Worth writing for

ADM-20, Sterilizing Filtration and Sterility Testing describes techniques for using Millipore filters to sterilize pharmaceutical and biological solutions. Includes new MF technique for sterility testing of antibiotics in accordance with F.D.A. regulations. To receive a free copy of this 32-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.

NEW SPI STEREO AND ZOOM STEREO

NO. 1813-1 8X-32X ZOOM MAGNIFICATION

SPI development brings unprecedented performance combining stereo and zoom advantages. Focus held through entire zoom range.

No. 1813-1 ZOOM STEREO

MODEL 1813-1 complete with illuminator base and mirror... $420 ... With regular base... $380.

MODEL 1838-2: Full 360° rotating head. Designed for exacting use... adjustable for long working distances. With illuminator base and mirror, $162.50. Also available, without base and mirror; Model 1838-1, $142.50... in various optical combinations.

A comprehensive, well illustrated catalog of SPI microscopes for secondary schools, laboratories and research is yours for the asking. Write for catalog and name of your nearest franchised dealer.

SOUTHERN PRECISION INSTRUMENT COMPANY Precision optics since 1947.

SPI BUILDING • SAN ANTONIO, TEXAS

The new model SW1 Electronic SQUARE WAVE STIMULATOR

The Model SW-1 Square Wave Stimulator is a useful tool in the classroom as well as in the research laboratory.

SPECIFICATIONS
- Wave Form—a square wave
- Stimulus Amplitude—continuously adjustable from 0 to 100 volts—indicated by a calibrated dial.
- Stimulus Duration—continuously adjustable from 0.04 ms to 100 ms in three ranges—0.04 ms to 3.2 ms; and 0.4 ms to 32 ms.
- Frequency—1 pulse per second to 1000 pulses per second continuously adjustable in 3 ranges.
- Sync Output—100 volt spike pulse.
- Signal Magnet Output—Power frequency voltage sufficient for 2 ohms and over.
- Modes of Operation—automatic, manual, and simple pulse control.
- Power Requirement—115 volt 60 cycle.

Catalog No. 70-926 Square Wave Stimulator, Model SW-1

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

For authoritative information about research on meteors and meteorites

METEORITICA

Vol. XXIII now available in English

Translated by: SPECTRUM TRANSLATION AND RESEARCH, INC.

A translation from the Russian edition published by the USSR Academy of Sciences and edited by V. G. Fesenkov and Ye. L. Krinov.

Volume XXIII sheds new light on the fall of the Tunguska meteorite, with data brought back from the site by the 1961 Combined Expedition... there is an account of the Lazarev meteorite find in Queen Maud Land... studies of chondrites and tektites... mineralogical and chemical investigations of meteorites... and an important review of achievements in meteor astronomy from 1958 through 1961.

Order now at $15.00 per copy (enclose payment to save postage and handling charges)

Taurus Press, Inc. 207 East 37th Street New York, N.Y. 10016

☐ I enclose $15.00 for Vol. XXIII of METEORITICA
☐ Please send and bill me

Name ____________________________
Address __________________________
City __________________ State ______ Zip ______

12 MARCH 1965
Photomicrographs of mitosis as follows: 1) Prophase, 2) Early Anaphase, 3) Anaphase, 4) Telophase... magnification—1600x. Taken by Robert F. Smith.

Make a sequence like this by touching a button

With the Carl Zeiss Photomicroscope you can click off a whole series of photomicrographs, each perfectly exposed and in focus. The microscope has a built-in automatic camera with photoelectric exposure control. The touch of a button opens the shutter, exposes the film the proper length of time, closes the shutter, transports the film one frame, actuates a film counter... ready for the next exposure. You can take an entire series of photomicrographs rapidly in color or black-and-white.

This large universal microscope provides the full versatility of a fine Zeiss instrument. It can be equipped for transmitted or reflected light (Epi-illumination). It is also available as a polarizing microscope.

The inclined binocular is provided with an adjustment to maintain tube length regardless of interpupillary setting. Interchangeable stages and interchangeable condensers, for bright field, dark field and phase contrast work, are also available.

A 6-volt light source is built in, but a 12-volt light source is available as well as a base plate for carbon arc or high-pressure mercury burner illumination. Write Dept. SC for further details and literature on the Carl Zeiss Photomicroscope.

Complete service facilities available.
New Products

Laboratory controller, Matheson Lab-Stat, versatile, capable of proportional, on-off, and high-limit operation; controls any variable which can be expressed as a change in liquid level. Change is sensed by a variable-capacitance probe which clips to the tube in which liquid level is to be regulated. Variations in level around the set-point change the capacitance of the probe which is part of a tuned circuit in a crystal-controlled, solid-state oscillator. Resulting change in oscillator frequency affects the duration of constant-amplitude pulses which power heating or cooling devices or both. Probe is sensitive to both proximity and direction of the liquid level, so that the proper output is supplied to the control device to correct deviation. Power output is 115 volt, 50 to 60 cy/sec, and ± 15 amp. As a proportional controller, it controls level to within 1 mm. A switch selects on-off or high-limit operation; in the latter mode, the instrument opens or closes output contacts when the preset level is reached and must be manually reset. Temperature is controlled by clipping the probe to a mercury-in-glass thermometer; pressure or vacuum are controlled by using mercury- or water-filled manometers; liquid level in closed containers is controlled by monitoring level in sight-gauge glass. Any liquid having a dielectric ≥ 20 can be used. Probes available for tubes up to 6 or 12 mm in diameter (larger probes on request). Front-panel meter indicates whether level is at, above or below set point; switch selects control mode, knob regulates gain. In side are: plug for probe, a-c outlets for heating and cooling systems, and output terminal for millivolt recorder. Instructions permanently printed on box. Dimensions: 11.5 by 6.25 by 4 inches deep (30 by 15 by 10 cm). Teflon-coated 6-foot coaxial probe cable. List: $197.50.—D.J.P. (Matheson Co., Inc., Jackson and Swanston Sts., Philadelphia, Pa.)

Circle 1 on Readers’ Service Card

Microflow valve, for controlling extremely low flows of gas or liquid, combines a small-bore glass capillary and a close-fitting, precision-ground stainless rod to achieve laminar flow through the capillary over a 10 to 1 range of flow. In this laminar region, flow is directly proportional to pressure drop and, for different fluids at a given pressure drop, is inversely proportional to viscosity; this facilitates calculation of estimated flows. Fine screw provides 20 turns in the 0.5 inch (1.25 cm) of stem travel. First ten turns provide a laminar-flow range of 10 to 1; transitional (laminar to turbulent) flow occurs over the next five turns, another 10 to 1 range. Because the end of the rod is ground to a needle point, the final five turns provide conventional needle-valve orifice-flow with another 10 to 1 range. Overall range in flow is thus ≅ 1000 to 1 [for 2-lb/in.² (.14 bar) differential, range is in fact 0.25 to 6000 cm³ of air per minute]. Valve available in chromed brass or 303 stainless. Capillary is pyrex; rod, stainless. O-ring seals make valve tight against pressure (6000 lb/in.²) and vacuum (10⁻⁶ torr). Male pipe thread (¼ inch) on inlet, standard ½-inch tubing adapter on outlet. A filter is recommended to prevent fouling of valve by dust or dirt. List: model 150B (chromed brass), $21.65; model 150S (stainless steel), $29.50.—D.J.P. (Matheson Scientific, Inc., Jackson and Swanston Sts., Philadelphia, Pa.)

Circle 2 on Readers’ Service Card

Laboratory recorder, Honeywell Electronic 19, records d-c voltages on 19 full-scale spans from 0.01 mv to 100 volts; accurate within 0.25 percent full scale or 1 μv, whichever is greater. Convenient for recording a wide range of d-c signals in analytical or biological laboratories. The null-balance, servo-type, measuring system gives true potentiometric measurement from 0.01 to 100 mv; input impedance is infinite at null, 25,000 ohm/mv off null; constant 4 Mohms on all voltage ranges. Solid-state circuitry incorporates constant-voltage source referenced to a double Zener-diode bridge. Dead band, 0.15 percent of span; frequency response down 1 percent at 5 cy/sec (measured on sine-wave signal, 10 percent of full scale). Thumb-wheel selected chart speeds of 10, 5, 2, and 1 min/in. and 40, 20, 10, 5, 2, and 1 sec/in., with standby position. Zero displacement continuously adjustable from -100 to +100 percent of full scale, with accurate calibration of zero value. Jewel-tipped pen uses disposable ink cartridges. Reloading of paper is easy. Has tilting writing table (locks at 30 and 45 deg), mechanical pen lifter, carrying handle, 7-foot cord. Dimensions: 8.75 inches square by 11 inches deep (22.3 by 28 cm). Weight: 20 lb (9 kg).—D.J.P. (Honeywell Industrial Products Group, Wayne and Wilson Ave., Philadelphia, Pa.)

