normal. None of these findings were considered pathognomonic, but it was agreed that they are characteristic. In children who die before the age of 2 years, and most frequently in those who die when they are between 2 and 5 months old, these pathologic anatomic features, in conjunction with the absence of other demonstrable pathologic findings and the absence of any evidence of previous significant illness, appear to constitute a syndrome. The designation “sudden-death syndrome” seemed acceptable to all the conference participants.

The problem of the epidemiology was discussed. The evidence indicates the following points. (i) The syndrome appears in all socioeconomic groups, and the incidence is much the same in England and in several parts of the United States. (ii) The evidence relative to seasonal and sex incidence is not clear. (iii) Temporal correlation with the occurrence of infectious disease in the general population remains uncertain. (iv) Although multiple cases in a single family have been reported, no clear evidence as to whether these are fortuitous is available. Twin studies are in progress in England.

A major portion of the conference was concerned with the discussion of two problems, (i) the etiology, and (ii) the mechanism of death. Attempts at viral isolations have been made by several highly competent groups of investigators. However, not all of the most recent virologic techniques have been applied. In a small number of instances viruses have been isolated from...
tissues, including lung and brain, taken at autopsy. In a few instances the same virus has been recovered from other members of the immediate family. However, in the majority of cases examined no viruses were recovered from the autopsy tissues available. The possibility was raised that the sudden-death syndrome may represent a response to viral infection during the period of incubation. The response of mice infected with ectromelia was suggested as an example of occasional fatality during the usually silent incubation period. The data available at present neither support nor disprove a viral etiology for the syndrome.

The problem of immunological immaturity and the change from early neonatal resistance mechanisms to more mature responses was discussed. It was suggested that the second, third, and fourth month of life may be a transition period during which the infant is more vulnerable to infectious disease than he is shortly after birth. While gamma globulin levels in this group of infants appear to be within the normal range for this age, this finding cannot be taken as evidence against such a hypothesis.

There was considerable discussion of the possibility that hypersensitivity to proteins in cow’s milk resulted, after inhalation of milk during sleep, in an atypical anaphylactic reaction. An experimental model in guinea pigs was presented in which the pathologic findings bore sufficient resemblance to those of the syndrome to merit serious consideration. Circulating antibodies to cow’s milk proteins have been observed in a substantial proportion of infants who died with this syndrome, but nearly as high a proportion of living infants of the same age have also exhibited positive titers. Another finding consistent with this hypothesis was the frequent presence of cow’s milk antigen in the lungs of children who died with the syndrome. All agreed that while the hypothesis was attractive, the evidence was highly circumstantial and currently incomplete. If one could prove that infants who never received cow’s milk (entirely breast-fed) never exhibited the syndrome, the case for the hypothesis would be strong. Such information is exceedingly difficult to obtain.

Cardiopulmonary factors which might lead to sudden unexplained death were described by the pulmonary physiologists. It became evident that for the age group most affected, nothing is known about pulmonary physiology.
Gentlemen:

This versatile P-K Laboratory Blender Pres-BLENDS, DISPERSES LIQUIDS, GRANULATES IN JUST MINUTES

If you have any liquid-solids or solid-solids blending requirements, consider the P-K Liquid-Solids Blender. It's a fast, efficient and extremely versatile laboratory tool. With it, you'll find most blending operations can be accomplished in 1 to 5 minutes, achieving a uniformity not attainable with other types of mixing equipment.

3 Different Blending Actions

Gentle Precision Blending. Unique "Twin-Shell" tumbling action will not cause attrition of even the most delicate crystals.


Liquid Solids Blending. Disperses and blends, uniformly, liquids of any viscosity with dry solids. (Blends from ½% liquids by weight to whatever percentage solids can absorb and still remain a solid.) Liquid is introduced into hollow shaft of revolving bar by gravity or pump. Then, flung outward from dispersion discs into the tumbling mass of dry materials.

P-K Liquid Solids Laboratory Blenders are available in 8- and 16-qt. capacities, in transparent lucite or stainless steel. For complete technical information and prices, write to P-K's Chemical and Process Equipment Division, 1011 Hanson St., East Stroudsburg, Penna.

Patterson Kelley

AAAS Symposium Volumes

BIOPHYSICS OF PHYSIOLOGICAL AND PHARMACOLOGICAL ACTIONS


SCIENCES in Communist China


OCEANOGRAPHY


GERM PLASM RESOURCES


Order Today From

American Association for the Advancement of Science
1515 Massachusetts Ave., NW,
Washington, D.C. 20005

Calorimetry

In order to report new developments in thermodynamics and thermochemistry, to develop cooperative schemes for improving the acquisition and dissemination of thermodynamic data, and to exchange views on techniques, the 18th Annual Calorimetry Conference was held 16-18 October in Bartlesville, Oklahoma, at the Bureau of Mines Petroleum Research Center. This conference was the first to be held at the home laboratory of its founder, the late H. M. Huffman.

The keynote address, "Some legacies of H. M. Huffman to calorimetry and thermodynamics," was delivered by John P. McCullough (Socony Mobil Oil Co.), a successor of Huffman as director of the laboratory. He described the(i) development of a model laboratory and (ii) the method of obtaining coherent and comprehensive thermodynamic data by a coordinated series of various kinds of experiments upon carefully selected classes of compounds. This approach, initiated by Huffman and continued by his successors, has resulted in such outstanding contribu-
The complete microscope, pact and J. instantaneously converts a monocular tube into a micro-projection unit.

**MICRO-VIEWSCOPES**

- **NO eyestrain**
- **NO intense motionless inspection**
- **NO time-consuming setups**

**MICRO-VIEWSCOPE II**
The Micro-Viewscope Model II is a complete micro-projector combining a microscope, an illuminating system and a projection screen into one compact unit. Magnifications 50x to 1000x.

**MICRO-VIEWSCOPE ATTACHMENT**
The Micro-Viewscope Attachment instantly converts any available microscope with monocular tube into a micro-projection unit.

**REQUEST LITERATURE**

Hacker
WILLIAM J. HACKER & CO., INC.
BOX 646 / W. CALDWELL, N. J. / CA 6-8450

**What's your best buy in heavy duty beakers?**

Months of field tests in 25 major laboratories prove that it's the new Pyrex® brand heavy duty beaker.

It outlasted conventional types by 3 to 5 times in the field tests, cutting replacement costs up to 40%. In our own tests—in a special machine that bongs beakers together hard, bums them down hard—it has outlasted all other Griffin types by as much as 20 to 1.

The No. 1003 Heavy Duty Beaker will give you superior performance in your toughest lab jobs because we make it with a new process that yields extra-heavy rims and extremely uniform walls.

Test it in your own lab. See how much you can save on replacements. Order now through your labware dealer.

Want more information? Write Laboratory Glassware Dept., Corning Glass Works, 7101 Crystal St., Corning, N. Y. And ask for the new, blue Pyrex® brand Labware Catalog LG-3 if you don't yet have a copy—it has all the best buys in labware.

**CORNING**
CORNING GLASS WORKS
tedious arithmetic, allows the variations in the spectrum to be readily followed as changes are permitted in the relative proportions and masses of light and heavy atoms in the lattice. The heat capacity, at least in its broad pattern, is readily derived, of course, when the frequency spectrum is fully known.

