



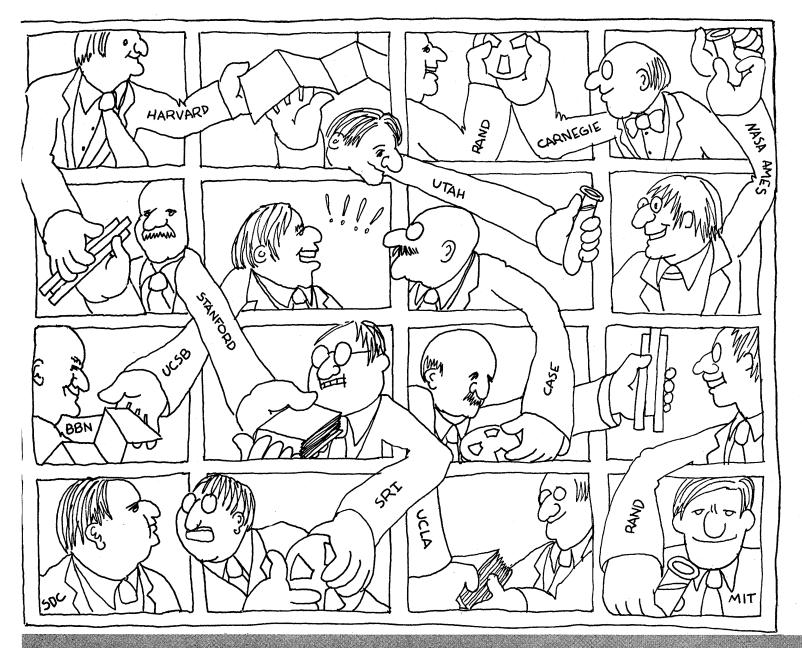
You can save time and money by using the MiniRac for all the less-complicated fraction collecting in your laboratory. It does these jobs just as well as more sophisticated and costly instruments. Up to 60 fractions can be collected, automatically, in one run and dispensing time per fraction can be set for 1 to 40 minutes. An event-marking outlet is incorporated, making the MiniRac suitable

for inclusion in a complete system of columns, pumps, monitors and recorders. Above all, it is easy to operate. A run can be set up in minutes.



IN THE SERVICE OF SCIENCE

LKB INSTRUMENTS INC. 12221 PARKLAWN DRIVE, ROCKVILLE MD. 20852 11744 WILSHIRE BLVD. LOS ANGELES CALIF. 90025 6600 WEST IRVING PARK ROAD, CHICAGO, ILL. 60634 260 NORTH BROADWAY, HICKSVILLE N.Y. 11800



## ARPA has a network of Supercomputers.

There are two dozen huge computer systems in the Advanced Research Projects Agency network.

Over half of them are DECsystem-10s. Our Supercomputer. MIT has two. So does Utah. Then there's Harvard, BBN, Carnegie, Case, SRI, Stanford and Rand.

Which should give you some idea of how popular our DEC-system-10 really is.

In the ARPA network, DECsystem-10's are doing state-of-theart research into weather forecasting, econometric studies, resource management, computer sciences, and much more. Everyone shares their computer and expertise with everyone else. Everyone comes out ahead.

Additional DECsystem-10's will be a part of ARPA's mammoth ILLIAC IV number crunching complex now being installed at NASA-Ames Research Center in California. They'll handle all communications while at the same time managing up to a trillion bits of file storage. Once ILLIAC IV is in gear, ARPA members will be able to do in hours jobs so big that they wouldn't even attempt to do them now.

ARPA is one of the biggest brain trusts ever assembled. If half of its members have a DECsystem-10, you really ought to know about it.

Write for the literature that explains why 62 of the leading universities and research institutions in the country have selected DECsystem-10's. (Hint: It does computation and timesharing at half the cost of other systems—without sacrificing throughput.)