Circle 3 on Readers’ Service Card

Ice-point calibration standard, automatically maintains an immersion well at 0° ± 0.01°C, replaces the common ice bath in precise calibration procedures. The reference well, 7 mm internal diameter by 150 mm, is immersed in a hermetically-sealed chamber of water cooled thermoelectrically. The reference temperature, 0°C, is established by the physical equilibrium of ice and water; this is sustained by a thermoelectric cooler automatically controlled by a sensing device (bellows-microswitch) which responds to the relative volumes of ice and water in the chamber. Well is thus continually surrounded by ice and water in equilibrium. Instrument is ready for plugging in to a 110-volt, 60-cy/sec a-c source. Eliminates inconveniences of ice baths and triple-point methods. Reference is automatic at 0°C and sustained. Simplicity of thermoelectric coolers and their power supplies makes the device virtually maintenance-free. Model RCS1 has a single well; stability, ±0.01°C. Model RCS4 has four wells
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.

with stabilities of ±0.025°C; one well stable within 0.005°C. Both operate in ambient from 35°F to 100°F. Dimensions: 14.38 by 9.75 by 8.07 inches high (36.5 by 25 by 20.5 cm). Designed for use in standards laboratories in the fine calibration of thermocouples, thermocouple wire, and other temperature-sensing devices. List: model RCS1, $395.00; model RCS4, $550.


Circle 4 on Readers' Service Card

Electrodeless conductivity meter, which measures the conductance of liquids without direct contact between solution and metallic electrodes, is particularly suitable for titrations in both aqueous and nonaqueous solvents, as well as for monitoring conductance in flowing fluids. The solid-state variable oscillator provides three frequencies; one is selected to meet the range of conductance under measurement. For each frequency, the instrument responds to changes in conductance over at least a hundredfold range of solution concentrations; total range is from $10^{-7}$ to $10^{-2}$ mho/cm. Oscillator output is coupled with the solution at a metallic sleeve and is carried by ion flow to a second sleeve which couples the attenuated signal with the solid-state amplifier.

An eight-position attenuator permits a 3000-to-1 range of full-scale measurements. The amplifier output drives the panel meter and the recorder jack; meter (calibrated 0 to 100 μA) has a repeatability of 0.5 percent. The standard titration cell provided includes a reservoir for titrants and a gas intake port for gas mixing; a flow-through cell is optional. The front panel jack provides 0 to 100 mv for driving a constant delivery-rate buret or standard strip-chart recorder.

Dimensions: 13.75 by 8.75 by 7 inches high (35 by 22.3 by 18 cm).—D.J.P.

(Melabs, 3300 Hillview Ave., Stanford Industrial Park, Palo Alto, Calif.)

Circle 5 on Readers' Service Card

Constant-speed drive system and power stirrer, Servo-Dyne, comprises a d-c motor and solid-state controller; provides constant-speed output regardless of load variations. Speed is continuously variable from 5 to 3000 rev/min in two ranges (0 to 300 rev/min, 0 to 3000 rev/min). Maximum torques: 4 inch-lb (4600 g-cm) from 5 to 1500 rev/min; 1 inch-lb at 3000 rev/min. Within these ratings, speed is maintained within 3 percent. Separate winding on the motor arma-
Porous Bottom Crucibles

Coors Porous Bottom crucibles give the chemist sturdy, dependable filtering crucibles for unlimited service under the most exacting conditions. An exclusive process developed by Coors provides a porous disc, formed into the crucible wall, that will not crack or drop out during use at room or elevated temperatures. The disc will not disintegrate when subjected to acids (except HF) or moderate alkali solutions. When these Coors crucibles are ignited even to extremely high temperatures, the porous disc will not crack, nor will the pore size be altered. Carefully controlled pore sizes are available in three ranges: (1) for bacterial separation and (2) fine filtering and (3) coarse precipitates. The crucibles are easily cleaned and readied for re-use. The same filtering disc may be ordered in the Coors Emich micro-filter stick for immersion filtration.

Write for Bulletin No. 548. Coors Porous Bottom crucibles are immediately available through your nearest laboratory supply dealer.

COORS U.S.A.

NOW! AN AUTOMATIC SAMPLE CHANGER FOR LESS THAN $2700...

Including Scaler and Gas-Flow Detector

Model SM-368
"Sample Master"

Sounds impossible, but it’s true. And the “Sample Master” gives you the same degree of accuracy and versatility as the high-priced models:

- 25-planchet capacity
- Printing timer built in
- “Manual” mode for counting individual samples
- Automatically rejects sample whose activities are too low

Send for FREE literature.

(Circular SC-4)

Neutralized-capacitance amplifier, PICO-metric model 181, is a completely solid-state amplifier for use with high-impedance electrodes in applications requiring optimum signal-to-noise ratio and fast rise time. Its input impedance has a negative capacitance which compensates for positive capacitance across the electrode, reducing time constant (resistance times capacitance) and rise time of the electrode output. High-impedance sources such as nerve-cell probes, with resistances from 10 to 1000 MΩ shunted by \( \leq 12 \) pf, can be compensated to show rise times of from 3 to 10 \( \mu \)sec. Amplifier has: input impedance of \( 10^{13} \) ohm (minimum), +1 to −12 pf; input offset-current adjustable to \( 10^{-13} \) amp. Output-voltage range, ±1 volt, with a rate limit of \( 10^{5} \) volt/sec. Temperature coefficient, 200 \( \mu \)V/°C (viewed at output); long-term stability, 100 \( \mu \)V/day. Battery life, 1500 hours. Dimensions: 3 by 3 by 2.25 inches (7.5 by 7.5 by 6.6 cm). List: $345.—D.J.P. (Instrumentation Laboratory, Inc., 9 Galen St., Watertown, Boston 72, Mass.)

Circle 6 on Readers’ Service Card

Circle 7 on Readers’ Service Card
NEW BOOKS

(Continued from page 1278)


Bausch & Lomb Diffraction Gratings are preferred by all major manufacturers of spectroscopic instruments as well as astronomers, spectroscopists and other scientists. As the world's number one source, we maintain a stock of hundreds of different gratings and we can produce thousands of varieties from master gratings now on hand.

Our interferometric control is your assurance of the highest precision standards and finest quality gratings available. They are outstanding in their high resolving power, low ghosts and high efficiency.

B&L has specialized in coating both gratings and mirrors with fast fired aluminum plus MgF₂ for high reflectance at wavelengths shorter than 1500Å in the vacuum ultraviolet. Coatings of gold or platinum are also available for gratings for the extreme ultraviolet region.

Write to Bausch & Lomb, 64215 Bausch Street, Rochester, New York 14602, for Catalog D-261. It gives prices, uses, characteristics and details on the theory and applications of diffraction gratings.

BAUSCH & LOMB


Lea & Febiger Research References

Kraus and Jordan—Human Dentition Before Birth

Schalm—Veterinary Hematology

Galigher and Kozloff—Essentials of Practical Microtechnique
1964. Provides detailed explanations of the procedures commonly used in preparing material for microscopic study. 484 Pages. 60 Illustrations. $10.00.

Porter and Bonneville—An Introduction to the Fine Structure of Cells and Tissues
2nd (1964) Edition. 68 loose-leaf sheets, 8½" x 11", punched to fit standard three-ring notebook. 32 full-page electron microscopic illustrations and 5 text figures. 37 accompanying legends. $4.50. Clothbound, $7.50.

Grollman—Pharmacology and Therapeutics
6th (1965) Edition. Emphasizes basic mechanisms of drug action while orienting the subject toward practical therapeutics. 1181 Pages. 330 Illustrations. $15.00.

Lloyd—Human Reproduction and Sexual Behavior
1964. An interdisciplinary work which integrates clinical syndromes with basic physiology. 564 Pages. 203 Illustrations. 16 Tables. $12.50.

Radeff—Veterinary Toxicology
1964. Devoted specifically to veterinary toxicological problems in the U. S., the book covers diagnosis, treatment and prevention. 314 Pages. 105 Illustrations. $9.00.

Sherman—Atlas of Congenital Heart Disease
1963. A detailed study of gross anatomic observations on over 500 autopsy specimens. 303 Pages, 7" x 10". 263 Illustrations on 200 Figures. $15.00.

Quimby and Feitelberg—Radioactive Isotopes in Medicine & Biology: Basic Physics and Instrumentation
2nd (1963) Edition. A full presentation of the basic physics of radioactive nuclides. 343 Pages. 84 Illustrations. 27 Tables. $8.00.

Silver—Radioactive Isotopes in Medicine & Biology: Medicine

Lumb—Small Animal Anesthesia
1963. Describes anesthetic techniques and equipment needed to handle normal and emergency situations for domestic, wild and laboratory animals. 420 Pages. 125 Illustrations, 1 in Color. $11.50.