Of particular interest to calorimetrists is the accuracy of the temperature scale because the validity of most measurements is dependent upon it. J. L. Riddle (National Bureau of Standards) discussed the changes in the International Practical Temperature Scale proposed by the Advisory Committee on Thermometry of the International Bureau of Weights and Measures. These changes, currently the subject of intense work in several laboratories, would extend the International Practical Temperature Scale below the oxygen point to the hydrogen triple point, would extend the platinum resistance thermometer scale upward to 1063°C, and make several minor adjustments of defined fixed points. The object of the change is to create an International Practical Temperature Scale as close to the thermodynamic scale as can be done in the light of current knowledge.

The prospect of making these changes within the next few years should stimulate studies to indicate whether or not the proposed changes are consistent with the best thermodynamic data.

An illustration of the lack of consistency in the present scales was given by G. T. Furukawa (National Bureau of Standards), who showed consistent deviations in correlations of low-temperature, heat-capacity data based on the temperature scales. When the experimental data are analyzed on the basis of the observed resistances of the thermometer instead of converting to temperatures, the deviations are eliminated. The deviations observed are attributed to inconsistencies in the dr/dT derived from the temperature scales.

In the calorimetry of reacting systems, P. Gross (Fulmer Research Institute, England) illustrated how, with apparatus of utmost simplicity, it is possible to obtain accurate heats of combustion of metals in fluorine or chlorine. The use of fluorine in bomb calorimetry was further illustrated by E. Greenberg, H. A. Porte, and W. N. Hubbard (Argonne National Laboratory) who described the heats of formation of pentfluorides of Nb, Ta, and Ru, W. D. Good, M. Mansson, N. K. Smith, and J. P. McCullough (U.S. Bureau of Mines, Bartlesville) showed that
the thermochemistry of boron, long a troublesome element for calorimetrists, can be handled with high precision in a rotating bomb calorimeter. They are able to burn organo-boron compounds completely and form a homogeneous, well-characterized final state by converting the boron to fluoroboric acid in aqueous solution.

A principal factor impeding measurements on the combustion of metals and refractory solids in a bomb calorimeter has been the inability to observe the actual combustion. Slow-motion pictures taken of combustion in a bomb with a window were shown by C. E. Holley, Jr. (Los Alamos Scientific Laboratory). This method, while not in any sense a calorimetric method, may result in devising a system for heat measurements which are traditionally very difficult because complete and reproducible combustion cannot be obtained easily.

In discussions of solution calorimetry, L. A. K. Staveley (Oxford) and K. W. Dunning (University of Bristol) presented very ingenious studies on the energies of complex formation of metallic ions in combination with organic ligands; students of Cobble (Purdue University) reported on precise determinations of specific heats of aqueous salt solutions.

Dealing with calorimeters for measuring radiation dose, P. Nagl (International Atomic Energy Agency, Vienna) and E. Schleiger (U.S. Radiological Defense Laboratory) described calorimeters for measuring absorbed dose in rads (a rad is 100 erg/g); this device has received increasing attention during the past 5 years.

Many important new contributions in the field were noted at the conference; there were altogether a total of 51 papers. Several informal discussion groups were set up; their general topics and moderators included: experimental techniques in enthalpy measurements, E. F. Westrum (University of Michigan); experimental techniques in bomb calorimetry, W. N. Hubbard; standard reference materials for solution calorimetry, S. R. Gunn (Lawrence Radiation Laboratory); and classification of calorimetric data for publication and retrieval, G. T. Furukawa.

The Phillips Petroleum Company was joint host for the conference; J. A. Morrison (National Research Council, Canada) was conference chairman.

GEORGE T. ARMSTRONG
National Bureau of Standards, Washington, D.C. 20234

What's your best buy in Erlenmeyers?

Just look at the Pyrex® brand flask No. 4982 pictured here and you'll know.
You get a tough, heavy rim that makes the 4982 work much longer for you, plus the balance of glass throughout the walls that strengthens every Pyrex brand Erlenmeyer.
You get white screened approximate graduations, at no extra cost, to speed your work and make the flask itself more versatile.
All the best buys are in the new, blue Pyrex brand labware catalog LG-3. If you need a copy, write Laboratory Glassware Dept., Corning Glass Works, 7101 Crystal Street, Corning, New York.

CORNING GLASS WORKS
NewEMR Spectrometers Advance Standards in Sensitivity & Resolution

Strand Labs announces that its new B-series of X-band electron magnetic resonance spectrometers set a new standard in EMR sensitivity and resolution. Using a new development in microwave detectors, these systems, with a high-resolution 6 ke magnetic field modulation, offer demonstrated noise figures of 15 db at 1 milliwatt sample cavity power level. This figure corresponds to a minimum detectable number of spins of $2 \times 10^{10}$ spins/gauss of line width when the sample is observed at room temperature in a cavity with unloaded $Q$ of 25,000 (which is standard in our X-band systems) and with an integration time of 3 seconds.

These proven systems in Model 601 and Model 602 configurations are available for use with microwave power at the cavity of up to 200 milliwatts. Note that these B-series systems may be compared in sensitivity with existing units by scaling the sensitivity, $2 \times 10^{10}$ spins/gauss, inversely proportional to both the square root of the microwave power and the $Q$ of the sample cavity. In these systems, however, the use of the full 200 milliwatts of power may not increase the sensitivity by another factor of 14, since saturation of the sample tends to limit the increase in sensitivity with power. It can only be said that, in many cases, a sensitivity of better than $5 \times 10^{10}$ spins/gauss is achievable in these systems with more power.

This sensitivity increase corresponds approximately to a reduction by 15 db in noise figure of Strand Labs A-series systems. This is accomplished by using a new type of semiconductor diode selected for low 1/f noise and for match in our detector mounts. We consider the B-series the ultimate in EMR apparatus since, though conceivably a further 10 db noise figure may be possible with maser amplifiers, this further reduction in noise figure yields only a factor of 3.1 decrease in the minimum number of detectable spins. The high $Q$ of our sample cavity gave the Strand Labs A-series EMRs an 11 db increase in sensitivity with systems with sample cavity $Q$ of 7,000. Now, with a detector noise figure within a few db of that attainable at any signal frequency, 100 kc or 30 mc, and with our ultra-stabilized klystron sources, Strand Labs offers a B-series EMR system with highest resolution and unsurpassed noise figure. The high $Q$ sample cavity yields a bonus sensitivity of up to 11 db.

For the K (26-256Gc), K, (34-36 Gc) and E (67-73 Gc)-band EMR, Strand Labs expects similar increases in sensitivity, even though they are remarkably good at present. For example, the K and K, units have been demonstrating sensitivities (based on molecular oxygen as a standard of better than $5 \times 10^{10}$ spins/gauss of line width).

If you have a requirement for an electron magnetic resonance spectrometer that demands the limit of what is currently achievable at X, K, K, or E-band, or if you already own a Strand Labs EMR and would like to have it modernized or given a maintenance check up, write the Technical Director at Strand Labs.
possible and "strongly urged that every effort be made to continue publication of this unique bibliographic instrument."

A third resolution commended "the International Council of Scientific Unions for the inauguration of an International Biological Program which stresses the biological basis of productivity and human welfare" and urged zoologists individually and through their societies to support the program.

The plenary session ratified the new constitution of the International Commission on Zoological Nomenclature and changes involving articles 11(b), 11(d), 29(a), and 31 of the code. The election of the following members to the Commission was also ratified: do Amaral, Vokes, Stoll, Holthuis, Miller, Mayr, Ride, Krauss, Hubbs, Sabrosky, and Forest, and, subject to his agreement to serve, G. G. Simpson.