DECsystem-10 Scientific Group. Digital Equipment Corporation, 146 Main St., Maynard, Mass. 01754. (617) 897-5111.

digital

ATTENTION: Members of the Digital Equipment Users Society: SPRING SYMPOSIUM MAY 11-13, Parker House—Boston, Mass.

#### 14 April 1972

Vol. 176, No. 4031

## SCIENCE

LETTERS	World Modeling: D. Gabor; H. H. Hemond, R. H. Goodwin, W. A. Niering; J. W. Forrester; M. Shubick; Test Bias: T. A. Cleary and J. C. Stanley; Psychology and Health Care: H. Dörken; Research Management: F. L. Floyd; The College Professor: C. S. Pike; Machine Translation: J. R. Pierce; Lunar Basalts: H. C. Urey and K. Marti	109
EDITORIAL	Who Should Ultimately Own the Data?: A. Etzioni	121
ARTICLES	The Human Nature of Human Nature: L. Eisenberg	123
	Circumscribed Halos: R. G. Greenler and A. J. Mallmann	128
	Congenital and Genetic Disease in Domestic Animals: J. J. Mulvihill	132
	The Significance of Science: V. F. Weisskopf	138
NEWS AND COMMENT	National Environmental Policy Act: How Well Is It Working?	146
	NSB Loses Branscomb to IBM	147
	Harvard Teaching Assistants on Strike	148
	OECD: Report Sees Closer Links between Research, Social Objectives	150
BOOK REVIEWS	Harvest of Death, reviewed by A. W. Galston; Statistical Ecology, R. R. Sokal; Recent Advances in Adrenergic Mechanisms, I. J. Kopin; Inorganic Reaction Mechanisms, R. G. Linck; Force in Newton's Physics,	
	A. Gabbey	154
REPORTS	Multivariate Analysis of an Early Hominid Metacarpal from Swartkrans:  G. P. Rightmire	159
	Enrichment of Heavy Metals and Organic Compounds in the Surface Microlayer of Narragansett Bay, Rhode Island: R. A. Duce et al.	161
	Cloud Seeding Experiments: Lack of Bias in Florida Series: G. W. Brier et al	163

BOARD OF DIRECTORS	MINA REES Retiring President, Chairman	GLENN T. SEABORG President	LEONARD M. RIESER President-Elect	DAVID BLACKWELL RICHARD H. BOLT	LEWIS M. BRANSCOMB BARRY COMMONER
VICE PRESIDENTS AND SECTION SECRETARIES	MATHEMATICS (A) John W. Tukey F. A. Ficken	PHYSICS (B) Herbert Friedman Rolf M. Sinclair	CHEMISTRY (C) Martin Paul Leo Schubert	Georg	ONOMY (D) ge B. Field U. Landolt
	PSYCHOLOGY (I) Dale B. Harris William D. Garvey	SOCIAL AND ECONOMIC James S. Coleman Harvey Sapolsky	SCIENCES (K)	HISTORY AND PH Everett Mendelsohn Raymond J. Seeger	
	PHARMACEUTICAL SCIENCES (Np) Linwood F. Tice John Autian	AGRICULTURE Roy L. Lovvorn Michael A. Far	Jacob E. G		EDUCATION (Q) Lloyd K. Johnson Phillip R. Fordyce
DIVISIONS	ALASKA DIVISION  Gordon Harrison Irma Duncan President Executive Secreta	Roy A. Young	C DIVISION  Robert C. Miller Secretary	SOUTHWESTERN AND RO John R. Lacher President	OCKY MOUNTAIN DIVISION  Marlowe G. Anderson Executive Secretary

SCIENCE is published weekly, except the last week in December, but with an extra issue on the third Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with The Scientific Monthly®. Second-class postage paid at Washington, D.C. Copyright © 1972 by the American Association for the Advancement of Science. Annual subscription \$20; foreign postage: Americas \$3; overseas \$5; air freight to Europe, North Africa, Near East \$16 single copies \$1 (back issues, \$2) except Guide to Scientific Instruments which is \$4. School year subscription: 9 months, \$15; 10 months, \$16.75. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the Reader's Guide to Periodical Literature.

#### AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

	Charge Distribution in the Light-Atom Mineral Kernite: P. Coppens, W. F. Cooper, F. K. Larsen	165
	Spacecraft Propulsion: New Methods: H. Alfvén	167
	Intestinal Calcium Transport: The Role of Sodium: S. J. Birge, Jr., H. R. Gilbert, L. V. Avioli	168
•	The Immune Reaction as a Stimulator of Tumor Growth: R. T. Prehn	170
_	Polyamino Acids: Preparation from Reported Proportions of "Prebiotic" and Extraterrestrial Amino Acids: M. A. Saunders and D. L. Rohlfing	172
	Leukemia, Lymphoma, and Osteosarcoma Induced in the Syrian Golden Hamster by Simian Virus 40: G. Th. Diamandopoulos	173
	Hormone-Calcium Interactions with the Plasma Membrane of Rat Liver Cells:  L. Shlatz and G. V. Marinetti	175
	Norepinephrine and Dopamine: Assay by Mass Fragmentography in the Picomole Range: S. H. Koslow, F. Cattabeni, E. Costa	177
	Genetic Control of Lactate Dehydrogenase Expression in Mammalian Tissues:  R. D. Glass and D. Doyle	180
	Organotypic Bioelectric Activity in Cultured Reaggregates of Dissociated Rodent Brain Cells: S. M. Crain and M. B. Bornstein	182
•	Freezing Resistance in Polar Fishes: A. R. Hargens	184
	Molecular Defect in a Gamma-2 (γ2) Heavy Chain: S. M. Cooper, E. C. Franklin, B. Frangione	187
· -	Acetylcholine Receptors: Number and Distribution at Neuromuscular Junctions in Rat Diaphragm: D. M. Fambrough and H. C. Hartzell	189
	Morphologic Alterations of Synapses in Electrically Stimulated Superior Cervical Ganglia of the Cat: J. J. Pysh and R. G. Wiley	191
	Technical Comments: Carbon Monoxide Concentration Trends in Urban Atmospheres: M. Eisenbud and L. R. Ehrlich	193
MEETINGS	Translation: Its Mechanism and Control: T. Caskey et al.; Ethics, Law, and Genetic Counseling: D. Callahan; Forthcoming Events	195

WARD H. GOODENOUGH
CARYL P. HASKINS

GEOLOGY AND GEOGRAPHY (E)
Frank C. Whitmore
William E. Benson

ENGINEERING (M)
Newman A. Hall
Raynor L. Duncombe
INFORMATION AND
COMMUNICATION (T)
Andrew A. Aines
Scott Adams

DANIEL P. MOYNIHAN
PHYLLIS V. PARKINS

BIOLOGICAL SCIENCES (FG)
Ian Sussex
Richard J. Goss
Richard J. Goss
Anthropology (H)
Richard N. Adams
Anthony Leeds

