Looking for your Best Buy in Life Insurance?

tiaa announces...

NEW LOWER Life Insurance Rates

Plus "QUANTITY SAVINGS" DIVIDENDS, which reflect the economy of issuing larger policies.

For example,

A $50,000 POLICY COSTS ONLY $98

at age 30. Here's how:

$50,000 20-Year Home Protection Policy

Age at Issue 25 30 35

Annual Premium (Payable only 16 Years) $134.00 $159.00 $206.50

Cash Dividend End of First Year* 55.50 61.00 70.50

First Year Net Premium $ 78.50 $ 98.00 $136.00

*These dividends are based upon the 1965 dividend scale and are, of course, not guaranteed.

This is a plan of level premium Term insurance which provides its largest amount of protection initially, reducing by schedule each year over a 20-year period to recognize decreasing insurance needs. There are several other insurance periods, and Home Protection policies are available at all ages under 56.

ARE YOU ELIGIBLE FOR TIAA? Yes, if you are employed by a college, university, private school, or other nonprofit educational or scientific institution that qualifies for TIAA eligibility.

Send the coupon for the new Life Insurance Guide and a personal illustration of TIAA policies for your age. TIAA is nonprofit and employs no agents.

---

**TEACHERS INSURANCE AND ANNUITY ASSOCIATION**

730 Third Avenue, New York, N.Y. 10017

Please send the new Life Insurance Guide and personal illustrations.

Name_________________________Date of Birth_________________________

Address________________________

Dependants' Ages________________________

Nonprofit Employer________________________

[Signature of college, university, or other educational or scientific institution]

5 FEBRUARY 1965
How often do labeled biochemicals get the nod?

Or, what percentage of the time do biochemists, chemists, physiologists, microbiologists, physicians, immunologists, biologists, endocrinologists, cell biologists, enzymologists, botanists, pharmacologists, biophysicists, et al., solve their biochemical-type problems by turning to tagged biochemicals? Answer: 44.2% of the time.

This figure comes from our just-completed survey of exactly one issue (recent) of a major biochemistry journal. And if you don't mind extrapolation from a solitary datum, you might conclude that marked biochemicals now represent the major tool for solving a multiplicity of biochemical puzzles.

This conclusion pleases us because we have an impressive list of tagged nucleic acids and their precursors, antimetabolites, amino acids, sugars and sugar phosphates and other compounds of biological importance. (Need our catalog?)

Enough of generalizations. We particularly want you to know about our deoxyribonucleosides and ribonucleosides like: thymidine, uridine, and cytidine. These and many others are available with C\(^1\) and/or H\(^3\) labeling. Never out of stock and never more than a day away from you.

Finally: if there's a rush for one of our products—or you just wish additional information—call us collect at 914-359-2700. Ask for Maryann.

Schwarz BioResearch, Inc.

Orangeburg, New York 10962
New Products

**Sampler changer**, versatile, reasonable, automatically counts up to 25 planchetts of either 1-inch (2.5-cm) or 2-inch diameter and up to ½ inch deep. Also has “manual” mode for counting individual samples. Detecting element is a gas-flow chamber operating in the Geiger region. Made of oxygen-free copper, the unit has an ultra-thin window (≤ 100 μg/cm²) for efficiency in detecting low-energy beta emitters such as C-14, S-35, and Ca-45. Two inches of lead shielding holds the normal background down to about 20 count/min. The gas-flow detector is available in interchangeable sizes: 1 1/4- and 2-inch. Model SM-368 uses the 1 1/4-inch detector as standard equipment; model SM-368/2 uses the 2-inch. For counting strong betas and gammas, the detector may be replaced by an optional GM tube (model EWT-64) which has a 1.4- to 2.0-mg/cm² end window. Counting done by a transistorized, five-decade “blind” scaler with a resolving time of 5 μsec. A preset count range from 40 to 90,000 counts (eight steps) is chosen by means of a selector switch. Time required to accumulate the predetermined number of counts is printed in hundreds of a minute by a four-digit printer; capacity of the printer is 100 minutes. Front panel contains a series of lights which give an approximation of the general counting rate of each sample. Samples whose activities are below the preset count selected are rejected automatically by the “time reject” control; such samples may be counted individually later. Model SM-368 does not recycle automatically or print each sample number. Each instrument includes a roll of self-sticking tapes which are prenumbered from 1 to 25; every set of 25 numbers corresponds line-for-line with the position of the digital printout for 25 consecutive samples. When all planchetts are counted, a set of 25 numbers is cut off the roll and positioned next to the readout for each planchet, thus identifying the samples permanently. List: $2650.—D.J.P. (Atomic Accessories, Inc., 811 West Merrick Road, Valley Stream, N.Y.)

**Circle 1 on Readers’ Service card**

**Picoampere source**, Keithley model 261, is the current-source companion to the model 260 voltage source. Currents may be selected with three-digit resolution between 10⁻⁴ (± 0.25 percent) and 10⁻¹² (± 0.5 percent) amp; maximum resolution, 10⁻¹⁴ amp. Consists of a precision variable-voltage source in series with a large range resistor. Applications include calibration of picometers, high-stability zero suppression, and galvanometric measurements. Selector switches incorporated in both instruments for use on 105- to 125- or 210- to 250-volt, 50- to 1000-cy/sec power sources. Dimensions: 5.5 by 8.75 by 10 inches deep (12.4 by 22.3 by 25 cm). List: $425.—D.J.P. (Keithley Instruments, 12415 Euclid Avenue, Cleveland, Ohio)

**Circle 2 on Readers’ Service card**

**Thermocouples** of assorted sizes and materials may be fabricated, insulated, and cemented in place for specific applications with kits. The first kit contains 12 50-ft (15-m) spools of six matched pairs of fine-gage, unsheathed thermocouple wire. Each of four kits comprises six different wire sizes of one type of thermocouple; the buyer chooses either chromel-alumel, iron-constanant, copper-constanant, or chromel-constanant and receives six spools of each of the two materials chosen in diameters of 0.001, 0.002, 0.003, 0.005, 0.010, and 0.015 inch (0.0254 to 0.381 mm), for any of which 0.004, 0.006, or 0.008 inch may be substituted. The contents of the second kit are used for: insulating thermocouple wires; cementing fine-gage thermocouples in place on metal, plastic, and ceramic surfaces; assembling thermopiles, probes, and bolometers. It includes heat-curing silicone lacquer for insulation, various cements for different applications, an assortment of fine-gage single- and multiple-lumen ceramic tubing for insulation, and the necessary tools for their utilization. With these two kits, small, convenient thermocouples can be made which permit precise temperature measurements in various biological applications, with minimum disturbance of the system.—D.J.P. (Omega Engineering, Inc., Box 47, Springdale, Conn.)