The officers of the congress were: president, Alfred S. Romer; vice presidents, Umberto D'Ancona (Italy); Jean G. Baer (Switzerland); Enrique Beltran (Mexico); N. John Berrill (Canada); L. C. Birch (Australia); P-P. Grassé (France); Sven Horstadius (Sweden); Libbie H. Hyman (U.S.); H. J. Muller (U.S.); Ye. N. Pavlovskii (U.S.S.R.); Eduardo de Robertis (Argentina); Oswain W. Richards (United Kingdom); B. R. Seshachar (India); E. J. Slipher (Netherlands); George G. Simpson (U.S.); Nikolaas Tinbergen (United Kingdom); Tohru Uchida (Japan); and C. M. Yonge (United Kingdom); secretary-general, Gairdner Moment; program chairman, John Moore; treasurer, Alexander Wetmore; and finance chairman, Gerard Piel.

Baer expressed the sincere hope of the permanent committee that the tentative invitation for the 17th Congress to meet in Delhi in 1968 will become firm and will be accepted. He also thanked all the various American committees which had worked so hard to achieve this outstanding Congress.

The Daily Phoenix, edited by William T. Kabisch of the AAAS staff, recorded the day-by-day progress of the congress and even reported a field sighting of the Phoenix.

Volumes 1–5 of the proceedings may be bought at $1.25 per volume by writing the Printing and Publishing office, National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418. Each volume contains about 300 pages. Volumes 1 and 2 consist of the contributed papers, and volumes 3 and 4 are the specialized

---

**What's your best buy in Volumetric Flasks?**

If you use stoppered flasks, it's No. 5642. This PYREX® brand flask gives you Class A accuracy plus the strength of uniform glass distribution in the walls plus the economy of polyethylene stoppers.

If you prefer plain tops, it's the PYREX brand flask No. 5600. It gives you Class A accuracy, permanent red inscriptions, strength that means longer life and greater safety in your lab, plus savings you'll realize through fewer replacements.

Do you know all the best buys in laboratory glassware? You'll find them in the new, blue PYREX brand labware Catalog LG-3. If you need a copy, write Laboratory Glassware Dept., Corning Glass Works, 7101 Crystal St., Corning, New York.
THE DOOR TO SUCCESS IS SELECTION

Buchler UVISCAN II is the double-beam ultraviolet monitor designed to solve your selection problems. Attach the UVISCAN II to an electrically-driven fraction collector, such as the Buchler Sectional Turntable Fraction Collector; make a few simple tubing and recorder connections; and the system is ready to monitor. This is the U-V monitor designed with special attention to detail.

- The double beam handles solvents with changing absorptions or handles two separate chromatographic columns supplying outputs for two recorders.
- UVISCAN II has a sensitivity of 0.01 optical density unit and a spectrum range of 230 to 300 μm.
- A flow cell with an adjustable light path of from 1.5 to 5 mm or from 5 to 10 mm.

The detail of price is not overlooked either—for 115 volt, 60-cps operation, the UVISCAN II price is $780.00. Other models are available for different power sources. So, when you are looking for that fraction of value, select it automatically and successfully with the Buchler UVISCAN II—another instance where Buchler provides the key to that door.

Send for Bulletin S-3-5000A

BUCHLER INSTRUMENTS, INC.
1327 16th Street, Fort Lee, New Jersey 07025
Phones: (N. J.) 201-945-1188 • (N. Y.) 212-563-7844

Paleontology

Advances in paleontological research and the republication of classic contributions to the field were reported at a meeting of the Paleontological Research Institution in Ithaca, New York, on 12 October.

The subject matter announced by K. V. W. Palmer, director of the institution, as having been published or in press in the serial publications of the institution (Bulletins of American Paleontology and Palaeontographica Americana) reflects a continuing interest in the problems of tertiary stratigraphy which first attracted the founder, Gilbert Dennison Harris. However, in recent years the institution has embarked on a program of republishing important references no longer readily obtainable. While some will be reprinted in their original form, such as Conrad’s Fossil Shells of the Tertiary Formation (available in 1964), others are being reevaluated and modernized, such as K. V. W. Palmer’s Illustrations and Descriptions of Type Specimens of Marine Mollusca Described by P. P. Carpenter from the West Coast of Mexico and Panama (in press).

The institution also compiles data covering wide geographic areas and a wide range of organisms. Research workers will soon have available the Catalogue of Paleocene Mollusca of the Southern and Eastern U.S.A. by K. V. W. Palmer and D. Brann, and Late Cenozoic Pelecypods from Northern Venezuela by N. E. Weisbord (both in press). Publications on organisms, from Foraminifera through Lycocops, indicate the breadth of the institution’s activities in all areas of paleontology. Palmer noted that the total volume of publications had doubled during the last 3 years to sustain this activity. The number of manuscripts at hand point to further increases in volume in the near future.

In addition to activities pertinent to publication, the institution maintains and processes large collections of type symposia. Volume 5 contains the list of registrants and a general account of the congress. Volume 6 will contain the six scientific plenary sessions and will be published by the Natural History Press, Central Park West at 79th Street, New York, New York.

GAIRDNER B. MOMENT
Goucher College, Baltimore, Maryland
a complete low cost system for taking motion pictures of exceptional quality through the microscope

The New Sage SERIES 300 Time Lapse Apparatus takes pictures that are sharp, clear, in perfect register

The Sage Series 300 Time Lapse Apparatus provides all the features necessary for getting excellent motion pictures at high magnifications. The instrument includes a unique desk-mounted vibration-isolation system, camera and drive assembly with wide choice of framing rates, viewing eyepiece for the microscope, variable time exposure control for continuous light photography, and trigger for flash synchronization.

Also from Sage, the completely integrated Series 100 Time Lapse Cinephotomicrographic Apparatus includes a dual light source, steady source for viewing and xenon flash for photography, built-in controls, and other features that make it the most versatile time lapse instrument available.

For complete information, write or telephone.

SAGE INSTRUMENTS, INC.
2 SPRING ST., WHITE PLAINS, N.Y. 914 WH 9-4121
Represented by leading microscope dealers.

Make digital data from mechanical motion

FROM DIGITAL ENCODER TO READOUT TO COMPUTER

Perkin-Elmer One-Brush Encoders are uniquely different. Superior features—a single brush, freedom from noise, low torque, low moment of inertia, and long, long life (5 million brush passes are guaranteed), make them a major advance in encoding state-of-the-art.

Whether you have linear or rotary motion, there is an encoder model that can be adapted to your application. The 11 inch Linear Motion Encoder can be used with Brown or Bristol Recorders to digitize strip-chart information. There's a model for Leeds & Northrup Series H Recorders too. For rotary inputs there are 1, 10, 36, and 100-turn models with total counts from 100 to 100,000.

In addition, Encoder/Readouts are available with BCD8421, Straight Binary, Minimum Switching, Gray or Datex outputs. Encoder/Readouts can be provided with 3, 4, 5, or 6 digit decimal light readouts, or buffer storage, and are compatible with standard card and tape punches.

Specifications for the entire line of Perkin-Elmer One-Brush Absolute Position Encoders and Encoder/Readouts, optional equipment, and applications information are contained in the brochure, Digital Monitoring and Control. Send for your copy from the Vernistat Division, Perkin-Elmer Corporation, 784 Main Avenue, Norwalk, Connecticut.