Smith and Jones—Veterinary Pathology
2nd (1961) Edition. Stresses practical diagnostic pathology and pathogenic cause and effect. 1068 Pages, 7" x 10". 763 Illustrations on 338 Figures and 12 in Color on 2 Plates. 11 Tables. $17.50.

Soffer, Dorfman, and Gabrilove—The Human Adrenal Gland
1961. "The most reliable account of modern knowledge of the adrenal gland available." 591 Pages. 79 Illustrations, 1 in Color. $18.50.

Moses—Atherosclerosis: Mechanisms as a Guide to Prevention
1963. Presents in one volume all of the factors which influence the atherosclerotic process. 239 Pages 7" x 10". 54 Illustrations. 7 Tables. $8.00.

Write for Descriptive Literature on Books in Your Special Field of Interest

------------------------------- MAIL TODAY ----------------------------

LEA & FEBIGER
Washington Square
Philadelphia, Pa. 19106

Please send me the books circled above or listed in margin below. I will return books or pay for those I keep within 60 days of their receipt.

NAME (print) .................................................................

ADDRESS .................................................................

CITY ................. ZONE ............. STATE .................

TEACHING AFFILIATION .................................................

SC 3-12-66

12 MARCH 1965
Whether you are lazy or not, you will enjoy saving up to two hours daily conducting electrophoresis research. Using the EC 470 Apparatus, here is how it is done:

1. Cell locks itself together—no further manipulation.
2. Pour in single gel solution—no further manipulation.
3. Apply samples directly—no further manipulation.

After running for one hour, remove gel slab.

CIRCLE READER SERVICE CARD FOR DATA SHEETS AND BIBLIOGRAPHY

E-C APPARATUS CORP.

220 SO. 40TH ST., PHILA. 4, PA.
PHONE: Area Code 215-282-2204

YOUR RESEARCH DESERVES THE BEST REAGENTS

Check these major classifications in Dajac's latest catalog:
- Biological Stains
- Buffer Solutions
- Stabilized Diazonium Salts
- Enzyme Substrates and Reagents
- Fluorescent and Scintillation Reagents
- Ribonucleosides and 5'-Nucleotides
- Tetrazolium Salts
- Special Reagents and Custom Syntheses

Send for free catalog Dept. S-35

GERM PLASM RESOURCES

AAAS Symposium
Volume No. 66

Edited by Ralph E. Hodgson

394 pages, 59 illustrations
Index, Cloth, April 1961.

PRICE: $9.75. For AAAS members, only $8.50, prepaid.

Origin of Germ Plasm—4 chapters
Need For and Utilization of Additional Sources of Germ Plasm—5 chapters
Developmental Programs in Crops and Livestock—5 chapters
New Approaches in the Use of Plant and Animal Germ Plasm—6 chapters
Perpetuation and Protection of Breeding Stocks—5 chapters

Order today from

American Association for the Advancement of Science
1515 Massachusetts Avenue, NW
Washington, D.C. 20005
finite resistivity or finite current-carrier mass” by H. P. Furth; “Nonlinear theory of electrostatic waves in plasmas” by P. A. Sturrock; “Equilibre et stabilité des systèmes toroïdaux en magnétohydrodynamique au voisinage d’un axe magnétique” by C. Mercier; and “Boundary layer problems in plasma physics” by B. Botzat.

Three papers presented at a seminar are also included: “Introduction for papers on adiabatic invariance” and “Adiabatic invariant of the harmonic oscillator” by R. M. Kulsrud and “The gyration of a charged particle” by M. Kruskal.


Seven papers: “The role of computers in election night broadcasting” by Jack Moshman; “Some results of research on automatic programming in Eastern Europe” by Włodzisław Turski; “A discussion of artificial intelligence and self-organization” by Gordon Pask; “Automatic optical design” by Orestes N. Stravroudis; “Computing problems and methods in x-ray crystallography” by Charles I. Coulter; “Digital computers in nuclear reactor design” by Elizabeth Cuthill; and “An introduction to procedure-oriented languages” by Harry D. Huskey.


...the most useful Spectropolarimeter money can buy

The Durrum-Jasco* Model ORD/UV-5 combines the most useful set of measurement capabilities ever presented in an Automatic Spectropolarimeter. With standard equipment, a single instrument can display precise recordings of:

- Optical Rotatory Dispersion from 1850 to 7000 Å
- Optical rotation kinetics
- Optical density or percent transmittance from 1800 to 7000 Å
- Specific or observed rotation

These additional standard features confirm the validity of your ORD recordings:

- Continuous slit-width recording
- Continuous photomultiplier voltage recording
- Wavelength scale expansion for analysis of structural detail

Breadth of the Model ORD/UV-5's capabilities is matched only by the simplicity and convenience of its operation. And although you would expect to pay much more, the price is only $22,950.

For further information, write to Durrum Instrument Corporation, 925 East Meadow Drive, Palo Alto, California 94303. Or phone (415) 321-6302.

* Japan Spectroscopic Company, Ltd.
Distilled in Glass

...to meet exacting solvent needs

Acetonitrile...Alcohols...Benzene...Cyclohexane...
Dimethyl Formamide...Dioxane...Ethyl Acetate...
Hexane...Ketones...Methylene Chloride...
Petroleum Ether...Toluene...Others

Ask for Data Sheet BJ-13S

BURDICK & JACKSON LABORATORIES, INC.
616 PA 2-2310
MUSKEGON, MICHIGAN 49442

The only thing these fiberglass fume hoods won't exhaust is your budget

You can pay more for a fume hood. But you can't find one that will perform better than a Labconco fiberglass fume hood.

Fiberglass is fire retardant and chemical resistant. No paint to peel or crack, no transite to sag, no metal to corrode.

Fiberglass fume hoods cost less to install or relocate. Ship completely assembled — ready to plug in and use.

Labconco hoods are stocked in major cities for prompt delivery. Contact your laboratory supply dealer or write.

LAB CON CO
8805 Prospect Kansas City Missouri

DISPOSABLE CAGES
NOW AT NEW LOW PRICES!

RIGID—Needs no Supports of Any Kind

Here's the best buy in disposable cages on the market! Increased sales make new low prices possible. Clear polystyrene units are completely disposable—can be incinerated with 1-2% residue. Ideal size (11½" x 7½" x 5") based on ILAR standards for housing mice. Now priced so low that they make costly and time consuming washing and sterilizing obsolete and uneconomical.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>No. Pieces</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Case</td>
<td>48 pcs.</td>
<td>14.87</td>
</tr>
<tr>
<td>10 Cases</td>
<td>480 pcs.</td>
<td>14.09</td>
</tr>
<tr>
<td>25 Cases</td>
<td>1200 pcs.</td>
<td>13.30</td>
</tr>
<tr>
<td>50 Cases</td>
<td>2400 pcs.</td>
<td>12.52</td>
</tr>
<tr>
<td>100 Cases</td>
<td>4800 pcs.</td>
<td>11.74</td>
</tr>
</tbody>
</table>

Note: Contract prices available on quantities over 5000 pieces. Sample Kit available (10 disposable cages and 5 #22-D Lids) at $17.25 per case.

Contact your Econo-Cage distributor for our complete line of cages with matching lids—or send for new catalog.

ECONO-LAB division
MARYLAND PLASTICS, INC.
9 E. 37th St., N.Y., N.Y. 10016


Ten papers: "Two-dimensional Lagrangian hydrodynamic difference equations" by William D. Schulz; "Mixed Eulerian-Lagrangian method" by R. M. Frank and R. B. Lazarus; "The strip code and the jetting of gas between plates" by John G. Trulio; "Cel: A time-dependent, two-space-dimensional, coupled Eulerian-Lagrangian code" by W. F. Noh; "The tensor code" by G. Maenchen and S. Sack; "Calculation of elastic-plastic flow" by Mark L. Wilkins; "Solution by characteristics of the equations of one-dimensional unsteady flow" by N. E. Hoshin; "The solution of two-dimensional hydrodynamic equations by the method of characteristics" by D. J.

The
Tempting
Temptrol Model 154

A refrigerated bath and circulator that's got just about everything!

Wide temperature range? You bet—from \(-10^\circ\) to \(+100^\circ\) C. What about uniformity? You get ±0.02° C or better throughout the range. Pumping capacity? Up to 210 gal./hr. Space saver? Yes, only 13" wide x 14" deep x 21" high, but has 360 cu. in. bath. Other features? Plenty, including Precision's guarantee of quality and dependability. Only $995 and available immediately from your nearby Precision Scientific Distributor's stock. Why wait? Call him today, or write us for Bulletin 629. You'll get full details on the Temptrol Line—most complete in the industry!

Since 1920—The finest in Quality Laboratory Apparatus

PRECISION
SCIENTIFIC CO.