**Circle 3 on Readers’ Service card**

**Frozen tissue pulverizer** comprises a stainless steel reservoir for the freezing medium, a sample holder (mortar) in contact with the medium, and the pulverizer (pestle). Reservoir is filled with dry ice, dry ice and acetone, or liquid nitrogen, depending on the application. Sample is placed in the mortar, frozen or thawed. The pestle, a separate unit resembling a staple gun, is placed over sample and mortar. The lower handle is squeezed, driving the pestle against the sample. A built-in retaining shield confines the sample. By half-cocking the trigger, pestle may be used as a grinder. Effective with kidney, bladder, intestine, spleen, liver, heart, muscle tissue, and skin. List: $99.50.—D.J.P. (Bio-Chem Instruments, Inc., 39 Deckert Street, Copiague, L.I., N.Y.)

**Circle 4 on Readers’ Service card**

**Portable pH meter**, Instrumentation Laboratory model 175, with battery-operated solid-state electronics, input impedance of 10⁹ ohms. Zero to 14-pH range on a 7.5 mirrored scale. Readability, 0.02 pH; reproducibility, ± 0.01 pH; drift, 0.001 pH per 24 hours, manual temperature compensation, 0° to 100°C, battery life, 3000 hours. For field usage, the meter is housed in an impact-resistant plastic case sealed against moisture. Rear-panel clamps hold pH electrode and buffer-solution bottle. Combination-electrode, blood-pH reference buffer of pH 7.384 at 37°C, and saturated KCl solution are included. Dimensions: 7.38 by 8.25 by 3.75 inches deep (19 by 21 by 9.5 cm). Weight: 4 lb (1.8 kg). List: $185.—D.J.P. (Instrumentation Laboratory, Inc., 9 Galen Street, Watertown Square, Boston 72, Mass.)

**Circle 5 on Readers’ Service card**

---

The material in this section is prepared by the following contributing writers:

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 551 and 645. Circle the department number of the item in which you are interested on this card.

5 FEBRUARY 1965
NEW BOOKS

(Continued from page 602)

Illus. Plates. $2.25. Seven papers: "The prehistory of Panamá Viejo" by Leo P. Biese; "The language of Santa Ana Pueblo" by Irvine Davis; "Observations on certain ancient tribes of the Northern Appalachian Province" by Bernard G. Hoffman; "El Limón, an early tomb site in Cocle Province, Panama," "Archaeological notes on Almirante Bay, Bocas del Toro, Panama," and "The archeology of Taboga, Urabá, and Taboguilla Islands, Panama" by Matthew W. Stirling and Marion Stirling; and "Iroquois masks and maskmaking at Onondaga," by Jean Hendry.


Drinking Among Teen-Agers. A sociological interpretation of alcohol use by high-school students. George L. Maddox and Bevode C. McCall, Rutgers Center...
them dry bones...

Here’s a use we hadn’t thought of when we designed our industrial Airbrasive Unit. The American Museum of Natural History tells us that they have drastically reduced the recovery time of fragile fossils from hard stone matrix.

What used to take months by hand methods now takes only a few weeks. Extraction is more precise too, yielding more information. With proper technique, the most delicate bone structure is retained while the matrix is removed by Airbrasive cleaning...even from previously “inaccessible” places. In the small specimen above, the first known vertebrate to fly, even the inner ear was delineated.

This is only one of the many “impossible” jobs accomplished by the Airbrasive. In laboratories and production lines its precise, gas-propelled stream of abrasive particles is used to cut all sorts of hard, brittle materials.

<table>
<thead>
<tr>
<th>S. S. WHITE INDUSTRIAL DIVISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. 49A, 10 East 40th St., New York 16, N.Y.</td>
</tr>
<tr>
<td>for superfine cutting • deburring • cleaning</td>
</tr>
<tr>
<td>hard brittle materials</td>
</tr>
</tbody>
</table>

Send for BULLETIN 4407A for complete information...
FOCUS ON THESE FARRAND SPECTROFLUOROMETER FEATURES

...for greater analytical accuracy

• SUPERIOR SENSITIVITY
  Full scale deflection produced by .0001 mg/ml Quinine Sulfate, when operating with 20 μl resolution with noise level of less than 0.1 of total signal

• SIGNIFICANT RESOLUTION
  1 μg capability provides data normally obscured

• MODULAR DESIGN
  Complete accessibility and component interchangeability

• OPTICAL PRECISION
  Farrand Master Grating replicas . . . /3.5 optical beam throughout

Compare before you buy. Send your sample for free comparative analysis.

Farrand OPTICAL CO., INC.

Think of Farrand first...for the finest scientific instruments

THE LID'S OFF

...EASILY!

Just Let Air in, Lift Lid Off

DES-O-RING™ BEST SEAL FOR GLASS DESICCATORS

NEEDS NO GREASE — NO CROWBAR!

Holds Vacuum Indefinitely. Fits 150 mm or 160 mm Kimax® or Pyrex® Brand Desiccators.

No. SC103-75 Specify Material
  Neoprene . . . each $4.95
  Silicone Rubber . . each 7.95
  Viton® . . . . . . . . . each 10.95

LA PINE COMPANY

6001 South Knox Ave., Chicago, Illinois
South Buckhout Street, Irvington, N. Y. 2229 McGee Ave., Berkeley, Cal.

A NEW APPROACH TO STUDY OF IRON-BINDING IN PROTEINS

Our preoccupation with the techniques and tricks of Disc Electrophoresis prompts us to call your attention to a highly sensitive and specific iron stain. It ignores hemoglobins, hemoglobin-aproto globin complexes and other ferrous iron-containing materials, but seeks out ferric iron with single-minded determination. The stain is therefore a nifty aid in locating such proteins as ferritin and transferrin.

It appears to us that some research-minded person might find the stain useful in studying the iron-combining capacity of sera. To be specific, one might compare densitometrically the iron-stained electrophoretically separated bands of transferrin in two samples of the same serum, one as taken from the donor and the other saturated with iron in the laboratory in some subtle and appropriate way.

Analogous applications in studying apoferritin-ferritin will no doubt suggest themselves to the ingenious.

We offer the stain in kits consisting of three solutions ready to mix and use. Stock No. 700 will stain 100 samples and costs $10; Stock No. 800 will stain 600 samples and costs $22. Both prices include postage in the USA and Canada.

The 100-sample kit will carry you through a goodly amount of experimenting. But why not get the 600-sample economy size? You might just get involved in a full-scale research project.