PERKIN-ELMER

What's your best buy in Graduated Cylinders?

For research, it's the Pyrex® brand cylinder No. 3050. You can see why—large numerals and fine graduations of fused-in ACCU-BED™ for accuracy, permanence, and strength—a tough shoulder of glass that stays put to prevent tipping chipping —the stable hexagonal base that resists toppling and can't roll.

For teaching, it's the Pyrex brand No. 3075 cylinder. Real price economy—detachable plastic hex base—sharp white enamel graduations, large numerals.

These are just two of the best buys in laboratory glassware that you'll find in the new, blue Pyrex brand labware Catalog LG-3. If you don't have your copy, write Laboratory Glassware Dept., Corning Glass Works, 7101 Crystal St., Corning, N. Y.

CORNING GLASS WORKS
The SORVALL SS-3 is the ONE Automatic Superspeed Centrifuge that is first choice in laboratories where efficient, routine separations, or a wide diversity of centrifuge work, are performed. In addition to features mentioned above, the SS-3 now incorporates the latest SORVALL Speed Selector. This all-new control provides rapid, automatic acceleration to all speeds from 500 RPM to maximum. It maintains your preset speed with the highest accuracy and regardless of possible fluctuations in line voltage. As such, the SORVALL Speed Selector is a major advance in centrifuge instrumentation. Six Angle and Horizontal Rotor are available, and SORVALL offers from stock the largest range of tubes and adapters in the field. Before you buy any superspeed centrifuge, we suggest you ask for our literature, consult a direct SORVALL representative, or call our main office. Remember, SORVALL CENTRIFUGES SERVE YOU BEST! Ask for Bulletin SC-155-3.

Ivan Sorvall, Inc.
NORWALK • CONNECTICUT
WHAT’S NEW IN STOPCOCKS?

#6460 • with serrated tubulations on each end of the stopcock.

#6461 • with 10/18 taper on one end, serrated tubulation on the other. Male taper mates with glass connection into leakproof joint, without lubrication.

#6462 • with 12/5 socket on one end, serrated tubulation on the other. Female joint mates with glass connection into leakproof joint, without lubrication.

Nalge has done it again! Our research has developed these three new corrosion-resistant stopcocks with polypropylene housing and TFE plug. These all-plastic stopcocks are low-friction, absolutely leakproof. They’re vacuum-tight . . . yet can’t stick, won’t freeze. No lubrication is required, thus eliminating the possibility of contamination. You never had such perfect control of liquid flow. Each stopcock is tested for vacuum and pressure. Enjoy the trouble-free operation and repeated savings of new unbreakable Nalgene® stopcocks. For complete information ask your lab supply dealer or write for Brochure M-563, Dept. 2101, The Nalge Co., Inc., Rochester, N.Y.

Du Pont registered trademark

Nalgene LABWARE
Leader in quality plastic labware since 1949

erly Hills, Calif. (E. McCandless, Los Angeles County Heart Assoc., Los Angeles 57, Calif.)

February

2-5. American Inst. of Chemical Engineers, annual, Boston, Mass. (J. Henry, AICE, 345 E. 47 St., New York, N.Y.)


2-8. Teratology, workshop, Commission on Drug Safety, Gainesville, Fla. (D. C. Trexler, Commission on Drug Safety, 221 N. LaSalle St., Chicago, Ill. 60601)


3-4. Society of Rheology, Claremont, Calif. (T. L. Smith, Stanford Research Inst., Menlo Park, Calif.)

3-4. Perspectives in Virology IV, Gustav Stern symp., New York, N.Y. (M. Pollard, Lobund Laboratory, Univ. of Notre Dame, Notre Dame, Ind.)


5-7. Military Electronics, 1964 winter conv., Los Angeles, Calif. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York, N.Y. 10021)

5-8. American College of Radiology, natl. meeting, Tucson, Ariz. (American College of Radiology, 20 N. Wacker Dr., Chicago, Ill. 60606)


9-11. Entomological Soc. of America, Southwestern Branch, Monterrey, Mex. (D. F. Martin, P.O. Box 1033, Brownsville, Tex. 78521)

10-14. New Zealand Institution of Engineers, conf., Wellington. (F. N. Stace, P.O. Box 3047, Wellington, N.Z.)


13-14. Texas Industrial Pharmacy Seminar, Austin. (L. R. Parker, Pharmacy Extension Service, Univ. of Texas, Austin)


What’s your best buy in Water Distillation Apparatus?

For purity, convenience and safety, it’s got to be our new No. 3500 packaged unit.

Its Pyrex® brand components, Vycor® brand immersion heater, and Teflon® stopcocks give you complete freedom from metal contamination. You can operate this unit continuously without special attention and get up to 3 liters per hour of water with purity like this: resistivity of 1.7 megohms-cm; 0.3 ppm total solids; pyrogen free (U.S.P. XVI).

This completely packaged water distillation apparatus is just one of the best buys you’ll find in the new, blue Pyrex brand labware Catalog LG-3. If you don’t have a copy, write Laboratory Glassware Dept., Corning Glass Works, 7101 Crystal St., Corning, N. Y.

*Du Pont trademark
Licensed under Pat. No. 2,876,985.

CORNING GLASS WORKS
HERE'S VARIAN'S NEW X-Y RECORDER

Recorders should be rugged and reliable. That's why Varian's solid-state X-Y recorders have all moving parts mounted on one sturdy casting. And Varian's X-Y recorders are designed for convenience, too. Unique vacuum hold-down is maintenance-free and holds any size or shape of paper from 2" x 2" to 11" x 17", without masking. The control panel is arranged to avoid confusion. Pen is held magnetically for easy servicing. Charts can be precisely positioned with vacuum on.

THE VARIAN X-Y RECORDER FEATURES:
- 0.2% accuracy
- 17"/sec. pen speed
- 14 DC voltage ranges
  - 0.5 mv/in. to 50 mv/in.
- vernier adjustment between ranges
- full scale zero plus 100% suppression
- zener diode reference
- independent servo-operated axes
- bench-top or rack mounting

Varian makes two models of this superior X-Y recorder: The F-80 (shown above), with automatic-cycling time base—$2025; the F-81, without time base—$1875. For further information or a demonstration, write RECORDER DIVISION.

The Radiochemical Centre is now able to supply a range of reasonably priced INDIVIDUALLY TESTED cobalt-57 sources for Mössbauer studies.

Sources are electroplated and annealed, employing stainless steel backing foils for single line sources and natural iron backing foils for hyperfine magnetic splitting.

Write for our Technical Bulletin which describes the range of Mössbauer sources now available.
New Products

Laser power meter (model 401), designed specifically for measurement of power of continuous-wave gas lasers, measures directly radiation of 6328-Å wavelength. Measurements can be performed at any other wavelength between 4000 and 12,000 Å by use of a spectral-response calibration curve with which the instrument is supplied. Amplitude modulation of the laser beam at frequencies between 10 and 50 kcy/sec can also be monitored. Calibration accuracy of the meter is said to be ± 2.5 percent of full-scale range at 6328 Å. Full-scale ranges are 1, 3, 10, 30, and 100 mw and are selected by a front-panel switch. Output is provided for a 100 mv potentiometer recorder with frequency flat to 20 kcy/sec at the recorder output. Lens aperture of the sensing cell is 25 mm in diameter and acceptance angle is ± 10 deg. The cell may be used in a mounting stand or mounted directly to the beam output aperture of the laser—J.s. (Spectra-Physics, 1255 Terra Bella Ave., Mountain View, Calif.)