3737 W. Cortland Street, Chicago, Illinois 60647
Local Offices in New York • Chicago • Los Angeles


Richardson: "The particle-in-cell computing method for fluid dynamics" by Francis H. Harlow; and "The time dependent flow of an incompressible viscous fluid" by Jacob Fromm.

You might choose Furnace Type 1300 for PORTABILITY...
papers: "Reaction by metal halides with ammonia and aliphatic amines" by G. W. A. Fowles; "The magnetic properties of transition metal complexes" by B. N. Figgis and J. Lewis; "Reactions of the noble gases" by John H. Holloway, and "The coordination model for non-aqueous solvent behavior" by R. S. Drago and K. F. Purcell.


New and Timely publications on...

**Surface Effects in Detection**
*Edited by J. I. Bregman and A. Dravnieks*
*IIT Research Institute*

This significant work covers a wide range of scientific fields, but all revolve around the same theme—how does one analyze for very faint traces of contaminants in the air? A conference was held to answer this question by reviewing and extrapolating knowledge of surface effects and interactions that could be applicable to rapid detection of various substances in the air. This book is an outgrowth of the conference. A unique and vital feature of the book is the inclusion at the end of each paper the verbatim question-and-answer exchange between the author and audience.

410 pages 6 x 9 illus. $15.00

---

**Computer Augmentation of Human Reasoning**
*Edited by Margo Sasse, Office of Naval Research and W. D. Wilkinson, Bunker-Ramo Corporation*

Each advance in the computer sciences over the past twenty years has opened new doors to new problems. The human problem solver traditionally has handled such matters by using past experience, trying alternatives, or applying intuition. The apparent need is a synthesis of the capabilities of man and machine. In this book experts exchange views on both the practical and theoretical application of the man/machine relationship.

240 pages 6 x 9 illus. $5.00

---

**Information System Sciences**
*Edited by Joseph Spiegel, The Mitre Corporation*

One of the most stimulating and most serious areas of interest in the information processing sciences is the development of joint man-computer systems. The U.S. Government is investing an increasing proportion of its funds and confidence in the generation of these systems for military command and control. The Second Congress on Information System Sciences, on which this book is based, encouraged the exchange of information in such areas as on-line man/computer systems, current military data management systems, tactical information systems, self-organizing and adaptive information and other phases of the science.

592 pages 6 x 9 illus. $23.75

---

**Specialized Information Centers**
*By Allen Kent, Director Knowledge Availability Systems Center University of Pittsburgh*

This is the first book in the field which provides detailed information on specialized information centers, the unit operations performed and the factors influencing their success or failure during operation. The information scientists and librarians who read this book will find that the operation of such centers is similar to the operation of the more traditional special library or university and public libraries.

296 pages 6 x 9 illus. $9.00

---

**INSTRUMENT DEVELOPMENT CO.**
A division of Hazleton Laboratories, Inc.

makes the most advanced air pollution monitoring instruments in the country.

For details • write, call or wire

Instrument Development Company
11455 Newton Square So., Reston, Va.
area code 703 • Jefferson 2-5800

---

**WHY are MONOCHROMATIC LIGHT and**

A SINGLE PHOTOMULTIPLIER

**VITAL to AUTOMATIC DIFFERENTIAL REFRACTOMETRY?**

**MONOCHROMATIC LIGHT?**
The use of monochromatic light eliminates the dispersion effect found in instruments employing polychromatic light. Only the use of monochromatic light permits differential refractometers to be calibrated in terms of absolute refractive index difference.

**A SINGLE PHOTOMULTIPLIER?**
Drift due to temperature changes, spectral shifts, and fatigue are eliminated with the use of a single photomultiplier tube. This also permits measurement of highly absorbing and turbid samples, a capability not provided by other photo-detectors.

The end result is an instrument with greater accuracy, more sensitivity, extended range and increased stability . . . the Phoenix Differential Refractometer. Want more reasons? Write for Bulletin R-2000.

**PHOENIX PRECISION INSTRUMENT COMPANY**
A subsidiary of CENCO INSTRUMENTS CORP.
3803-05 N. 5th Street, Phila., Penna. 19140, U.S.A.
categories: Nuclear and Orientation Effects (9 papers); Epitaxial Films (14 papers); and Physical Properties (5 papers).


Technical personnel are a large investment. Model 15‘S advanced design prevents their capabilities being instrument-limited. ■ Reliability is an investment. Model 15‘S quality and craftsmanship minimize expensive down-time. ■ Versatility is an investment. Model 15 has ten different accessories which mount in seconds into spacious sample compartment (5 ¼” x 5 ¼” x 5 ¼”) to offer ready adaptability to a wide range of problems. ■ Performance is an investment. Model 15‘S precision and repeatability meet tomorrow’s needs as well as satisfying those of today. ■ Make an investment in quality with a Cary 15. Priced under $12,000.
Polymers of the following L-α-amino acids are available from stock:

- ALANINE
- ASPARTIC ACID
- β-BENZYL ASPARTATE
- GLUTAMIC ACID, SODIUM SALT
- γ-BENZYL GLUTAMATE
- LEUCINE
- LYSINE HYDROBROMIDE
- e-CARBOBENZOXY LYSINE
- PHENYLALANINE
- TYROSINE
- O-CARBOBENZOXY TYROSINE

In addition to the above, PILOT can synthesize copolymers, special molecular weights and polymers of amino acids having unnatural configuration. Also available from PILOT is Woodward’s Reagent K, a new peptide-former. For further information, write to Dept. S-622.

**SYNTHETIC POLYPEPTIDES**

C. H. STOELOING CO.

Polygraphs • Telemetering
Stereotaxic Instruments • Micro Syringes
Micro-Manipulators • Communications Logging

424 N. Homan Avenue • Chicago, Illinois 60624

**RECENT ELECTROPHORESIS RESEARCH**

With EC455 horizontal plate electrophoresis apparatus...

EC455 electrophoresis apparatus makes paper electrophoresis possible under uniform conditions of paper wetness. Six—2½” or sixteen—1” paper strips are placed between nonwettable plastic surfaces, thus preventing evaporation and allowing sample to travel through uniformly wet paper from beginning to end.

The paper strips with sample applied are then clamped between water-cooled plates. When ice water is circulated through these plates, as much as 2000 V at 200 MA can be passed through the cell, permitting rapid separation.

**AMONG MANY RECENT APPLICATIONS FOR THE EC455 . . .**

- Mobility studies of iodinated human serum albumin.
- Two-dimensional paper agar electrophoresis of hemoglobin.
- High-voltage electrophoresis BAIB.
- Super-cooled electrophoresis of P-esters in non-aqueous buffers.

REPRINTS . . . and technical bulletins on these and other applications of the EC455 Electrophoresis Cell are available on request. Write or call for technical consultation on all electrophoresis problems. Circle Reader Service Card for our file folder of selected electrophoresis material.

**TELEPHONE** Area Code 215—382-2204

E-C also manufactures countercurrent apparatus and the new Vertical Gel Electrophoresis unit.


From the HOLDEN-DAY
Library of Pure and Applied Science

Counterexamples in Analysis
by Bernard R. Gelbaum, UNIVERSITY OF CALIFORNIA, Irvine, and John M. H. Olnsted, SOUTHERN ILLINOIS UNIVERSITY

A fascinating collection of instructive examples and counterexamples from the folklore of mathematical analysis. The authors introduce each of the major topics with a summary of the important ideas, definitions, and pitfalls encountered in the use of the theorems. The presentation is sufficiently complete to avoid communicating false impressions as to what can be done with the theorems, yet succinct enough to afford pleasurable reading for a broad and varied audience. $7.95

Final-State Interactions
by John Gillespie, COLUMBIA UNIVERSITY

The first (and only) complete treatment of the subject. By abstracting and relating the simplest basic concepts, the author emphasizes the essential unity of various final-state theories. And by consolidating techniques developed in various domains of physics, ranging from high-energy elementary particle research to studies of atomic photodetachment, he creates an admirable introductory text to the subject. Graduate students interested in elementary particles, potential theory, dispersion relations, and space physics will find it especially valuable. $6.95

Computer-Oriented Mathematics
by Ladis Kovach, PEPPERDINE COLLEGE

Discusses, in elementary terms, the mathematical and numerical methods pertinent to computers in general. The book also contains a number of examples to show how computer-oriented mathematics can be used to solve problems even though a computer may not be available. It is written to interest a wide audience, assuming only a knowledge of high-school mathematics and a generous dash of scientific curiosity. $3.95 (cloth) $2.95 (paper)

Introduction to Scientific Inference
by Robert Hooke, WESTINGHOUSE RESEARCH LABORATORIES