CANAL INDUSTRIAL CORPORATION

4935 Cordell Avenue, Dept. E-2
Bethesda, Maryland 20014


Science for High School Students. Nu-
Completely free skill, roentgen mustards (ethylene-1, 2-C14) Trilolein carboxyl-C14
L-methionine-methyl-H3

Order degrees
Adenosine
L-asparagine
Dine acid-2-C14

MOIRE PATTERNS KIT
COST-SAVING, TIME-SAVING, ACCURATE RESULTS

Get the jump on competition. Here's a breakthrough in a new technology. Completely simple in use for researchers, product designers, developers. Inexpensively measures one part in a billon. Measures... diffusion pattern movement produced by lasers, diffusion of molecules in solution or heat waves. Study liquid flow, stress lines, distortion of metals. Obtain elastic modulus. Technically, moire patterns are predictable patterns created by superpositioning of one pattern over another. Using elements which include equi-spaced linear, logarithmic and circular rulings. By Dr. Gerald Oster, Brook Polytechnic Lab., he developed a complete novel scientific tool. Kit contains 8 basic patterns on both clear acetate in lantern slide size measuring 3 1/4" x 4 1/2" thick; (1) Coarse grating; (2) 65-line grating, (3) Logarithmic scale grating, (4) Radial lines, 5-degrees, (5) Equispaced circles, (6) Rectangular zone plate, (7) Cylinder projection, (8) Cylinder projection; two pieces 3 1/4" x 4" 150-dot screen on film; 26-mesh, 2" x 1", copy of Dr. Oster's book, "The Science of Moire Patterns"—an authoritative introduction to the fascinating world of moire. STOCK NO. 70.19-W $38.50 Ppd.
STOCK NO. 60.446-W Same as above without book MOIRE PATTERN ACCESSORY KIT. For additional experiments. Contains ballon, calicte, two kinds of diffraction gratings, one-way mirror foil, and bath, before the minute movement of tangents.

NEW WORKING MODEL DIGITAL COMPUTER

BAROOGNE! LONG & SHORT WAVE ULTRA-VIOLET LIGHT SOURCE, Small Lightweight! Portable! Most Powerful at the Price!

Newly developed for prospecting, mineral collecting, fluorescence demonstrations, etc. Most powerful source of long and short wave ultra-violet light in one compact home-model unit! One source UV radiation with peak intensity of 2500 angstroms. Other source produces long wave UV with peak intensity of 3000 angstroms. Unit has rugged all-metal housing, special circuitry for battery conserva- tion, easy access for replacing tubes, easy large filters. Operates on house current or batteries. Lightweight, only 1 lb. 5 oz. Compact 9 1/2" x 6" x 6". Polyethylene film. Includes 6 identified mineral specimens included.

STEEL SPANNER WRENCH

Made for U. S. Air Force—available at a fraction of Government cost. A top grade, versatile tool that every instrument and camera repair man or just plain tinkerer should own. Adjustable from 1" to 12" diameter retaining rings. Complete with six different pairs of points to fit all types of slots and holes, 3", 6", and 12" mains. Accurately ground and nicely plated. The finest tool we have ever come across for this type of retaining ring work and it comes at a real bargain at our low price.

FREE GIANT 148-PAGE CATALOG "W"

Completely revised, 1965 edition. New Home Science stories, illustrations. 148 easy-to-read pages packed with 100s of indus- trial-on-the-job helps... quality control aids. Many war surplus bars. Imported instruments. Lenses, Magnifiers, Telescopes, Satellite Scopes, Microscopes, Binoculars, etc. For industry, research labs, hobbyists, experimenters. Write for free Catalog "W".

EDMUND SCIENTIFIC CO., Barrington, N. J.

Around the clock, coast to coast over 400 radiochemicals... nuclear services... radioactive sources

FEBRUARY 1965

TRACERLAB
A DIVISION OF LABORATORY FOR ELECTRONICS, INC.
WALTHAM 54, MASSACHUSETTS

Sources Health Physics Services Film Badge Service Radioactive Waste Disposal Bioassays
Microchemical
and Instrumental
Analysis

Worth writing for
ADM-70, Microchemical and Instrumental Analysis
describes techniques for identifying particulate con-
taminants, using Millipore filters, in optical and elec-
tron microscopy, microchemical spot tests, ring oven
analysis, infrared and ultraviolet absorption spectros-
copy, flame photometry, radio-activity analysis and
other related methods. To receive a free copy of this
80-page manual, write to

Millipore FILTER CORPORATION
145 Ashby Road, Bedford, Mass.

(Millipore filters are cellulose plastic porous membranes made in
twelve pore-size grades from 8 microns down to 10 millimicrons. In
microfiltration or analysis, all matter larger than the filter pore size
is screened from fluids and retained on the filter surface.)

DENSITY-GRADIENT
FRACTIONATOR

Automatic Absorbance
Recording And
Preparative
Fractionation Of
Density Gradient
Columns

The ISCO Model D records a complete and detailed
UV-absorbance profile along the length of a gradient
column. This apparatus provides one of the highest
resolution and sensitive techniques for analysis of
macromolecular mixtures. An accessory fraction
collector is also available. See Brakke, (1963)
ANALYTICAL BIOCHEMISTRY 5, 271. Priced from
$1350.00, plus UV-absorbance recorder. Write for
literature.

ISCO INSTRUMENTATION SPECIALTIES CO.
DEPT. D3
5624 SEWARD AVE., LINCOLN, NEBRASKA 68507

MECHANISMS OF
HARD TISSUE DESTRUCTION

Based on a symposium presented at the AAAS
Philadelphia Meeting, 29 and 30 December 1962.
AAAS Symposium Volume #75.
Edited by Reidar F. Sognnaes.
1963. 776 pages, 480 illustrations, color plate, refer-
ences, indexes. Price: $13.00. Cash Order Price to
AAAS Members: $11.00.

Sponsors: AAAS Sections on Dentistry, Medicine, and
Zoology; International Association for Dental Re-
search, North American Division; American College
of Dentists, American Dental Association.

Symposium by 49 outstanding co-authors on destruc-
tion of mineralized structures by organisms and by
physical and chemical agents, ranging from rock
boring to bone resorption and tooth decay.

British Agents: Bailey Bros. & Swinfen Ltd., Warner House,
48 Upper Thames Street, London E.C.4, England

Order Today from
AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE
1515 Massachusetts Ave., NW, Washington, D.C. 20005


Mathematics, Physical Sciences, and Engineering

ACCESSORIES INCREASE CAPABILITIES OF THE MODEL 450

Highly versatile as a basic analytical instrument, the Perkin-Elmer Model 450 Ultraviolet Spectrophotometer has even more impressive capabilities with accessories to perform extra functions. Here are some of the auxiliaries that are available:

Specular Reflectance Accessory—versatile analytical tool for pursuing mirror reflectance and coating material absorption studies, including glass coatings on tanks, food can coatings, protective metal coatings. Also may be used to determine thickness of thin films.

Diffuse Reflectance Attachment—records the diffuse reflectance of a variety of solid samples; also the transmittance of turbid or otherwise highly scattering materials.

Spectral Fluorescence Attachment—converts the instrument into a recording spectrophotofluorimeter for charting absorption spectra and fluorescence emission data.

Microsampling Beam Condenser—obtains excellent spectra of liquid samples as small as 0.04 ml. Particularly useful in low concentration biomedical applications and to obtain spectra of very small solid samples.

Temperature-controlled Cell Mount—for Perkin-Elmer Cylindrical Sample Cells, maintains any specified temperature from 0°C to 100°C within 0.5°C. Helps determine the kinetics of reactions at various temperatures.