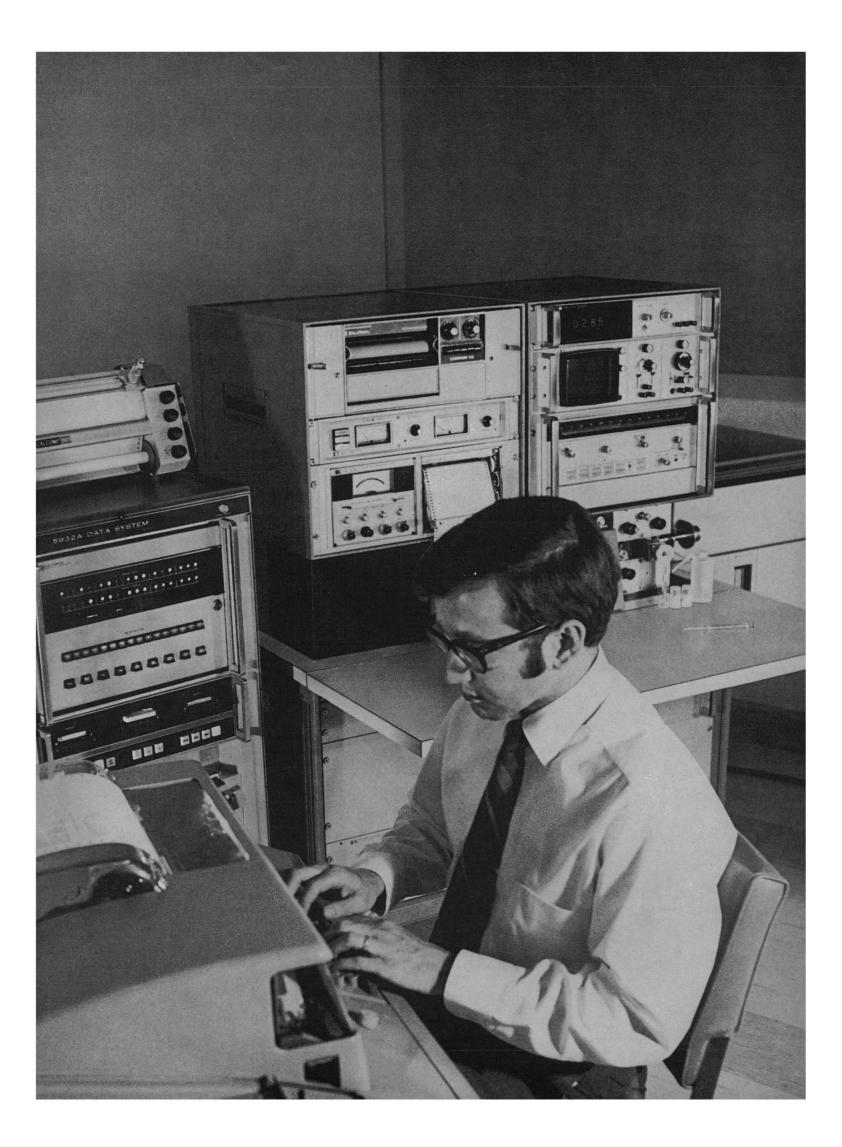
DENTISTRY (Nd)
Joseph L. Henry
Sholom Pearlman

ATMOSPHERIC AND HYDROSPHERIC
SCIENCES (W)
John A. Knauss
Louis J. Battan

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

#### COVER

The 22° halo and the upper tangential arc. The photograph, which covers the entire sky, was obtained by photographing the reflection in the convex surface of a reflecting sphere. The entire horizon, camera, tripod, and author are visible. See page 128. [R. G. Greenler, University of Wisconsin, Milwaukee]



# the problem solver

A fully integrated GC/Mass Spectrometer/Computer System designed specifically to solve analytical problems routinely

Traditionally a research instrument, the mass spectrometer has always been the exclusive domain of the skilled spectroscopist. But not the new Hewlett-Packard GC/Mass Spectrometer/Computer System. Designed specifically as a general-purpose analytical tool, it is easily operated by scientists who have no special knowledge of mass spectroscopy or computers and whose primary interest is to solve analytical problems.

In the HP System, the spectrometer may be operated manually or by the computer. When in computer mode, the data system controls the mass scan and accumulates the spectral data while it calculates masses and relative abundances in real time, automatically. It does a complete mass scan in two seconds, fast enough to provide spectral identification of GC peaks in real time. It can do repetitive scans and store all the data for as many as

1,000 scans on a single tape cassette. Later, any time you decide to examine a scan in detail, it will search the cassette, find the scan you are interested in and type out a list of every peak by mass number and relative abundance.