Circle 1 on Readers' Service card

Streak camera (model SP-1), manufactured by Hitachi Ltd., Tokyo, is designed for recording the emission spectra of laser materials. Writing time of the camera is 165 µsec at a writing rate of 4 mm/µsec. Film loading may be performed in daylight with attached lightproof 100-ft 35-mm magazines with built-in cutoff. Synchronization of events is accomplished by using an output pulse from the rotating mirror and the high-speed rotating capping shutter. Both pulses are displayed on an electronic counter. The system is said to have been designed so that it can be operated by research technicians without photographic training. To prepare for an observation, the object is positioned in line with the optical system. Provision is made for alignment up to 350 deg off axis by turning the mirror pickup assembly. Alignment focusing is accomplished with a reflex viewer through the prime lens, and focusing for slit alignment is straight through the optical system at the film plane. The mirror drive is electrical, requiring 20 amp at 220 volts for the maximum writing speed.—J.s. (Ehrenreich Photo-Optical Industries of California, 701 Welch Rd., Palo Alto, Calif.)

Circle 2 on Readers' Service card

High-vacuum baffles designed specifically for use with liquid nitrogen as a refrigerant are available in 4-inch and 6-inch nominal sizes. The baffles consist of a flanged housing containing a chevron element and reservoir assembly that can be removed for cleaning without breaking vacuum line flange connections. The reservoir holds enough liquid nitrogen for an operating period of 11 hours. A vacuum jacket surrounds the reservoir to reduce refrigerant losses to a minimum. Flanges of the aluminum casing have standard 150-lb (68-kg) ASA series drillings. The flanges have raised gasket seating surface designed for use with O-rings in aluminum ring retainers. Automatic liquid nitrogen level sensors and fillers are available as accessories.—J.s. (Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester 3, N.Y.)

Circle 3 on Readers' Service card

Viscometer bath (model TV-40) manufactured by P. M. Tamson, Netherlands, provides a working temperature range of 0 to 230°C. Temperature control precision is said to be ±0.005°C when water is used as the bath medium. With oils or silicone fluids as the medium, maximum variation is given as ±0.01°C. The control heater of quartz is cycled by the thermoregulator to maintain temperature control. The bulb of the contact thermometer in the thermoregulator is close to the heater so that it is rapidly heated by the hot coil. As a result, the control heater is on only 4 seconds each cycle. A stainless-steel jacketed booster heater permits the bath to be brought up to working temperature at the rate of 1°C/min with water and 2°C/min with oil. Power consumption with the booster heater is 2920 watts. A cooling coil with inlet and outlet connections is a refrigerant circulat-

The material in this section is prepared by the following contributing writers:
Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager (D.J.P.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither Science nor the writers assume responsibility for the accuracy of the information. A Readers' Service card for use in mailing inquiries concerning the items listed is included on pages 87 and 161. Circle the department number of the items in which you are interested on this card.
Single piston—for producing artificial breathing in small animals. The valve is synchronized with the stroke to control air flow direction. When the pump reaches full travel on the pressure stroke, the valve disconnects the flow of air to the lungs and exhalation takes place naturally. Gas mixtures may be introduced or collected through the valve system. For best results, use our #71-021 cannula.

Available in three models.

- #70-078-01
  Rate 15-140 strokes per min.
  Vol. 7.5-50ce per stroke

- #70-078-02
  Rate 40-200 strokes per min.
  Vol. 0.1-50cc per stroke

- #70-078-03
  Rate 7-34 strokes per min.
  Vol. 0.7-50cc per stroke

PHIPPS & BIRD, INC.
Manufacturers & Distributors of Scientific Equipment
6th & Byrd Streets—Richmond, Virginia

New AAAS Symposium Volume

BIOPHYSICS OF PHYSIOLOGICAL AND PHARMACOLOGICAL ACTIONS

Edited by Abraham M. Shanes. 612 pages.
212 illustrations. 19 tables. References. Index.

Price: $13.50
For AAAS Members: $11.75 prepaid.

The past decade has seen a remarkable extension of concepts related to excitability, permeability, and muscle contraction. The 30 articles composing this volume provide a new basis for understanding many kinds of muscle and nerve cells and various forms of junctional transmission. The subject is one of the exciting borderline frontiers of biological science which has been under attack in recent years from a number of directions.

A birds-eye view of a number of principles and their applicability to a variety of excitable systems that will be useful both in teaching and in research.

Order Today from
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
1515 Mass. Ave., NW, Washington, D.C. 20005
ingsystem is also provided. All parts in contact with the bath liquid are made of stainless steel. The bath chamber has a stainless-steel cover with four covered openings, 2 inches (5 cm) in diameter, for suspending viscometer tubes.—J.s. (Fisher Scientific Co., Fisher Building, Pittsburgh 19, Pa.)

Circle 4 on Readers’ Service card

**Thickness gage** is designed specifically for measuring the thickness of silicon and germanium slices and wafers. It allows measurement of thickness without actual contact with the brittle semiconductor slice, thus avoiding mechanical damage. The instrument operates on the air-flow principle. Linear displacement is converted into an amplified air-flow change which is read on a specially adapted flowmeter. During measurement, the semiconductor slice is suspended between two air jets. The air flow has the additional advantage of cleaning away grit or particles that might affect readings made in other ways. Accuracy of ±0.000025 inch is said to be easily achieved. Four models provide amplifications ranging from 100 to 1 through 10,000 to 1.—J.s. (Futurecraft Corp., 1705 N. Chico Ave., South El Monte, Calif.)

Circle 5 on Readers’ Service card

**High-speed infrared detector system** (model IRD-4) is designed for plasma diagnostics, millimeter and sub-millimeter wavelength studies, and time-resolved infrared spectroscopy. The detector operates in the wavelength region from 100 μ to a few millimeters. The system consists of a high-sensitivity photodetector with a wave guide, a super-conductive magnet, and a helium cryostat in which the detector is immersed. This unit is contained within the stainless-steel cryostat, which is 36 inches (91 cm) high. Signals with risetimes of less than 1 μsec are said to be detectable. The output is available from a low-capacitance transmission line for connection to appropriate circuitry. With amplifiers of low input noise resistance, minimum detectable energy is said to be 10⁻¹⁰ watt-sec or better with 1 cy/sec bandwidth. A special constant-current power supply is available to charge the superconducting magnet and a helium liquid level detector is available for monitoring the operation of the system.—J.s. (Advanced Kinetics, Inc., 1231 Victoria St., Costa Mesa, Calif.)

Circle 6 on Readers’ Service card
Bronwill brings you Godfrey Stereomodels

Can you match these Stereomodels with their correct names? See bottom of page.

SEE SKELETAL STRUCTURE...ACTUALLY MEASURE INTERNUCLEAR DISTANCES

GODFREY STEREO MODELS are of tremendous importance to teachers, students and research chemists. They present chemical relationships better than ever before possible. You can see skeletal structure...how atoms are linked...whether they are stable...and why. You can even measure internuclear distances with remarkable accuracy...a precise, 250,000,000 x magnification of all elements is ingeniously maintained (2.5 cm = 1 Å).