Other accessories include Short-Path Liquid Cell; Flame Attachment; Variable-Path Liquid Cell; Reference Screen Kit; Linear Wavelength Converter Assembly; Optical Rotatory Dispersion Accessory. For complete details on Model 450 accessories, write to Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut.


Extend your vision to 13,000 A

With a Model 5500 DETECTIRSCOPE® in your hand, you can look through objects transparent to near IR, see in darkness, or study IR phenomena. Typical response is from 4,000 to 13,000 A, peaking at 8,500 A.

Lightweight and portable, the DETEC-TIRSCOPE® is convenient for studies made in darkness in zoology, psychology, ophthalmology, and photography. With near IR, you can penetrate corneal opacities, insect shells, some organic pigments, the surface skin, and observe dislocations in certain crystals. THE DETECTIRSCOPE® is a practical tool for direct observation of near IR luminescence, diodes and lasers.

Standard tube resolution is 25 line-pairs/mm. The DETECTIRSCOPE® is completely self-contained, including the power source. An IR light source that may be attached directly to the viewer is also available.

The DETECTIRSCOPE® can help solve your IR viewing problem. Write today for complete information.

VARO INC.

SCIENCE, VOL. 147


Worth writing for

ADM-30, Detection and Analysis of Contamination outlines the measurement of particulate contamination with Millipore filters as applied to hydraulic fluids, air, fuels, lubricants, solvents, garments, surfaces and other aerospace and industrial fluids. To receive a free copy of this 44-page manual, write to

Millipore® FILTER CORPORATION
145 Ashby Road, Bedford, Mass.

(Millipore® filters are cellulose plastic porous membranes made in twelve pore-size grades from 8 microns down to 10 millimicrons. In microfiltration or analysis, all matter larger than the filter pore size is screened from fluids and retained on the filter surface.)

50TH ANNIVERSARY 1915-1965
THE KLETT FLUORIMETER

No. 2070

Designed for the rapid and accurate determination of thiamin, riboflavin, and other substances which fluoresce in solution. The sensitivity and stability are such that it has been found particularly useful in determining very small amounts of these substances.

KLETT SCIENTIFIC PRODUCTS
PHOTOELECTRIC COLORIMETERS • BIO-COLORIMETERS
GLASS ABSORPTION CELLS • COLORIMETER NEPHELOMETERS • KLETT REAGENTS • COLONY MARKER AND TALLY

Klett Manufacturing Co., Inc.
179 EAST 87TH STREET, NEW YORK, N. Y.

Technical Measurement Corporation now offers a wide variety of compatible units to form totally integrated activation analysis systems. The systems feature the ACTIVATRON 111 with a fast neutron yield of 10^{10} neutrons per second. The ACTIVATRON 111 is ideally suited for research investigations as well as routine chemical analysis. As a result, particular project parameters can be implemented from a single source.

TMC has established a complete activation analysis laboratory at its Ellison facility. An ACTIVATRON 111 and other TMC products are available to the customer for the investigation of his particular samples. TMC engineering personnel are also available to aid in the investigation of your specific problems.

Detailed information is available on the ACTIVATRON 111 as well as units of lower yields. Application data is also available on TMC pulse height analyzers, sample transfer systems, flux monitors, scintillation detectors, and COMPLETE activation analysis systems.

TMC
TECHNICAL MEASUREMENT CORPORATION
441 Washington Avenue, North Haven, Conn.

FEBRUARY 1965
A clear, direct and practical presentation of microtechnical procedures—

ESSENTIALS OF PRACTICAL MICROTECHNIQUE

by the Late ALBERT E. GALGHER and EUGENE N. KOZLOFF, Ph.D., Professor of Biology, Lewis and Clark College, Portland, Oregon.

1964 484 Pages 60 Illustrations $10.00

This book provides detailed explanations of the procedures commonly used in preparing material for microscopic study. All methods are introduced by clearly worded discussions of the principles involved, what each preparation should show, and how to obtain the best results. Techniques for vertebrates and invertebrates, including parasites, are covered in this text which numbers or letters consecutively the actual steps to be taken, and indicates pitfalls to be avoided. Contents include the use of the microscope; organization of the laboratory; methods for the study of living and fresh material; fixation; staining; paraffin, nitrocellulose, and freezing and grinding methods; metallic impregnation; permanent mounting media; a summary of procedures recommended for various types of material used in teaching and research laboratories; and a table of weights and measures. “Gives the student the basis for logical and intelligent application of the various techniques.”

Examination Copies Sent to Teachers on Request

Washington Square

LEA & FEBIGER

Philadelphia

Pa. 19106
WELCH CRYSTAL LATTICE AND MOLECULAR MODEL KIT

You can quickly and easily assemble colorful models for demonstration and study with this complete kit. 54 brightly colored balls are supplied... plus connectors and illustrated instruction book.

No. 5739 Crystal Lattice and Molecular Models Kit
$27.50

Write for NEW CHEM Study Apparatus List

---

ENTERIC PATHOGENS

SALMONELLA—SHIGELLA

Isolation

- Bacto-S S Agar
- Bacto-MacConkey Agar
- Bacto-Bismuth Sulfite Agar

Differentiation

- Bacto-Triple Sugar Iron Agar
- Bacto-S T M Medium
- Bacto-Purple Broth Base

- Bacto-Brilliant Green Agar
- Bacto-Selenite Broth

- Bacto-Tetrathionate Broth Base

- Bacto-Urea Broth Base

ENTEROCOCCI

- Bacto-Azide Dextrose Broth
- Bacto-Azide Blood Agar Base
- Bacto-S F Medium

- Bacto-Phenylenethanol Agar

- Bacto-Enterococci Presumptive Broth

- Bacto-Enterococci Confirmatory Broth

ENDAMOEBA HISTOLYTICA

- Bacto-Endamoeba Medium with Bacto-Horse Serum and Bacto-Rice Powder

DIFCO LABORATORIES
DETROIT 1, MICHIGAN

THE DIFCO MANUAL, NINTH EDITION, including descriptions of these media and their use, is available on request.

---

This improved family of instruments combines excellent resolution and high speed in three basic low-cost units designed for maximum versatility: Model 1500 (f/6.8 aperture) vacuum 1100Å to 22µ; Model 1600 (f/9.8 aperture) 2000Å to 22µ; Model 1700 II (f/6.8 aperture) 2000Å to 22µ.

Radiation from the entrance slit collimated by a spherical mirror is dispersed by a plane grating to a collimating mirror focusing at the exit slit.

Slits (Hilger & Watts precision bi-lateral slits pictured) are in fixed positions; wavelength is changed by rotating the grating. Continuously variable scan-speed drive may be used. Wavelength indicator reads direct to 0.1Å.

A complete line of optional and accessory items available. The camera attachments include mirror assembly, which switches from photo-electric to photographic detection by a flick of the wrist. Photo-electric detectors, including cryostat, are available.