A monograph to acquaint scientists and engineers (and undergraduates) with some of the elements of scientific inference as statisticians see it, and to stimulate their interest in the study of statistics. Emphasizes ideas, with a low mathematical level, but provides clear and simple explanations of principles of quantitative description. $4.75

Available at all Scientific Book Stores

For a copy of the new Holden-Day catalog of approximately 70 titles in the fields of biology, chemistry, mathematics, physics, engineering, mathematical economics, and psychology, write to:

Holden-Day, Inc.
730 Montgomery Street
San Francisco, California 94111

12 MARCH 1965
INDEX TO ADVERTISERS—12 March 1965

Abbott Laboratories 1373  
Ace Glass Inc.  1216  
Ainsworth, Wm., & Sons, Inc.  1335  
Allied Chemical, Fibers Div.  1375  
American Edelstaal Inc.  1381  
American Optical Co.  1380  
Applied Physics Corp.  1198, 1365  
Arapahoe Chemicals, Inc.  1183  
Atomic Accessories, Inc.  1353  
Bausch & Lomb  1338, 1355  
Beckman Instruments, Inc.  1213, 1226  
Beckman & Whitley  1345  
Bell Art Products  1330  
Bendix Corp. Cincinnati Div.  1220, 1221  
Blackstone Ultrasonics, Inc.  1347  
Bio-Tronics Research, Inc.  1377  
Booz-Allen Engineering Research Inc.  1377  
Borden Chemical Co.  1358  
Bromwill Scientific  1327  
Burdick & Jackson Laboratories, Inc.  1360  
Canal Industrial Corp.  1348  
Cannon Instrument Co.  1336  
Center for Information Resources, Inc.  1368  
Central Scientific Co.  1336  
Chemical Abstracts Service  1373, 1376  
Clay-Adams  1207  
Coleman Instrument Co.  1232, 1233  
Coors Porcelain Co.  1353  
Corning Glass Works  1196  
Cosmic Radiation Labs, Inc.  1192, 1193  
Custom Scientific Instruments, Inc.  1356  
Denominator Co., Inc.  1329  
Dinco-Grey Co.  1333  
Disposable Laboratory Cages, Inc.  1333  
Dow Chemical Co.  1333  
Durrum Instrument Corp.  1359  
Eastman Chemical Products, Inc.  1199  
E-C Apparatus Corp.  1358, 1366  
Economics Laboratory, Inc.  1233  
Edmund Scientific Co.  1280  
Electro-Mechanical Development Co.  1339  
Electronic Associates, Inc.  1238  
Farrand Optical Co., Inc.  1346  
Fisher Scientific Co.  1331  
Fish-Schurman Corp.  1337  
Forma Scientific, Inc.  1336  
Four Continent Book Corp.  1336  
General Nuclear Research Laboratories  1375  
General Tire & Rubber Co.  1370  
Glas-Col Apparatus Co.  1209  
Hacker, William J., & Co., Inc.  1355  
Hammer, F. W. Co.  1352  
Harford Metal Products, Inc.  1356  
Harvard Apparatus Co., Inc.  1337  
Haskel Laboratories, Inc.  1360  
Heath Co.  1374  
Hoffmann-La Roche Inc.  1374  
Holden-Day, Inc.  1375  
Honeywell, Denver Div.  1236  
Hotoface  1333  
Hyland Laboratories  1369  
Institute for Scientific Information  1321  
Instrumentation Specialties Co.  1344  
International Equipment Co.  1186  
Isomet Corp.  1329  
Japan Electron Optics Laboratory Co., Ltd.  1212  
Jarrell-Ash Co.  1326  
Keithley Instruments  1332  
Kirschner Manufacturing Co.  1329  
Klett Manufacturing Co.  1279  
Kontes Glass Co.  1201  
Korad  1363  
Lab-Cages, Inc.  1360  
Laboratory Construction Co.  1360  
Lawrence Radiation Laboratory  1360  
Lea & Feibiger  1357

Leeds & Northrup Co.  1208, 1324  
Leitz, E., Inc.  1244  
Linde Div., Union Carbide Corp.  1227  
LKB Instruments, Inc.  1206  
London Co.  1202  
Lourdes Instrument Co.  1325  
Maryland Plastics, Inc.  1369  
Matheson Co. Inc.  1205  
McGraw-Hill Book Co.  1334  
Mead Johnson & Co.  1273  
Mechanical Enterprises, Inc.  1328  
Melabs  1341  
Melpar Inc.  1376  
Merrell-Wan. S., Co.  1329  
Microtek Instruments Inc.  1225  
Millipore Filter Corp.  1337, 1349  
Nalge Co., Inc.  1354  
Nega File Co.  1328  
Nuclear-Chicago Corp.  1197, 1217, 1229  
Nuclear Data Inc.  1189, 1224  
Ohaus Scale Corp.  1246  
Pallard Inc.  1204  
Pericle Refrigeration and Manufacturing Co.  1343  
Perkin-Elmer Corp.  1330  
Pfizer Europe  1372  
Pharmacia Fine Chemicals Inc.  1234  
Phillbrick Research, Inc.  1324  
Phipps & Bird, Inc.  1349  
Phoenix Precision Instrument Co.  1364  
Photovolt Corp.  1356  
Pilot Chemicals, Inc.  1366  
Precision Scientific Co.  1361  
Professional Tape Co., Inc.  1346  
Radio Corporation of America  1195, 1277  
Reeve, Angel  1273  
RGI Inc.  1347  
Sage Instruments, Inc.  1334  
Samborn, Div. of Hewlett-Packard  1219  
Sandia Corp.  1371  
Sandoz Pharmaceuticals  1370  
Saunders, W. B., Co.  1183  
Schleicher, Carl, & Schuoll Co.  1340  
Scientific Industries Inc.  1339  
Shell Companies  1375  
Svenska Amerika Inc.  1190, 1191  
Sigma Chemical Co.  1327  
Sorensen  1228  
Sorvall, Ivan, Inc.  1318  
Southern Precision Instrument Co.  1349  
Spartan Books, Inc.  1364  
Standard Scientific Supply Corp.  1328  
Stoecking, C. H., Co.  1566  
Sulfur Cryogenics, Inc.  1341  
Taurus Press, Inc.  1349  
Teachers Insurance and Annuity Assoc.  1352  
Technical Measurement Corp.  1210  
Technicon Instruments Corp.  1215  
Texas Instruments  1342  
Thermox Corp.  1362  
Thurmond Scientific Instruments Co.  1203  
Vanguard Instrument Corp.  1230  
Varian Associates  1200, 1237  
Vario Inc.  1352  
Vickers Instruments, Inc.  1188  
Victoreen Instrument Co.  1243  
Warner-Chilcott Laboratories  1211  
Waters Laboratories Instruments Div.  1211  
Warner-Lambert Pharmaceutical Co.  1377  
Welch Scientific Co.  1370  
Wild Heerbrugg Instruments, Inc.  1325  
Williams-Anderson Co.  1354  
Wittwep Labatories  1337  
Worthington Biochemical Corp.  1344  
Wyle Scientific Sales  1240  
Zeiis, Carl, Inc.  1350
clarity!

Instant inspection of animals at all times. That's one of the outstanding features of clear polycarbonate and acrylic cages made by Lab Cages. Not just visibility but brilliant clarity! And if you require opaque cages, disposable cages, restraining cages, feeders, water tubes or cage racks, Lab Cages assures you of the most up-dated line. Lab Cages is also exclusive sales agent for AB-SORB-DRI® animal bedding, produced by Michael Wood Products, Inc., Garfield, N. J. It's the all-wood bedding that has been tested and approved by major laboratories and breeding colonies across the country.

Write for our new free catalog!

lab cages, inc.
P.O. Box 176, Kennett Square, Pa.
Area code 215 444-4551
Highly sensitive... to 0.01 gram. Capacity is 111 grams and can be increased to 201 gr. with the extra weight. Adjustable platform for specific gravity determinations.

Construction... Stainless steel... one piece beam with reverse-etched scales. Sliding weights—positive setting. Surfaces are electropolished for corrosion resistance.

4030 Triple Beam Balance, high form ................. $27.50
4031 Auxiliary weight, increases capacity of balance to 201 grams .......... 1.50

General Offices: 7352 N. Linder Avenue, Skokie, Illinois 60076

THE WELCH SCIENTIFIC COMPANY

SANDOZ PHARMACEUTICALS
Hanover, New Jersey

CENTRAL RESEARCH AND DEVELOPMENT CENTER

BASIC POLYMER RESEARCH

SENIOR RESEARCH POSITIONS FOR FUNDAMENTAL WORK IN:

MATERIALS PHYSICS: Ph.D. in Applied Mechanics or Engineering Physics, for work at advanced scientific level in mechanical behavior, strength and performance of polymeric materials.