Bond angles are correct, too. Elements are all vividly, solidly and permanently colored throughout...and virtually unbreakable, too! Free rotation about single bonds is demonstrable...yet structures will remain locked in any preset position. Boat or chair conformation of cyclohexane show their natural stability...even intermediate twist conformations can be fixed in position for handling and measurement.

The basic kit is supplied, at no extra charge, with a large variety of structural components...olefinic and aromatic double bonds, acetylenic triple bonds, the benzene ring, amide and nitrile groups, as well as tetrahedral and trigonal carbon and nitrogen, digonal oxygen and sulfur, hydrogen and the halogens...at a price, one-third of any competitive units. No tools are required for any assembly...simple, quick, hand connections only. Connector tubes have positive, snap-lock connections, with built-in torsional friction. Large, complex models (synthetic polymers, proteins, polycarboxylides) can be assembled and handled without inadvertent disruption.

STEREO MODELS IN TOP PHOTO: A. Methylacetylene; B. α-Phenoxyethyl Penicillin; C. cis Decalin; D. Bicyclo [2,1,1,0^2,6] hexane-5 (N-t-butyl) carboxamide; E. 6-Trifluoromethyl -7-sulfamyl-3,4-dihydro-1,2,4-benzothiadiazine 1,1-dioxide.

It would have been easier if they were visible in their full, identifying colors. Write today for full color brochure.

BRONWILL No. 90, GODFREY STEREO MODELS...Complete Kit, $49.95 each (lots of 12—$45.00, lots of 24—$40.00)

Rotating drum camera provides time-resolved photographic data of hypervelocity phenomena at writing speeds up to 0.19 mm/µsec. The record is made on a 3- by 12.4-inch fast-emulsion film strip fixed to the inner periphery of a rotating drum. The drum rotates at 600 rev/sec to provide the writing speed quoted for a total writing time of 1667 µsec. The camera requires adjustment only of focus and aperture (f/2.5 to f/16) for operation. Focus range is 14 inches to infinity. The instrument is air driven and requires 0.3 lb/sec of air at 70 lb/in.² pressure. The instrument measures 15 by 8 by 8 inches and weighs 25 lb.—J.S. (Avco Corp., 2 Industrial Ave., Lowell, Mass.)

Circle 7 on Readers' Service card

Neutron-gamma shielding materials utilize base materials of high hydrogen content, such as polyethylene, paraffin, hard rubber, or epoxy. Various additives such as lead, boron, cadmium, and tungsten may be added in appreciable quantities. Base materials and additives are of high purity to minimize activation of the shielding materials. The additives are uniformly distributed throughout the base material. A variety of formulations and shapes can be tailored to meet specific shielding requirements. Typical formulations are: polyethylene—3-percent boron; rubber—50-percent lead—1-percent boron; and paraffin—25-percent lead.—J.S. (Reactor Experiments Inc., 140 Harbor Blvd., Belmont, Calif.)

Circle 8 on Readers' Service card

Photoelectric autocollimator is designed for the monitoring and control of angular position with accuracy said to be better than 1 sec. In operation, the autocollimator sends out a highly collimated beam of light directed against a porro prism or a flat mirror mounted on the object to be monitored. If the object is perfectly aligned, the reflected beam is exactly parallel to the incident beam and no error is indicated. If the object is rotated, however, the returning image moves through twice the angle of deviation and the instrument generates a corresponding error signal. The instrument uses a single light source and a single detector. It can be furnished to monitor rotation about either the vertical or the horizontal axis or to monitor both axes simultaneously. Simultaneous visual autocollimation is provided on a diverted line of sight and sufficient

B R O N W I L L  S C I E N T I F I C
A DIVISION OF WILL SCIENTIFIC, INC.
125 N. GOODMAN ST., ROCHESTER 1, N. Y.
focusing adjustment is provided to enable an observer to view positions and orientation of the monitored object. A calibrated optical micrometer drum permits initial alignment and also functions as an alternative null-measuring device.—J.S. (Barnes Engineering Co. Commerce Rd., Stamford, Conn.)

**Circle 9 on Readers’ Service card**

**Image converter camera** (model ID) is a diagnostic instrument for the study of high-speed luminous events. The instrument provides both streaking and framing operation through the use of interchangeable plug-in units. Three frames per event are obtained at exposure times adjustable from 5 to 200 nsec, with independently adjustable framing intervals at rates from 5,000 to 20 million exposures per second. Streak writing rates range from 1000 to 0.25 mm/μsec. Framing and streak operation can be alternated through the same optical setup. Light gain of 50 makes possible the study of low-intensity events at exposure times in the nanosecond range. The camera can be triggered either optically or electrically from the experiment. A fiber optic probe from the trigger delay generator can pick up luminosity from the event and trigger the instrument at a preselected energy level. In the converter, light is converted into an electron image. The image converter tube is turned on for the selected interval by a rectangular pulse to the gating grid. The framing exposure time is determined by the duration of this shutter pulse. The electron image is focused and then deflected into three positions for framing operation. For streak operation, ramp pulses applied to deflection electrodes sweep the image across the photoanode.—J.S. (Space Technology Laboratories, Inc., 139 Illinois St., El Segundo, Calif.)

**Circle 10 on Readers’ Service card**

**Ultraviolet intensity meter** is designed for monitoring the exposure of phresists. The meter can be used to maintain control of ultraviolet source intensity, focus, and alignment. The spectral range of the meter is 250 to 500 mλ with peak at 400 mλ. Sensitivity is 200 μa/100 ft-ca. Diameter of the sensitive area can be adjusted between 1 and 0.2 inch. Other spectral ranges can be supplied.—J.S. (Gilway Co., Byfield, Mass.)

**Circle 11 on Readers’ Service card**

---

**CAN YOU MAKE 24 C, H AND N DETERMINATIONS IN A DAY... AND STILL HAVE TIME FOR OTHER PROJECTS?**

Certainly! With Fisher's new automatic CHN Analyzer, even an inexperienced technician can easily make three determinations of carbon, hydrogen and nitrogen in an hour, compared to the 10 or 15 an experienced analyst ordinarily makes per day. Accuracy is ±0.2% absolute. The CHN Analyzer can use large samples to minimize weighing errors. Results for each component are automatically printed in a numerical code. The CHN Analyzer soon pays for itself in increased output and reduced costs. Price: approximately $12,500, and available under terms of the Fisher Financing Plan.


---

**FISHER SCIENTIFIC**

World's Largest Manufacturer-Distributor of Laboratory Appliances & Reagent Chemicals

Atlanta • Boston • Chicago • Fort Worth • Houston • New York • Philadelphia

Pittsburgh • St. Louis • Union, N. J. • Washington • Edmonton • Montreal • Toronto
INDEX TO ADVERTISERS, 10 January 1964