For complete specifications, ask for Publication SS-25.

ENGIS EQUIPMENT COMPANY
8036 AUSTIN AVE. MORTON GROVE, ILL. 60053
SCIENTIFIC INSTRUMENTS DIVISION

f/6.8
1100Å-22µ
10Å/mm
Repetition to 0.1Å
Variable scan to 500Å/min.
Interchangeable mounted gratings

SPEX

SPECTROMETER-MONOCHROMATOR
STERILE OR CONTAMINATED?

TSI TAPE identifies the condition!

Protect laboratory personnel from contamination and assure STERILE glassware for each test by following this simple procedure:

1. Place all glassware in basket marked with TSI Tape.
2. After glassware has been autoclaved for 15 minutes at 250° F, TSI Tape will show a color change indicating "STERILE."
3. Following use, and before disposing of dangerous material, place glassware in basket marked with a new tape and autoclave.

TSI is the only tape which shows a color change after 15 minutes in the autoclave at 250° F. TSI Tape leaves no sticky residue when removed.

See your laboratory or hospital supplier for TSI (Time Sterile Indicator) Tape.

For samples and complete description write to:

PROFESSIONAL TAPE CO., INC.
365 East Burlington Avenue • Riverside, Illinois 60546

Don't Remember
Use a KLING Visual Control Board

Here's KLING
Visual Control Board with MAGNETS!

ONE SYSTEM TO CHART YOUR PROGRESS
Lightweight, white steel board with aluminum frame, 24" x 36", blank with 1" square gridlines, 50 color-coded magnets, and markers. Write on magnets and/or boards—or erase—for complete flexibility! No pins. No pegs. No flimsy cards.

$35 complete, ready to use, with magnets, markers, & aluminum frame

ON APPROVAL TO RATED FIRMS—or send for free booklet $1

Regal & Wade Mfg., Inc. / KLING SYSTEMS
Maspeth, New York 11378

at the 3rd Conference on the Exploding Wire Phenomenon, sponsored by the Air Force Cambridge Research Laboratories, the Office of Aerospace Research, with the cooperation of the Lowell Technological Institute Research Foundation.


NEW MODEL LR-1
LASER-SOURCE RAMAN SPECTROMETER
SPEDS STRUCTURAL DETERMINATIONS

For the first time, a high-performance, low-cost Raman Spectrometer is available to the spectroscopist. Compact and easy to use, the new instrument combines a gas laser source with a high-resolution grating monochromator to provide a totally new approach to a well-known analytical concept.

Raman spectra provide important supplementary information to any research laboratory conducting qualitative or quantitative analyses with infrared spectroscopy. Simpler than infrared spectra because of the lower intensity of overtone and combination bonds, Raman spectra permit better analytical discrimination between substances in a mixture. Since Raman line intensity is directly proportional to concentration, quantitative calculations are easy to perform.

Raman spectra are essential for structural analyses. Only a combination of infrared and Raman spectra will permit determination of geometric and symmetry properties. Raman lines correspond to energy differences in the vibrational and rotational states of the molecule.

The P.E. Laser-Excited Raman Spectrometer, Model LR-1, is a complete recording instrument at a comparatively low price. For full information and sample spectra write to Instrument Division, Perkin-Elmer Corporation, 723 Main Ave., Norwalk, Connecticut.
SAGE MICRO-FLOW PUMPS

Self-contained Infusion pump

Sage Micro-Flow Pumps Permit:

☐ Long term chemotherapy of ambulatory patients
☐ Drug Experiments with Unrestrained animals

Sage Micro-Flow Pumps break the shackles usually imposed by long-term chemotherapy. These miniature, self-contained, battery operated units provide continuous infusion of drugs or chemicals at various predetermined rates from 1 ml/½ hr. to 1 ml/24 hr. Flow rate is constant, linear and reproducible. This self-actuated syringe can be securely taped to subject's body...thereby allowing continuous infusion for periods up to 10 days—with little restriction of normal physical activity.

The pump operates by electrolysis, controlled by any of five interchangeable flow-rate setters. A uniformly generated gas drives the syringe piston at a selectable speed. Special features include an automatic cut-off (at the end of a run) and a constant current regulator which insures reproducibility of flow rate. All Sage Micro-Flow pumps are supplied complete with battery, electrolyte, and five permanently reusable rate setters. 5 different models: 1, 2 ½, and 10 ml capacities—from $65.00.

*Pat. Pending

Your Sage lab-ware dealer will be pleased to demonstrate this exciting new unit. For complete technical data write:

SAGE INSTRUMENTS, INC.

2 Spring Street, White Plains, N. Y. 10601
914 WH 9-4121
POSITIONS WANTED

Biochemist, Ph.D. Strong immunochemistry background, some microbiology and virology. Teaching experience. Reply to Box Number. Rater, nat. No agency commission allowed for ads under 4 inches. No cash discount. Minimum ads: 1 inch. Ads over 1 inch will be billed to the nearest quarter line. All replies by letter only apply to repeat of same ad. No copy changes. Positions in advance is required except where satisfactory credit has been established. Send copy for display advertising to SCIENCE, Room 1740, 11 West 42 St., New York 36.

Single insertion $65.00 per inch 4 times in 1 year. 60.00 per inch for PROOFS on display ads. copy must reach SCIENCE 4 weeks before date of issue (Friday of each week).

Replies to blind ads should be addressed as follows:
Box (give number)
SCIENCE
1515 Massachusetts Ave., NW Washington, D.C. 20005

Physicist and Biologist

Physicist: To teach general physics and to develop advanced undergraduate physics courses.
Biologist: To teach microbiology and general biology. $5900 to $11,500. Write Robert T. Brunfield, Department of Natural Sciences, Longwood College, Farmville, Virginia.

Postdoctoral research fellowship. Biochemist, Ph.D., major interests in biochemistry or biology and minor interests in organic chemistry. Studies include isolation, pharmacology and metabolism of indoles in relation to neural and cardiovascular phenomena. Resume to: Dr. R. G. Taborsky, Research Division, Cleveland Clinic Foundation, Cleveland, Ohio

Research Opportunities in Virology and Biochemistry available for well-qualified candidates (Ph.D.) with a non-profit organization with a multidisciplinary investigational program in both clinical and basic sciences. Applicants must offer evidence of ability to conduct original research work and to implement and direct expansion of the presently available facilities. For further information, contact: Medical Director, Children’s Asthma Research Institute and Hospital, 3401 West 19th Avenue, Denver, Colorado 80210.

DEPT OF BIOLOGY HEAD. The University of Alberta, Calgary, invites applications for the position of Department Head, effective 1 September 1965. Appointment will be at the rank of Associate or full Professor, with salary range of $10,500 to $17,000. Demonstrated ability in research and administration, and interest in teaching general biology are essential. The area of research interest is open. Currently there are eleven full-time teaching assistants. A graduate program has been initiated and the department will acquire new quarters during the coming summer. Applications and inquiries should be addressed to Dean, Faculty of Arts and Sciences, University of Alberta, Calgary, Alberta, Canada. Curriculum vitae should include names of three referees. Closing date, 13 March 1965.