The HP mass spectrometer proper is an entirely new design that lets you spend your time getting analytical data rather than caring for the instrument. Its magnetically constrained ion source means you get complete mass spectra from as little as 10 nanograms of sample injected on the GC column. Source and analyzer are bakeable for easy cleaning. It has a low-cost mass marker that identifies the mass of any peak to  $\pm 0.2$  amu. The spectrometer operates in the total ion mode whenever you want to record the chromatogram on its built-in strip chart recorder. It needs neither water nor liquid nitrogen and is easily moved from lab to lab.

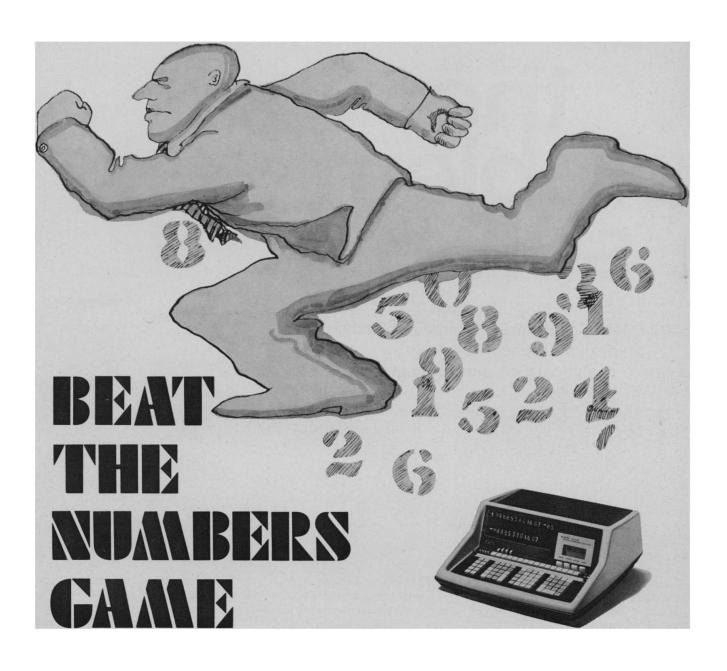
The gas chromatograph can be

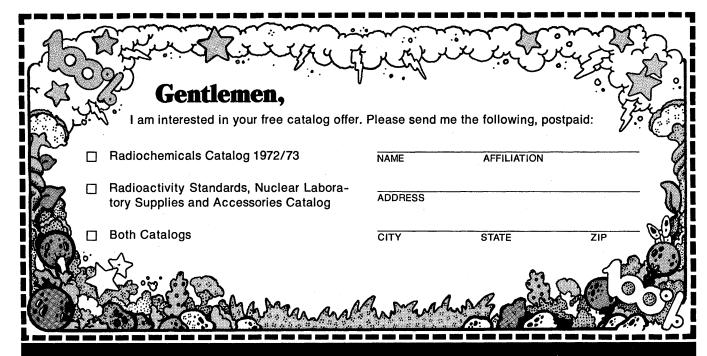
any model made by HP or, if you prefer, almost any other make. In either case, installation requires no more than a simple tubing connection.

As your final assurance that it will remain a Problem Solver for years after you buy it, HP manufactures the entire system—mass spectrometer and computer as well as GC-and services it world-wide, without buck-passing. The price of an operating mass spectrometer starts as low as \$26,600. Complete gc/ms/computer systems begin at \$69,500. Call your nearest HP sales office for complete information or write for literature. Hewlett-Packard. 1601 California Avenue, Palo Alto, California 94303. In Europe: 1217 Meyrin-Geneva, Switzerland.



SCIENTIFIC INSTRUMENTS





# This coupon entitles you to 100% off on our two new catalogs

Amersham/Searle is proud to offer two of the most complete catalogs of their kind.

First there is the 'Radiochemicals' Catalog, featuring the most extensive range of high quality radiochemicals (over 1200 listed) available today. Then, there is the Radioactivity Standards, Nuclear Laboratory Supplies and Accessories' Catalog, which describes virtually every accessory required by radioisotope users.

Please complete the accompanying coupon today for your free copies of these catalogs.