MECHANICAL PROPERTIES OF COMPOSITE MATERIALS: Ph.D. in polymer physics or applied mechanics, with research experience in any of the following areas—mechanical behavior and stress-strain dynamics of materials, experimental stress analysis, and mathematical physics of elasticity and deformation.

POLYMERIZATION MECHANISM AND STRUCTURE OF POLYMERS: Ph.D. in physical or physical organic chemistry for work in elucidation of polymer structure by kinetics and mechanism studies. Work at advanced scientific level on polymers of novel structures.

OPTICAL MICROSCOPY: M.S. or B.S. with experience in optical microscopy, application of microscopy methods in advanced research.

Qualified candidates are invited to explore these challenging assignments in our new Research Center. Modern personnel program. All inquiries will receive prompt replies.

For further information, please write:
Dr. Guido Stempel, Corporate Research

THE GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO 44309

An equal opportunity employer—for 50 years

SCIENCE, VOL. 147
BIOCHEMISTRY, PHARMACOLOGY AND PHYSIOLOGY. THE UNIVERSITY OF SINGAPORE invites applications for appointments to a Senior Lectureship in Biochemistry, and Lectureships or Assistant Lectureships in its Departments of Biochemistry, Pharmacology and Physiology. Candidates should have, at least, a Master's degree or a registrable medical qualification, with relevant teaching and research experience. A statement of the general terms and conditions of service may be obtained from the Registrar, University of Singapore, Singapore 10, with whom applications must be lodged by 30 April 1965.

RESEARCH SCIENTIST. Excellent position involves working with initial R&D phases advanced types switching tech. using computer logic, microelectronics for numerical machine control, and logic application. Salary commensurate academic and experience background. Modern plant suburban Conn. area. Submit in confidence curriculum, three references to: Box 98, SCIENCE
An Equal Opportunity Employer

JUNIOR AND SENIOR GEOLOGISTS
Applications are solicited by the government of the Province of New Brunswick for positions as Junior and Senior Geologists in expanding geological survey work beginning April 1, 1965. Fields of specialization—groundwater, petrology, stratigraphy, metallic and industrial minerals. Research facilities available. Salary commensurate with qualifications and experience. Address resumes to Directors, Mines Branch, Dept. of Lands and Mines, Province of New Brunswick, Fredericton, N.B. Canada.

MARINE BIOLOGIST
This is definitely for a man who has the interest and capability to build and direct a competent research staff for both fundamental and applied research.

He should be a Ph.D. in marine biology with 5 to 10 years' experience as principal investigator and/or supervisor of research. He will have an opportunity to initiate and develop programs on marine life, pollution, fishery resources, and related areas. Salary will be commensurate with qualifications.

For a qualified man who wants to grow, this opportunity in the New England area will prove unusually attractive. Write to Mr. L. G. Hill

BATTENELLE MEMORIAL INSTITUTE
505 King Ave. Columbus 1, Ohio
An Equal Opportunity Employer

12 MARCH 1965

ORDNANCE VULNERABILITY

Through exhaustive research and laboratory experimentation scientists and engineers continue to improve our ordnance systems with respect to vulnerability from environmental factors. At Sandia, scientists are now investigating the possible vulnerability of a wide variety of components to high energy electromagnetic pulses such as arise from lightning and nuclear explosions. New insights and tools for these and related problems are being developed through long-range studies of the pulse response of various antenna configurations and the evolution of equipment to generate standard fields. These will serve in eventually quantifying the pulse response of specific ordnance shapes and external connections now being analyzed mathematically.

Sandia scientists and engineers do related work in many fields including: field testing, materials research, aerodynamics, plasma physics, reliability studies, and logic systems.

Sandia Corporation is a Bell System subsidiary and a prime contractor of the Atomic Energy Commission engaged in research, design and development of the non-nuclear phases of nuclear weapons. With Sandia you would work in Albuquerque or in Livermore in the San Francisco Bay area.

Sandia recruits on many major campuses and is primarily interested in recent and current outstanding graduates in many of the engineering and scientific disciplines at all degree levels. Consideration of applicants is based solely on qualifications and without regard to race, creed, color or national origin. U.S. citizenship is, however, required. For current opportunities, contact the Sandia recruiter at your college or write Professional Employment Organization 3151, Ref. 517-5, Sandia Corporation, Box 5800, Albuquerque, New Mexico, 87115.

BELL SYSTEM SUBSIDIARY / ALBUQUERQUE, NEW MEXICO / LIVERMORE, CALIFORNIA
**Senior Research Appointments**

Pfizer Europe is creating a new major medicinal research group to be located in Belgium. This new group will play an important and integrated part in the total research effort of Pfizer International and will, in the first instance, embrace medicinal chemical research, pharmacological research and clinical research. The activities of the group will be directed specifically towards the search for new chemotherapeutic agents which are effective in the prevention and treatment of diseases of major clinical importance.

To direct the activities of departments within this group, Pfizer Europe is seeking the services of highly qualified and widely experienced research scientists. They will direct the Departments of Chemical, Clinical and Pharmacological Research.

The Director of Chemical Research will have had broad experience in synthetic medicinal chemistry particularly related to biological activity.

The Director of Clinical Research will have had wide clinical experience at the hospital level, and be strongly interested in clinical pharmacology—he will be concerned with the direction of initial investigations of new drugs in man.

The Director of Pharmacological Research will probably be medically qualified and have had broad experience in experimental pharmacology, and possibly experience in toxicology. For these important appointments, nationality is not important, but the successful applicants will be competent in verbal and written English, and preferably also in German and French. They will be required to recruit such staff as are appropriate to the objectives of their new departments. They will have close liaison with prominent European academic institutions related to their fields of activity.

Representatives will be available for interviews during the FASEB Annual Meeting in Atlantic City from April 10-13.

Or direct your resume to Hollis G. Schoepke, Ph.D., Dept. 584 ABBOTT LABORATORIES North Chicago, Illinois, 60064 An equal opportunity employer

**New Professional Positions in Research Expansion Program**

**Pharmacology:** Ph.D. positions in Neuropharmacology, Psychopharmacology, Autonomic Pharmacology—to organize and conduct research programs for the evaluation and development of new drugs and to initiate new areas of investigation on drugs affecting the central and peripheral nervous systems and effector organs.

**Drug Metabolism:** Ph.D. in Pharmacology or Biochemistry with interest and experience in drug metabolism—to plan and conduct investigations in drug metabolism, pharmacokinetics, and mechanisms of drug action.

**Biochemist:** Ph.D. or M.D. with interest and experience in lipid and carbohydrate metabolism to plan and conduct research in these and related areas for the development of drugs useful in the treatment of metabolic diseases.

These are some of the specific positions currently available in biological research at The Wm. S. Merrell Company. They represent an excellent opportunity to conduct challenging and productive research. Modern new laboratory facilities are located in a pleasant suburb of Cincinnati, an established and rapidly growing medical research center.

Send full resume & details to Donald G. Duncan, Personnel Manager THE WM. S. MERRELL COMPANY DIVISION OF RICHARDSON-MERRELL INC. Cincinnati, Ohio 45215 An equal opportunity employer

**Openings for Chemists at RCA Laboratories**

The Process Research and Development Laboratory of the world-famous David Sarnoff Research Center located in Princeton, N. J., requires men with exceptional qualifications. RCA Laboratories provide an excellent research environment for men with basic research interests and experience in the following areas.

**Specifically needed are:**

Inorganic/Ceramics Chemist. Ph.D. Experienced in new substrates; specialty ceramics; packaging concepts; ceramics synthesis and processing glass-ceramics.

Physical or Inorganic Chemist. Ph.D. Deposition techniques for passive components (non evaporative); synthesis onto substrate by vapor phase transport. Experience in dealing with resistors, capacitors, networks, and active elements.

Inorganic Chemist. Ph.D. or M.S. Experienced in glass technology and ceramics.

RCA Laboratories offer you a comprehensive employee benefit program. Working and living conditions in suburban Princeton are ideal, providing unexcelled educational, cultural, and recreational advantages.

Please send resume to:

Mr. W. A. Jaffe, Dept. RL-3 RCA Laboratories David Sarnoff Research Center Princeton, N. J. 08540

The Most Trusted Name in Electronics An Equal Opportunity Employer
OCCUPATIONS ...
THREE RESEARCH OPENINGS

Mead Johnson Research Center

- **Group Leader—Biochemical Pharmacology**
  Conduct independent research in drug evaluation and supervise group responsible for biochemical aspects of research on new drug possibilities. Requires Ph.D. in biochemistry or pharmacology.

- **Group Leader—Analytical Methods Development**
  Supervise group responsible for all new analytical methods and confirmation of structure of new organic compounds. Requires Ph.D. in pharmacy or chemistry plus three years' experience.