FEBRUARY 1965

INDUSTRIAL FERMENTATIONS

Microbiologist

We seek a resourceful, energetic Ph.D. Microbiologist or Biochemist with primary interest in industrial fermentations and with excellent working conditions in attractive Southern California. Responsibilities would include direction of several different fermentations. We offer liberal employee benefits and excellent working conditions with attractive Southern California. Full latitude in experimental approaches is encouraged. Please apply with full resume to:

Mr. J. R. McDonald
Chas. Pfizer & Co., Inc.
Groton, Connecticut
An Equal Opportunity Employer

PHYSICIST and BIOLOGIST

Physicist: To teach general physics and to develop advanced undergraduate physics courses.
Biologist: To teach microbiology and general biology. $5900 to $11,500. Write Robert T. Brunfield, Department of Natural Sciences, Longwood College, Farmville, Virginia.

Postdoctoral research fellowship. Biochemist, Ph.D., major interests in biochemistry or biology and minor interests in organic chemistry. Studies include isolation, pharmacology and metabolism of indoles in relation to neural and cardiovascular phenomena. Resume to: Dr. R. G. Taborsky, Research Division, Cleveland Clinic Foundation, Cleveland, Ohio

Research Opportunities in Virology and Biochemistry available for well-qualified candidates (Ph.D.) with a non-profit organization with a multidisciplinary investigational program in both clinical and basic sciences. Applicants must offer evidence of ability to conduct original research work and to implement and direct expansion of the presently available facilities. For further information, contact: Medical Director, Children’s Asthma Research Institute and Hospital, 3401 West 19th Avenue, Denver, Colorado 80210.

DEPT OF BIOLOGY HEAD. The University of Alberta, Calgary, invites applications for the position of Department Head, effective 1 September 1965. Appointment will be at the rank of Associate or full Professor, with salary range of $10,500 to $17,000. Demonstrated ability in research and administration, and interest in teaching general biology are essential. The area of research interest is open. Currently there are eleven full-time teaching assistants. A graduate program has been initiated and the department will acquire new quarters during the coming summer. Applications and inquiries should be addressed to Dean, Faculty of Arts and Sciences, University of Alberta, Calgary, Alberta, Canada. Curriculum vitae should include names of three referees. Closing date, 13 March 1965.

FEBRUARY 1965

INDUSTRIAL FERMENTATIONS

Microbiologist

We seek a resourceful, energetic Ph.D. Microbiologist or Biochemist with primary interest in industrial fermentations and with excellent working conditions in attractive Southern California. Responsibilities would include direction of several different fermentations. We offer liberal employee benefits and excellent working conditions with attractive Southern California. Full latitude in experimental approaches is encouraged. Please apply with full resume to:

Mr. J. R. McDonald
Chas. Pfizer & Co., Inc.
Groton, Connecticut
An Equal Opportunity Employer

PHYSICIST and BIOLOGIST

Physicist: To teach general physics and to develop advanced undergraduate physics courses.
Biologist: To teach microbiology and general biology. $5900 to $11,500. Write Robert T. Brunfield, Department of Natural Sciences, Longwood College, Farmville, Virginia.

Postdoctoral research fellowship. Biochemist, Ph.D., major interests in biochemistry or biology and minor interests in organic chemistry. Studies include isolation, pharmacology and metabolism of indoles in relation to neural and cardiovascular phenomena. Resume to: Dr. R. G. Taborsky, Research Division, Cleveland Clinic Foundation, Cleveland, Ohio

Research Opportunities in Virology and Biochemistry available for well-qualified candidates (Ph.D.) with a non-profit organization with a multidisciplinary investigational program in both clinical and basic sciences. Applicants must offer evidence of ability to conduct original research work and to implement and direct expansion of the presently available facilities. For further information, contact: Medical Director, Children’s Asthma Research Institute and Hospital, 3401 West 19th Avenue, Denver, Colorado 80210.

DEPT OF BIOLOGY HEAD. The University of Alberta, Calgary, invites applications for the position of Department Head, effective 1 September 1965. Appointment will be at the rank of Associate or full Professor, with salary range of $10,500 to $17,000. Demonstrated ability in research and administration, and interest in teaching general biology are essential. The area of research interest is open. Currently there are eleven full-time teaching assistants. A graduate program has been initiated and the department will acquire new quarters during the coming summer. Applications and inquiries should be addressed to Dean, Faculty of Arts and Sciences, University of Alberta, Calgary, Alberta, Canada. Curriculum vitae should include names of three referees. Closing date, 13 March 1965.

FEBRUARY 1965

INDUSTRIAL FERMENTATIONS

Microbiologist

We seek a resourceful, energetic Ph.D. Microbiologist or Biochemist with primary interest in industrial fermentations and with excellent working conditions in attractive Southern California. Responsibilities would include direction of several different fermentations. We offer liberal employee benefits and excellent working conditions with attractive Southern California. Full latitude in experimental approaches is encouraged. Please apply with full resume to:

Mr. J. R. McDonald
Chas. Pfizer & Co., Inc.
Groton, Connecticut
An Equal Opportunity Employer

PHYSICIST and BIOLOGIST

Physicist: To teach general physics and to develop advanced undergraduate physics courses.
Biologist: To teach microbiology and general biology. $5900 to $11,500. Write Robert T. Brunfield, Department of Natural Sciences, Longwood College, Farmville, Virginia.

Postdoctoral research fellowship. Biochemist, Ph.D., major interests in biochemistry or biology and minor interests in organic chemistry. Studies include isolation, pharmacology and metabolism of indoles in relation to neural and cardiovascular phenomena. Resume to: Dr. R. G. Taborsky, Research Division, Cleveland Clinic Foundation, Cleveland, Ohio

Research Opportunities in Virology and Biochemistry available for well-qualified candidates (Ph.D.) with a non-profit organization with a multidisciplinary investigational program in both clinical and basic sciences. Applicants must offer evidence of ability to conduct original research work and to implement and direct expansion of the presently available facilities. For further information, contact: Medical Director, Children’s Asthma Research Institute and Hospital, 3401 West 19th Avenue, Denver, Colorado 80210.

DEPT OF BIOLOGY HEAD. The University of Alberta, Calgary, invites applications for the position of Department Head, effective 1 September 1965. Appointment will be at the rank of Associate or full Professor, with salary range of $10,500 to $17,000. Demonstrated ability in research and administration, and interest in teaching general biology are essential. The area of research interest is open. Currently there are eleven full-time teaching assistants. A graduate program has been initiated and the department will acquire new quarters during the coming summer. Applications and inquiries should be addressed to Dean, Faculty of Arts and Sciences, University of Alberta, Calgary, Alberta, Canada. Curriculum vitae should include names of three referees. Closing date, 13 March 1965.