Honeywell Research Center .......... 83
Instron Engineering ................. 86
Instruments for Research and Industry .......... 171
International Equipment Co. 76, 77
ITT Industrial Laboratories .......... 155
Kewaunee Manufacturing Co. .......... 161
Klett Manufacturing Co., Inc. .......... 172
LaMotte Chemical . .......... 178
London Co. .......... 179
McDonnell Aircraft Corp. .......... 94
Mechanical Enterprises, Inc. .......... 158
Melpar, Inc. .......... 178
Monroe Calculating Machine Co. .......... 84
Nalge Co., Inc. .......... 169
National Instrument Laboratories, Inc. .......... 154
New Brunswick Scientific Co., Inc. .......... 80
Nuclear-Chicago Corp. .......... 79
Nuclear Data Inc. .......... 91
Patterson-Kelly, Chemical and
Process Equipment Div. .......... 158
Perkin-Elmer Corp. .......... 81, 167
Philips \& Bird, Inc. .......... 172
Photovolt Corp. .......... 165
Picker X-Ray Corp. .......... 75
Princeton Applied Research Corp. .......... 78
Professional Tape Co. .......... 88
Radiochemical Centre .......... 170
Sage Instruments, Inc. .......... 167
Saunders, W. B., Co. .......... 71
Scientific Industries Inc. .......... 163
Sorvall, Ivan, Inc. .......... 156, 168
Sprague-Dawley, Inc. .......... 178
Standard Scientific Supply Corp. .......... 162
Strand Labs, Inc. .......... 164
Technical Measurement Corp.,
Mnemotron Div. .......... 153
Technicon Instruments Corp. .......... 97
Tektronix, Inc. .......... 160
Thermovac Industries Corp. .......... 177
Thomas, Arthur H., Co. .......... 180
Troemner, Henry, Inc. .......... 154, 176
U.S. Nuclear .......... 178
Unitron Instrument Co. .......... 85
Vantage Press .......... 178
Varian Associates .......... 170
Wild Heerbrugg Instruments, Inc. .......... 173
Wilmot Castle Co. .......... 92
Zeiss, Carl, Inc. .......... 89

CALOREX TUBING
an elastic heat exchanger which can be wrapped around anything

(formerly made by Gorrell & Gorrell)

THE TROEMNER
MONODRUM
Kymograph

... reliable multi-speed chart mover;
29 rpm to 2.18 revolutions per day

Sturdy, reliable motor-driven precision chart mover for use in physiological and pharmacological education and research.
Choice of 22 reproducible speeds from .001512 rpm to 29.28 rpm through simple one-knob speed selector.
Shown above with continuous paper assembly for producing continuous records up to 300 ft. in length. Drums are 12 or 20 inches in length.
Write for detailed information on the Troemner MONODRUM Kymograph, recording accessories, charting papers.

Henry TROEMNER, Inc.
22nd & Master Sts., Philadelphia, Pa. 19121
Phone (215) 769-6386

CALOREX TUBING
an elastic heat exchanger which can be wrapped around anything

(formerly made by Gorrell & Gorrell)

THE TROEMNER
MONODRUM
Kymograph

... reliable multi-speed chart mover;
29 rpm to 2.18 revolutions per day

Sturdy, reliable motor-driven precision chart mover for use in physiological and pharmacological education and research.
Choice of 22 reproducible speeds from .001512 rpm to 29.28 rpm through simple one-knob speed selector.
Shown above with continuous paper assembly for producing continuous records up to 300 ft. in length. Drums are 12 or 20 inches in length.
Write for detailed information on the Troemner MONODRUM Kymograph, recording accessories, charting papers.

Henry TROEMNER, Inc.
22nd & Master Sts., Philadelphia, Pa. 19121
Phone (215) 769-6386

30 mm
15 mm
8 mm

Calorex may be used for heating or cooling from −50 to +120°C. Typical applications include the tempering of chromatographic columns, reaction vessels, distillation bridges, filters, pipelines, and storage vessels containing highly aggressive chemicals.

BRINKMANN
CANTIAGUE ROAD, WESTBURY, N.Y. 11590
ST. LOUIS \& CHICAGO \& HOUSTON \& CLEVELAND \& PHILADELPHIA \& SAN FRANCISCO
INSTRUMENTS

SCIENCE, VOL. 143

176
Physical Scientists
Mathematicians

at ORI

INTRIGUING OPPORTUNITIES FOR INQUISETIVE MINDS

The steadily growing responsibilities of Operations Research Incorporated continue to create new career positions for experienced mathematicians and physical scientists. We offer you an opportunity to work with scientists and engineers of other disciplines in pursuing solutions to problems in operational and systems analysis, in war gaming, and in a sector of military programs encompassing an entire complex of sophisticated offensive and defensive weapons systems.

At ORI the accent is on thought. We provide a stimulating scientific environment for work and the exchange of ideas.

We ask that you hold a B.S. or advanced degree and at least 3-5 years experience in applying the techniques of operations research, mathematics, and theoretical physics to a broad spectrum of difficult and complex problem areas. Further, we seek from you a background of original thinking and qualitative reasoning in problem areas where detailed theory is lacking.

Positions are at ORI's new headquarters building in a residential suburb of Washington, D.C., affording you the choice of urban, suburban or rural living. For further information, please send your resume to Mr. Carlton A. Robinson, Professional Staffing.

OPERATIONS RESEARCH INCORPORATED
1400 Spring Street
Silver Spring, Maryland
(Suburb of Washington, D.C.)
An equal opportunity employer

NEW FREEZE-DRY GLASSWARE BY THERMOVAC

INDUSTRIES CORP.

At Last! Freeze Dry Glassware with sections that snap together by applying slight pressure and stay together even when held at the top with one hand.

- No more vacuum grease!
- No more hard to clean flasks!
- Exclusive wide mouth flasks allows easy removal of contents.
- Top sections are interchangeable for use with 1/2" and 3/4" O.D. port and are also provided with vacuum break holes.

Write for complete catalog and price list. Better yet, send for sample on memo and convince yourself.
PHYSICISTS CHEMISTS

Melpar has immediate openings for physicists and physical chemists with experience or an interest in space problems to conceive and prosecute programs in space and simulated space environment. Currently areas of major interest include:

- Molecular Spectroscopy
- Flash Photolysis
- Electron and Proton Bombardment
- Low Temperature Phenomena
- High Vacuum Technology

An advanced degree in Physics or Physical Chemistry desired.

For further details, write in strictest confidence to:

JOHN A. HAVERFIELD
Manager—Professional Placement

MELPAR INC.
A SUBSIDIARY OF WESTINGHOUSE AIR Brake COMPANY
3375 Arlington Boulevard
Falls Church, Virginia
(a suburb of Washington, D. C.)

McMASTER UNIVERSITY

GRADUATE SCHOLARSHIPS IN BIOLOGY

Applications are invited for Graduate Research Scholarships from qualified students wishing to work toward the M.Sc. and Ph.D. degrees in biology. The monthly stipend is $150, and the research period is from $1900 to $2800, including laboratory assistants and research in progress: Systematics, ecology, and morphological physiology—of aquatic and bloodsucking Dipterans, emphasizing phylogenetic, and ecological biology. Microbiology—of musk; macro- and micro-fungal analysis for toxicological and other biochemical problems; cytology of healthy and diseased tissues employing viruses and radioactive tracers. Write: Dr. J. J. Miller, Department of Biology, McMaster University, Hamilton, Ontario.

DALHOUSIE UNIVERSITY

Institute of Oceanography

Applications are invited for three academic positions in the Department of Oceanography: one in Marine Geology and in Marine Geology—within which the successful candidate will conduct research and undertake a limited amount of teaching. Position is at the rank of Assistant Professor. Interested candidates should write to: The Director, Institute of Oceanography, Dalhousie University, Halifax, Nova Scotia, Canada.

CHIEF, MICROBIAL DISEASES

California State position in Berkeley

Administer reference and consulting services in non-vaccine microbial disease research. Need California license. M.D. certified or eligibility for a California license. Experience in bacteriology. Please send résumé to: Director, State Department of Public Health, Berkeley.