- **Research Associate—Electroneuro-physiology**
  Bioelectronic investigation of central nervous system drugs with emphasis on mechanism of action. Basic research in neuropharmacology and development of established product leads. Requires Ph.D. with working knowledge of bioelectronic experimentation.

Moving expenses, liberal stock option and benefit programs, and opportunities for continued scientific advancement. Please send résumé to:

Manager, Executive Employment
Mead Johnson & Company
2404 Pennsylvania Street
Evansville, Indiana 47721

An Equal Opportunity Employer

Research and consulting services in . . .

LIFE SCIENCES AND CHEMISTRY

Hazleton Laboratories scientists bring an interdisciplinary approach to our clients' problems in:
- Toxicology
- Environmental Health
- Pharmacology
- Safety Evaluation
- Applied Chemistry
- Quality Control
- Bioengineering
- Pathology
- Electron Microscopy
- Microbiology
- Instrument Development
- Virology

Our experienced professional staff provides consulting and research and development services in agricultural, industrial, and household chemicals; cosmetics; food and color additives; pharmaceuticals; veterinary drugs; and assistance in meeting federal and/or state regulations.

For further information about our capabilities or employment opportunities, write—

Hazleton Laboratories, Inc.
P. O. Box 30
Falls Church, Virginia
(Suburban Washington, D.C.)

Subsidiaries

Resources Research, Inc.
INBIFO
P. O. Box 90
Oberländer Ufer 118
Falls Church, Virginia
Köln 5, Germany

An Equal Opportunity Employer

Ph.D.-PHARMACEUTICAL RESEARCH—NEW PRODUCT DEVELOPMENT DEPT.

This position offers the opportunity to engage in research on all dosage forms. Recent or experienced Ph.D. will be considered. Emphasis for experienced man should preferably be in tablet research. Excellent salary, and future for man with ability to assume responsibility.

ORGANIC CHEMIST RADIOACTIVE SYNTHESES

The candidate we seek should have a Ph.D. in chemistry and will be supervising a small group of professionals in the radioactive syntheses of substrates for biochemical investigation. Excellent opportunity for professional growth and recognition.

CHEMIST OR BIOCHEMIST

Purification and characterization of natural products with application to substances of potential importance.

Experience should include a B.S. in chemistry and preferably an M.S. in biochemistry) with 1 to 2 years' background in the isolation of natural products.

Opportunity for scientific publication and attendance at local scientific meetings and symposia.

Superior employee benefits include tuition refund, liberal vacation policy and bonus.

Résumés, which will be treated in strict confidence, should include salary requirements, and be addressed to:

Mr. John W. Hone, Jr.
Employment Manager, SN 312

HOFFMANN-LA ROCHE INC.

Nutley, New Jersey 07110

An equal opportunity employer

An Equal Opportunity Employer
CAREER OPPORTUNITIES IN

synthetic fibers

AT OUR NEW TECHNICAL CENTER
NEAR RICHMOND, VA.

You will have ample opportunity to help us develop the exacting technology of synthetic fibers in research, development, engineering, applications or technical service. You will find room to move and grow; as much responsibility as you are able to handle—where your opportunity is limited only by your abilities.

Here is a partial list of immediate openings:

RESEARCH CHEMISTS
M.S. or Ph.D. Minimum 3 years related experience, to work on converting new polymers into fibers and modifying fiber properties for specific end uses.

SENIOR TEXTILE CHEMIST
M.S. or Ph.D. Chemistry. Minimum 3 years experience development of adhesive and surface coatings for bonding synthetic fibers to rubber synthesis of water-soluble resins, and latex polymers.

SENIOR DEVELOPMENT ENGINEER
B.S. or M.S. Chemical, Mechanical, Textile Engineering. Extensive experience in fiber technology necessary. Challenging position in fiber process development at semi-plant level. Responsible for technical progress of important fiber projects.

DEVELOPMENT ENGINEER
B.S. Mechanical, Chemical or Textile. Development of new fiber products and processes through pilot plant stage. Experience in fibers technology required.

ENGINEERS
B.S. or M.S. Chemical Engineering with three to five years experience in process design in chemical, petrochemical or plastics industries with assigned duties in the polymer processing area.

CHEMICAL ENGINEER
(B.S. or M.S.) for synthetic fiber process design, equipment design, data analysis, liaison with R&D, translation of R&D processes into commercial operations.

CHEMICAL OR MECHANICAL ENGINEERS
(B.S. or M.S.) with experience in operations analysis. Will obtain data, study equipment performance, etc., in order to improve operations with regard to efficiency, cost reduction and increasing capacity of existing synthetic fiber, polymer, and textile operations.

CHEMICAL ENGINEER
(M.S.) Supervisor Polymer Process Group, 5 to 10 years experience in process design in the chemical, petro-chemical, or plastics industry.

CHEMICAL ENGINEERS
(M.S.) with experience in chemical process engineering field. Will act in liaison with R&D. Will translate basic R&D data into design of polymer plants through the use of applied transport phenomena, thermodynamics and kinetics.

CHEMICAL ENGINEERS
(M.S.) with minimum of two (2) years experience (or Ph.D.) for application of mathematics, kinetics, transport phenomena, and thermodynamics to fundamental analyses of key processing steps in the synthetic fiber industry. Will employ analog, digital and hybrid computer techniques in arriving at solutions. Excellent salary and liberal company benefits. If you would like to explore further any of these opportunities, please send your résumé in confidence to: Dr. W. H. Maguigan, Dept. S 312

Fibers Division
P.O. Box 831A, Hopewell, Virginia
An Equal Opportunity Employer
Organic & Analytical Chemists
Instrumentation in the fields of visible, ultra-violet, and infrared spectroscopy, flame photography and gas chromatography for chemical analytical instruments.

Analytical or Physical Chemist
Experienced in spectroscopy and able to operate a Mass Spectrometer. Position at Cape Kennedy, Florida.

Micro-Biologist
Perform experiments with microbial production of hydrogen and the analysis of the data. Training in biochemistry and familiar with the influence of genetic alteration or enzyme capability. Advanced degree.

Molecular Biologist
Training and experience in nucleic acids. Conduct studies on the hybridization of nucleic acid from bacteria, virus and animal tissue. Ph.D. or equivalent desired.

Senior Infrared Physicist
Infrared system design of detectors, optical systems and specialized infrared techniques.

Bio-Physicist
Conduct research in biophysical aspects of virus-cell interaction. Advanced degree desired.

Write to Clarence Endsley
Professional Placement

Polymer Chemists. Project Leaders.
Positions available in the development of synthetic latexes for the paint, paper, floor polish, adhesives fields. The individual chosen should have a good background in polymerization, together with the ability to contribute original ideas. M.S. or Ph.D. preferred. Salary open. Pleasant New England surroundings. Send résumé in confidence to

Dr. Jack Dickstein,
Development Manager
The Borden Chemical Co.
511 Lancaster St.
Leominster, Mass.
An equal opportunity employer

Physical Chemists
Chemists with Ph.D. or equivalent for research in the fields of surface chemistry and colloidal phenomena. Various projects deal with foams, surface films, and dispersions of solids in liquids.

Please submit résumé, which will be treated in full confidence, to

Personnel Director
THE MEARL CORPORATION
Henry L. Mattin Laboratories
Ossining New York

Scientific Literature Analysts

For new computer-aided publication and information retrieval system. Biochemistry, microbiology, pharmacology and physiology are the major areas of subject emphasis. Knowledge of romance languages or Slavic languages, and degree in biological science with equivalent of chemistry major required.

Write to:
MR. PETER BERNAYS
Personnel Department

Chemical Abstracts Service
The Ohio State University
Columbus, Ohio 43210
Vision—at Booz-Allen Applied Research—is the union of insight and farsightedness in the service of military, governmental and industrial clients. The clarity of this vision has been evident in our organization's reputation for competence, our increasing responsibilities...and our continuing need for additional new talent.

Your career growth at Booz-Allen Applied Research will be as rapid as your talents permit. Because our breadth of interests encompasses aeronautics, communications, computer technology, mathematics and statistics, meteorology, operations research, reliability, and a dozen more, each professional staff member is able to participate in a wide range of interdisciplinary assignments. If you wish to share an outstanding record of diversified achievement and can bring us appropriate abilities and experience, we would like to hear from you. Please write Mr. Robert M. Flint, Director of Professional Assignments.

BOOZ • ALLEN
APPLIED RESEARCH Inc.
135 South LaSalle Street
Chicago, Illinois 60603
New York • Washington
Cleveland • Chicago
Los Angeles
An equal opportunity employer

Biochemist
Nutritionists
Physiologists

LAWRENCE RADIATION LABORATORY

The Lawrence Radiation Laboratory engaged in nuclear energy research has openings at Livermore, California, in the Bio-Medical Department. This division is concerned with the uptake, accumulation, retention and excretion of Radionuclides (ions) in living systems at all levels of biological structure.