FEBRUARY 1965

INDUSTRIAL FERMENTATIONS

Microbiologist

We seek a resourceful, energetic Ph.D. Microbiologist or Biochemist with primary interest in industrial fermentations and with excellent working conditions in attractive Southern California. Responsibilities would include direction of several different fermentations. We offer liberal employee benefits and excellent working conditions with attractive Southern California. Full latitude in experimental approaches is encouraged. Please apply with full resume to:

Mr. J. R. McDonald
Chas. Pfizer & Co., Inc.
Groton, Connecticut
An Equal Opportunity Employer

PHYSICIST and BIOLOGIST

Physicist: To teach general physics and to develop advanced undergraduate physics courses.
Biologist: To teach microbiology and general biology. $5900 to $11,500. Write Robert T. Brunfield, Department of Natural Sciences, Longwood College, Farmville, Virginia.

Postdoctoral research fellowship. Biochemist, Ph.D., major interests in biochemistry or biology and minor interests in organic chemistry. Studies include isolation, pharmacology and metabolism of indoles in relation to neural and cardiovascular phenomena. Resume to: Dr. R. G. Taborsky, Research Division, Cleveland Clinic Foundation, Cleveland, Ohio

Research Opportunities in Virology and Biochemistry available for well-qualified candidates (Ph.D.) with a non-profit organization with a multidisciplinary investigational program in both clinical and basic sciences. Applicants must offer evidence of ability to conduct original research work and to implement and direct expansion of the presently available facilities. For further information, contact: Medical Director, Children’s Asthma Research Institute and Hospital, 3401 West 19th Avenue, Denver, Colorado 80210.

DEPT OF BIOLOGY HEAD. The University of Alberta, Calgary, invites applications for the position of Department Head, effective 1 September 1965. Appointment will be at the rank of Associate or full Professor, with salary range of $10,500 to $17,000. Demonstrated ability in research and administration, and interest in teaching general biology are essential. The area of research interest is open. Currently there are eleven full-time teaching assistants. A graduate program has been initiated and the department will acquire new quarters during the coming summer. Applications and inquiries should be addressed to Dean, Faculty of Arts and Sciences, University of Alberta, Calgary, Alberta, Canada. Curriculum vitae should include names of three referees. Closing date, 13 March 1965.
Biosciences Research

The following research positions are now available to experienced Ph.D. personnel to develop and conduct research programs at the Battelle-Columbus laboratories:

Biochemist. Concerned with problems of intermediary metabolism, isolation and characterization of metabolites, nutrition and general biochemistry.

Microbiologist-Virologist. Programs involve virology as related to bacteriophages, and viruses in water and wastes, including applied virology.

Plant Biochemist-Physiologist. Will work in areas of biosynthesis plant growth substances and pesticides. Will collaborate with biophysists and organic chemists.

Food Clinician. Responsibilities include working on problems in food formulation, food ingredients, and food processing.

Sanitary Engineer. Primary assignment is concentration on environmental engineering problems related to public health and promotion of comparable programs.

Primary factors to be considered in all responses will be the nature and extent of professional experience, willingness to engage in both basic and applied research applicable to the solution of industrial and health oriented problems. Ability to communicate effectively and prepare written reports is important. Salary is open.

Devoted completely to research, we offer advantages of both academic and industrial environments, the finest facilities and an atmosphere conducive to research. There exists unusual personal freedom with excellent growth potential.

Forward your résumé and salary requirements to Mr. L. G. Hill.

BATTLE MEMORIAL INSTITUTE COLUMBUS LABORATORIES

505 King Ave., Columbus, Ohio 43201

An equal opportunity employer

D I R E C T O R

DIRECTOR OF RESEARCH AND EDUCATION


Box 42, SCIENCE

M I C R O - B I O L O G I S T — An unusual opportunity to work in one of today's most interesting fields, exobiology. Problems involve all aspects of space biology and the bacteriological aspects of space vehicle sterilization. Excellent facilities at G.E.'s Valley Forge Space Center, site of highly advanced research on missile and space vehicles. You should have an M.S. or Ph.D. in biology. Send a résumé of your background, including salary requirements, to: Mr. Dan Nauer, Re-Entry Systems Dept., Missile & Space Division, Room 120-E, General Electric Co., 3198 Chestnut St., Philadelphia, Pa.

Missile & Space Division

G E N E R A L ELECTRIC

An equal opportunity employer

(a) Ph.D. Clinical Chemist: supervise several local hospital laboratories; Mideast; to $18,000.

(b) Ph.D. Chromatography training; research; postdoctoral, starting at $7000. (c) Chief Bacteriologist: eastern research; laboratory; $7500.

(d) Senior Analytical Chemist, experienced; southeastern pharmaceutical house; $12,000 plus. (e) Ph.D. Research Scientist; chemistry training; Central drug firm.

Faculty Appointments:

(f) Ph.D. Biology: invertebrate zoology training; BSCS approach; central college; to $7500.

(g) Biologist (Physiology): southern college; $8000 plus and tenure.

(h) Ph.D. Microbiologist, medical; develop graduate courses; associate professor; excellent research.

(i) Ph.D. Biologist, experience in molecular biology; research; southwestern university.

(j) Animal Physiologist: introductory and upper vision teaching; eastern university.

(k) Mathe- matician, physics; research; chairman appointment; New England college.

(l) Ph.D. Cyto- logist; course work; research; southwestern college.


Research Position, GS-13, available on team investigating problems related to the pathogenesis of atherosclerosis. Ph.D. with background in microbiology desired. Salary up to $12,075. Contact Personnel Division, Brooklyn VA Hospital, 800 Pol Place, Bklyn, N.Y.

S E N I O R A N A L Y T I C AL CHEMIST


An equal opportunity employer

T R A I N E E S H I P S I N D I A B E T E S available for candidates with M.D. or Ph.D. degrees. Salaries according to qualifications. Write to: Division of Research, Sinai Hospital of Detroit, 6767 West Outer Drive, Detroit, Michigan 48235.

F E L L O W S H I P S

Predoctoral Assistantships in Physiology. Excellent opportunities for graduate students leading to the Ph.D. Ample stipends and free tuition. Training and research in biophysics, cellular physiology, endocrinology, muscle, water metabolism, cardiovascular, gastrointestinal. Write for details to: Head, Department of Physiology University of Illinois Medical Center Chicago, Illinois 60612

Graduate assistantships and Fellowships in Pharmacological Chemistry are available in the Faculty of Pharmacy, Areas of research include: Synthetic and Analytical Chemistry, Isotope Techniques and Natural Products. Stipends are approximately $3000 per annum, plus waiver of fees and travel. Address inquiries to: Dean M. J. Hefron, Faculty of Pharmacy, University of Alberta, EDMONTON, Alberta, Canada.