IMMUNOLOGY AND ENZYMOL-LOGY: Research position involving applications to mental health. Doctorate required. Send résumé to Research Department, State Hospital, Norristown, Pa.

POSTDOCTORAL FELLOWSHIPS IN LIPID METABOLISM

Applications are invited from persons with M.D. or Ph.D. degree wishing to obtain specialized training in lipid chemistry and metabolism. Areas for training consist of new and rapidly evolving biochemical and physiological techniques. Advanced students may participate in research on lipids and lipoproteins. Stipends for 1 or 2 year periods are available primarily for U.S. citizens. Further information and applications are invited from: Dr. D. B. Zilversmit, Dept. of Physiology, University of Pennsylvania, 3401 Spruce Street, Philadelphia, Pa.

PREDOMINANTLY PHYSIOLOGICAL SCIENTISTS IN BIOCHEMISTRY

are available in a new and well-equipped department. Base stipend for first year trainees is $2400 plus tuition and dependency allowance. Appointments are made on a 12-month basis and are renewable. Applicants must be U.S. citizens or must have applied for naturalization. For information and application forms, write: Chairman, Department of Biochemistry, Medical Center, University of Kentucky, Lexington.

The Market Place

BOOKS * SERVICES * SUPPLIES * EQUIPMENT

PROFESSIONAL SERVICES

Confidential Services Since 1952
Pharmacological Screening Studies
Dose-response Probes—Hazardous Properties
Subacute and Chronic Toxicity Studies
(Rhesus Macaques Emphasized)

PHARMACOLOGY RESEARCH, INC.,
21 Main Street, Darby, Pa. (215) 586-0707

BOOKS AND Magazines

Your book can be published, promoted, distributed by a reliable company on a cooperative basis. Fiction, non-fiction, poetry, scholarly, religious and even controversial manuscripts welcomed. Free Educational Kit available. Write: Vantage Press, Dept. SC, 120 W. 31 St., New York, N.Y.

SUPPLIES AND EQUIPMENT

1919 - 1964
LaMatte Chemical
2218 Market St.
Chester, Pa., Maryland, U.S.A.

Specialists in
Colorimetric Techniques
Reagents—Standards—Comparators
Send for Illustrated Control Handbook
Dept. H

GAMMA IRRADIATORS
Standard units from 100 to 10' R/hr
Write for Irradiator Catalog

U.S. NUCLEAR
P.O. Box 268, Burbank, Calif. (213) 618-3176

SPRAUGE-DAWLEY, INC.
Pioneers in the development of the
STANDARD IRRADIATOR RAT.
P.O. Box 4220
Madison, Wisconsin

CE 3-3318
... a complete diagnostic ultra-micro system on a modular basis

CO₂ tensions alone cannot diagnose acid-base anomalies. The Astrup technique — instrumented by Radiometer — provides a rapid Ultra-Micro system for complete Acid-Base evaluation — pH, CO₂ tension, Bicarbonates, Total CO₂, Buffer Base, and a figure for excess of fixed bases or acids in the system — all in a few moments from ultra-micro samples of arterialized ear lobe blood.

Now you can approach this critical instrumentation problem in your laboratory on a modular basis. Install the pH measuring and sample collection system first — then add the Micro-Tonometer AMTI, opening up the entire field of the Astrup technique.

Later again — the Standard Bicarbonate Apparatus SBC1 can be added, allowing Bicarbonate measurements to be made on routinely collected venous blood samples.

Shown above are:
- PHM27* — Expanded Scale pH Meter 0-14 pH, 6.8 - 8.2 pH
- VTS13* — Water Thermostat
- ES021* — Ultra-Micro Blood Electrode Unit
- AMTI — Micro Tonometer
- SBC1 — Standard Bicarbonate Apparatus

Write for complete details — and ask for reprints of the pertinent Astrup papers.

Also available is the AME1, a completely integrated system, in a wheeled cabinet for use in surgery, after-care wards, etc. Present users of Radiometer pH instrumentation and Ultra-Micro Blood electrodes can add to their existing equipment on a modular basis to develop the full Astrup Technique.

* For pH measurements

SOLD AND SERVICED IN U.S.A. BY
THE LONDON COMPANY
811 Sharon Drive WESTLAKE, OHIO

RADIOMETER
72 Emdrupvej COPENHAGEN, DENMARK

In Canada: Factory representatives Bach-Simpson Limited; sold and serviced by Canadian Laboratory Supplies Limited
New... Improved Magne-Matic® Model

Thomas MAGNETIC STIRRERS

- Stainless steel housing—
  corrosion-resistant and stronger than aluminum
- More powerful stirring action
- Wider diameter top plate—5 inches

A new stainless steel and more powerful, extremely efficient model of the Magnetic Stirrer introduced by us in 1944. Drive unit totally enclosed in compact housing of corrosion-resistant stainless steel, stronger than aluminum. Rotating magnetic field spins a magnetized stirring bar, encapsulated in inert plastic, to stir liquids in open or closed vessels. Speed is rheostat-controlled; operation is quiet and vibration-free.

Wide Power Range. These new model stirrers produce vigorous agitation of 4 liters of 50% glycerol solution (see fig. 3). Positive control of stirring rate, from full speed down to a few revolutions per second, allows use also for very small volumes or for gentle mixing. Magnetic coupling flux is adequate to stir effectively even in vessels elevated 1 inch above drive unit.

Drive Unit. Continuous duty motor and driving magnet are encased in housing of heavy gauge stainless steel, 5 inches diameter × 3 ½ inches high, with no seams above base. The larger motor of these improved stirrers is of the shaded pole type. Bearings are lubricated for long service life. Alnico V driving magnet, ¾-inch square × 2 inches long, is dynamically balanced on motor shaft. Rubber feet permit use on bench. Free-standing height is 4 inches.

Swing Arm Support. Exclusive feature of Thomas Magne-Matic® Stirrers is the attached swivel clamp.

When mounted on support, stirrer can be raised or lowered on the rod, or swung aside for easy removal of vessels from assemblies (see fig. 2). Clamp also permits adjustment of stirrer center in a horizontal plane from 3 to 4 ½ inches from rod. Particularly convenient in both the mounting and use of the closed system assemblies.

Stirring Bars. Stirrers supplied are Alnico V magnets encapsulated in Teflon, with central pivot ridge to minimize friction.

9235-B10. Magnetic Stirrer, Thomas Enclosed Rheostat Model, as above described; with rheostat in drive unit and speed control knob on front of housing. With two ³⁄₈-inch diameter Teflon-coated stirring bars, one 1-inch, the other 1⅛ inches long. With 3-wire cord, 3-prong plug with adapter, for 115 volts, 60 cycles, a.c.; 10 watts. ........................................... 40.40

9235-B20. Ditto, but without stirring bars . . . 36.00

9235-B40. Magnetic Stirrer, Thomas Remote Control Model, with separate rheostat attached to control unit by 30-inch connecting cord. With stirring bars as listed above. For 115 volts, 60 cycles, a.c.; 10 watts. ........................................... 44.40

9235-B50. Ditto, but without stirring bars . . . 40.00

10% discount in lots of 12 or more.

Bulletin 144, giving detailed information, sent upon request

THOMAS H. THOMAS COMPANY

Scientific Apparatus and Reagents

VINE STREET AT 3RD • P.O. BOX 779 • PHILADELPHIA 5, PA., U.S.A.