Biologist or Biophysicist to engage in studies relating to the localization of elements in biological materials. B.S., M.S. or Ph.D. degree with experience in preparing samples for electron microscope analysis or experience in cytological and electron microscopic techniques.

Biologist or Physiologist to study accumulation of alkali earth ions, alkaline earth ions, transition metal ions, and other ions by cells and tissues, and to study effects of diet on the accumulation of these ions by animals. B.S. or M.S. degree in biochemistry or physiology and experience working with radioisotopes is desirable.

Biologist or Physiologist to prepare solutions, tissue homogenates, samples for radiometric assays, sucore density gradients and carry out spectrophotometric assays in differential centrifugation procedures. B.S. degree in organic or biochemistry or physiology is required. One to five years experience in biological science laboratory is desired.

Biologist or Physiologist to prepare and maintain tissue cultures. B.S. or M.S. in cytology, anatomy, or histology is required. Must have had experience with tissue or organ cultures and/or autoradiography.

Chemist to perform inorganic analytical chemistry and radiochemistry associated with isotopic activation program. B.S. or M.S. degree is required. Microchemistry and microscopy experience is desired.

Physiologist or Biochemist to study incorporation and distribution of radioisotopes in milk and other food products. B.S. or M.S. degree in physiology or biochemistry is required. Experience with animals and radioactivity is desired.

Additional positions will become available in the Bio-Medical Program for research scientists and assistants at all degree levels.

Please send résumé to:

Mr. Keith E. Moseley
Personnel Department

LAWRENCE RADIATION LABORATORY

P. O. Box 808 M13-35
Livermore, California
U.S. Citizenship Required

An Equal Opportunity Employer

How often does your work make an impact on the Pharmaceutical Industry?

At Warner-Lambert you have every chance to do just this. Our Research Institute is an organization devoted to the development of therapeutic agents through basic and clinical research. To achieve this goal the research staff pursues the long journey from a laboratory curiosity to a potent, effective drug—creatively and methodically.

Modern laboratory facilities on a landscaped suburban site contribute to a congenial research environment. Laboratories are well-equipped, extensive research library and technical information facilities are available. Publications and attendance at scientific meetings are actively encouraged. A full employee benefit program includes company supported graduate study.

PROPRIETARY PHARMACOLOGY

Ph.D. Pharmacology. 2-3 years experience in proprietary pharmacology. Organize a new program of study in anti-tussives, gastrointestinal products, cold products, etc. Development of new concepts for combination products.

BIOCHEMIST—PHARMACOLOGICAL RESEARCH

Ph.D. in Biology, Physiology or Biochemistry. Initiate and develop program designed to evaluate the effects of various agents on the energetics of muscle contraction. Close cooperation with other Biological Research Departments.

MICROBIOLOGY

Ph.D. Microbiology or Biochemistry. Studies involving most defense mechanisms, parasite-host relationships and immunology.

If you feel that you are capable of creative contribution in any of these areas, we would welcome your inquiry.

VISIT OUR REPRESENTATIVES AT THE APHA MEETING IN DETROIT

Or write to Mr. R. L. Bowley, Employment Supervisor

WARNER-LAMBERT

PHARMACEUTICAL COMPANY

201 Tabor Road, Morris Plains, N.J.

An Equal Opportunity Employer

An Equal Opportunity Employer
CHEMISTS

Attractive openings for laboratory chemists in:
- Analytical Methods
- Biochemistry
- Physical Chemistry
- Natural Product Formulation
- Flavor Chemistry

These are interesting and creative assignments for chemists who desire professional achievement. Excellent salary, profit-sharing plan, company-paid benefits, and relocation expenses. Write to Administrative Assistant, Philip Morris Research Center, P.O. Box 3-D, Richmond, Virginia.

An Equal Opportunity Employer.

RESEARCH ASSOCIATES: Leading manufacturer of biologics is expanding its Research Department staff. Positions encompass virology, bacteriology, mycology, blood coagulation, immunology and immune chemistry. Independent research experience and an M.S. or Ph.D. degree is required. Please send complete résumé and salary requirement to: Personnel Director, Hyland Scientifics, P.O. Box 90039, An Equal Opportunity Employer.

RESEARCH ELECTROPHYSIOLOGIST: Evoked potential study, psychoactive drugs. BIOCHEMIST: Isotopic methods applied to brain. BIOCHEMIST: Chromatographic techniques, brain and urinary constituents. Salaries in accordance with experience. Apply Galesburg State Research Hospital, Galesburg, Illinois.

BIOCHEMIST—Ph.D.

If you have three or more years of experience and are interested in the development of biomedical instruments, we invite you to explore this opportunity. You will have the opportunity to contribute to the state of the art in instruments for clinical and biomedical laboratories by doing research in the instrumentation of clinical procedures. The techniques and procedures developed will hopefully result in the development of successful laboratory devices through the direction and coordination of engineers and scientists skilled in the art of instrument design.

R. W. Chapman
711 Forbes Avenue
Pittsburgh, Pa. 15219

FISHER SCIENTIFIC COMPANY
"An Equal Opportunity Employer"

MICROBIOLOGIST

Chemical and Media Sales

If you have an M.S. or B.S. plus experience in the field of microbiology, you should explore this opportunity. We have an opening for a sales-oriented young man in either Pittsburgh or St. Louis to help promote the sale of Fisher's own chemicals and media. Desire to travel and willingness to relocate are prerequisites. Excellent salary plus commission, car and expenses.

If you wish to explore these opportunities, send your résumé or curriculum in confidence to:

Wells A. Atterbury
R. W. Chapman
711 Forbes Avenue
Pittsburgh, Pa. 15219

FISHER SCIENTIFIC COMPANY
"An Equal Opportunity Employer"
BIO-TRONICS RESEARCH, INC.

Box 1

New London, New Hampshire 03257

What:

Bio-Tronics Research, Inc. of New London, New Hampshire is seeking a number of highly qualified imaginative, congenial research people to complete the formation of a promising research organization.

Who:

We need research and development people in the following areas who are willing and able to operate across discipline lines: BIO-CHEMISTRY, NEURO-BIOLOGY, BIO-MEDICAL INSTRUMENTATION, EE with emphasis on SHF, SOLID-STATE PHYSICS, CRYOGENICS; also an experienced proposal and contract administrator.

Why:

Bio-Tronics Research, Inc. has been operating for several years as a small research and development organization. We expect to do work in the following areas: electronic anesthesia; electronic aspects of human physiology; rapid detection and diagnostic procedures for microorganisms; electro-physiological transmission problems; biochemical and physiological aspects of ionization, etc.

Bio-Tronics Research, Inc. offers the right people a challenging, exciting research and development opportunity with a corporation having excellent potential and backing. Although a young company, we are prepared to offer competitive salaries to the right people.

Where:

New London is a small college town in the center of a year-round lake and mountain recreation area. It is situated in the Dartmouth—Lake Sunapee region about 35 miles southeast of Hanover, and the same distance northwest of Concord, New Hampshire. The town has excellent schools and serves the surrounding area with many advantages not ordinarily associated with a small rural community.

Action:

If this sounds interesting, let's get acquainted. Send us your resume for our careful review or contact us by letter or phone at your earliest opportunity. Call collect to New London, New Hampshire, 526-7207, person to person, Edgar R. Condict, President.
NOW! A Viewing Screen...and the new AO Microstar has it!

The AO Viewing Screen answers the long-felt need for a convenient and practical method of slide demonstration. It's designed exclusively for use with the new AO Microstar® Microscope and can be mounted quickly and easily on the trinocular body. You'll find it ideal for small group discussions, consultations and countless teaching situations in the classroom or laboratory. The six inch screen covers the same field of view as the 10X Wide Field Eyepiece. Magnification is 7.5X. The superior optical performance provided by the new Microstar's infinity-corrected optical system delivers a bright, crisp screen image that is flat and in focus over the entire screen area.

This unique AO Viewing Screen is just one example of the wonderful versatility and performance that has been designed into the remarkable AO Microstar. Its infinity-corrected optics, revolutionary focusing concept and unitized construction are the most significant basic improvements in microscope design made in this century. Learn how they make possible dramatic new breakthroughs in optical and mechanical performance. Ask your AO Sales Representative to demonstrate the new Microstar and Viewing Screen, or write for 24-page brochure.

AMERICAN OPTICAL COMPANY
INSTRUMENT DIVISION • BUFFALO, N. Y. 14215

Dept. 0-2
☐ I would like a demonstration of the new AO Microstar Microscope and Viewing Screen.
☐ Please send 24 page brochure.

Name ____________________________________________________________
Address _________________________________________________________
City ____________________________ State ____________ Zip Code ____________

IN CANADA write—P.O. Box 130, Postal Station R, Toronto 17, Ontario

Registered Trademark American Optical Company.