FELLOWSHIPS

James W. McLaughlin Predoctoral and Postdoctoral Fellowships, awarded in the broadly interpreted area of infection and immunity, may be granted for study at any department at the University of Texas Medical Branch. Stipends: predoctoral, $3600 plus allowance for dependents; postdoctoral, starting at $7500. Additional funds for equipment, supplies, travel. For information write Mrs. N. Schumaker, Department of Microbiology, University of Texas Medical Branch, Galveston, Texas. 2/12, 1965

Predoctoral Assistantships available in the Department of Nutrition and Food Science at the Massachusetts Institute of Technology for 1965 to 1966 for qualified candidates wishing to pursue a training and research program in either Nutrition, Food Science and Technology, Physiological Chemistry, Food Toxicology, Food Engineering, and Biochemical Engineering. For application and information write: Professor N. J. M. Williams, Head of Department of Nutrition and Food Science, Massa- chusetts Institute of Technology, Cambridge, Massachusetts, 02139.

Teaching and research assistantships available June 1 and Sept. 1 at the Carver Research Foundation and Tuskegee Institute leading to graduate degrees in Agriculture, Biology, Chemistry, Nutrition, and Food Science. Stipends starting at $2400 the year. Apply: The Director, Carver Research Foundation, Tuskegee Institute, Tuskegee, Alabama 36088

The Market Place

BOOKS • SERVICES • SUPPLIES • EQUIPMENT

SUPPLIES AND EQUIPMENT

PHOTO-ELECTRIC EYE MOVEMENT MONITOR

Range: ± 15° Resolution: 1.5 arc sec Sensitivity: 20mv/° Bandwidth: 4cps Special Modifications Available

Biosystems, Inc.

545 Technology Sq., Cambridge, Mass.

SPRAGUE-DAWLEY, INC.

Pioneers in the development of the STANDARD LABORATORY RAT

P.O. Box 4220

Madison, Wisconsin

670

CE 3-5318

SCIENCE, VOL. 147

EQUIPMENT

662
Six different kinds of light, that is.

Only Advanced DynaZoom® lets you choose the exact magnification you want—seen by the illumination you need. The incomparable zoom optical system offers continuously variable magnification from 1× to 2× through the entire range. (Monocular series available with and without zoom.) You select the lighting equipment that’s right for your work. For bright field . . . new Hi-Intensity illuminator with adjustable field iris for Koehler illumination, is just right for visual and photomicrographic work. Opti-lume illumination or mirror for visual bright field applications. For dark field . . . paraboloid and cardioid condensers for hard-to-see subjects from lesion exudates to flocculents. For ultra-violet . . . the most extensive line of grating monochromators, UV objectives, condensers and image converters, to reveal differential absorption of biological materials at high N.A. For phase contrast . . . turret and long-working distance condensers and objectives, with phase altering patterns in the rear focal plane, for selective differentiation of specimens without staining. For polarized light . . . analyzers, polarizers and retardation plates, for birefringence studies. For fluorescence . . . a Mercury arc lamp, exciter and barrier filters, non-fluorescing optics for all primary and secondary fluorescence and antibody testing. Ask for a demonstration or send for our new Advanced DynaZoom catalog, D-185, also our “Model Maker—Cost Finder,” D-1142 and mention the illumination you’re interested in. Write Bausch & Lomb Incorporated, 64214 Bausch Street, Rochester, New York 14602.
Available only from Thomas...
Hitachi Perkin-Elmer Model 139 SPECTROPHOTOMETER

with
DIGITAL READOUT and PRINTOUT

SPECTROPHOTOMETER, Hitachi Perkin-Elmer Model 139 UV-VIS, range 195 to 900 m. Diffraction grating type, compact modular construction, completely a.c. line operated, for precise research or control use. Excellent design and workmanship provide an instrument of outstanding accuracy, stability, and versatility.

Linear Wavelength Control. Easily readable dial, with uniformly spaced divisions over 1 mm wide, corresponding to 0.5 m.

Wide-Range Phototube. Single tube covers entire range from 195 to 900 m. Sensitivity is high throughout complete range. Dark current is very low.

Thomas Digital Readout. Indicates absorbance or transmittance as four large digits in illuminated window. Accuracy ±0.1%. Eliminates subjective reading errors of estimation and parallax, and increases convenience and accuracy of readings in routine serial determinations. Can be placed directly on monochromator housing.

Photomultiplier. Provides greater resolution and sensitivity in the range 195 to 700 m. Particularly important in the ultraviolet range and in applications requiring high resolution despite low light intensity. Housing containing the multiplier phototube and a.c. amplifier replaces the standard phototube housing.

Resolution (monochromator)—0.2 m (2 Å) throughout range.
Photometric accuracy—better than ±0.05% transmittance; better than ±0.005 absorbance at 0.4 absorbance.
Slits—continuously adjustable.
Wavelength accuracy—better than ±0.5 m throughout range.
Photometric reproducibility—better than 0.002 absorbance between 0 and 0.5 absorbance.

9096-E15. MODEL 139-PM SPECTROPHOTOMETER, with Photomultiplier, and Digital Readout*, range 195 to 700 m, complete outfit as shown in illustration. Including a.c. power supply for the photomultiplier. With hydrogen and tungsten lamps, 4-place cell holder, set of 4 matched fused silica 10 mm absorption cells, etc. For 115 volts, 50 or 60 cycles, a.c. ........................................ 3850.00
9096-E05. Ditto, with Digital Readout* and with standard wide-range phototube in place of Photomultiplier. For 115 volts, 50 or 60 cycles, a.c. ........................................ 3500.00
9096-E30. MODEL 139 SPECTROPHOTOMETER with Printout and Accessories, range 195 to 900 m, without Photomultiplier. Consisting of Spectrophotometer with standard wide-range phototube in place of Photomultiplier, and with accessories to provide printed readings consisting of 9096-J10 Print-Drive Readout, 9096-J50 Printout and 9096-J80 Identification Sequencer. For 115 volts ±10%, 50 or 60 cycles, a.c. ........................................ 5650.00
9096-J10. Print-Drive Readout*, Thomas, similar to Digital Readout shown in illustration but with additional circuitry to feed Printout. For 115 volts, 50 or 60 cycles, a.c. ........................................ 900.00
9096-J50. Printout, to provide 8-column printed record on paper tape. The four digits on the right are for absorption or transmittance readings as fed from the Print-Drive Readout. The four columns at the left are for identification digits as fed from 9096-J40 Sequence. For 115 volts, 50 or 60 cycles, a.c. ........................................ 1500.00
9096-J80. Identification Sequencer, to provide automatic identification of printed readings by feeding a four digit column to the Printout. The first column digit is set manually; the remaining three digits advance automatically each time the Printout is activated. .......................... 350.00

* For use only on Model 139 Spectrophotometers sold by us which have been modified in our plant for connection of these Readouts.

More detailed information sent upon request.

ARThUR H. THOMAS COMPANY
Scientific Apparatus and Reagents
VINE STREET AT 3RD • P. O. BOX 779 • PHILADELPHIA 5, PA., U. S. A.