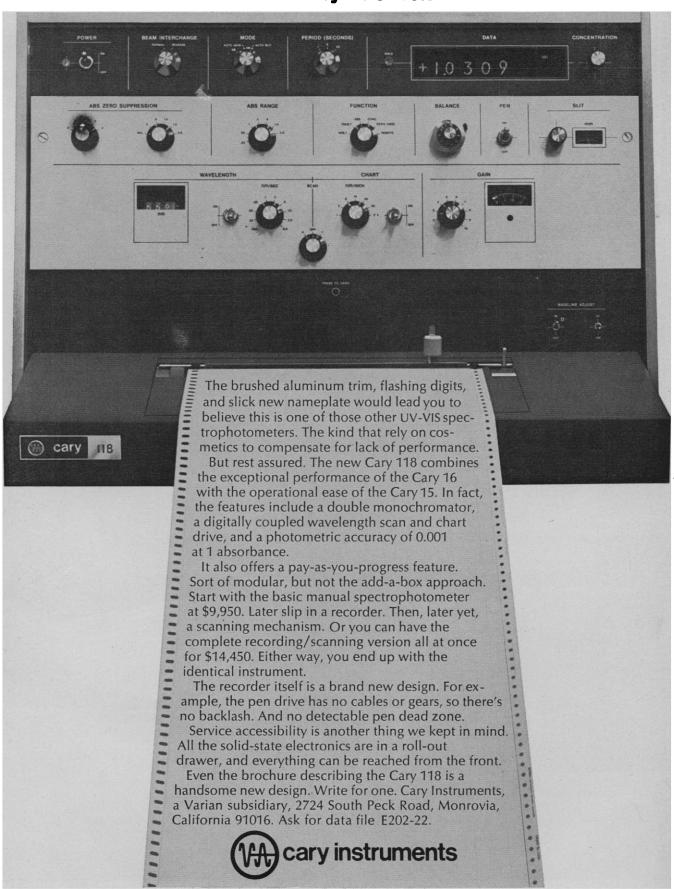
Meanwhile, if you require information about any of our products or special items, please call our Customer Service Department at (312) 593-6300.

OUR SPECIFIC ACTIVITY IS SERVICE



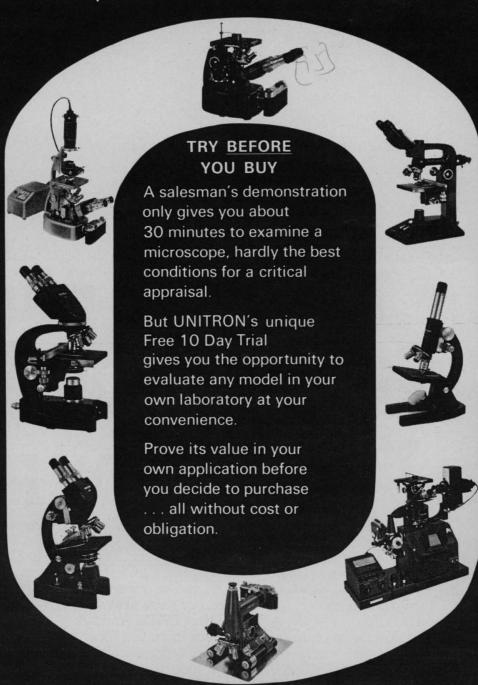
2636 S. Clearbrook Drive Arlington Heights, Illinois 60005 Telephone: 312-593-6300—Telex: 28-2452

# Until the new Cary 118 you could always judge a spectrophotometer by its cover.



# ACCEPT A FREE 10 DAY TRIAL OF ANY UNITRON MICROSCOPE





#### ASK FOR YOUR FREE MICROSCOPE CATALOG

Choose from a complete line of budgetpriced microscopes for Research, Industry and Education including metallurgical, biological, stereoscopic, polarizing, measuring, and student models. See for yourself, as have thousands of other buyers, why . . . UNITRON means MORE MICROSCOPE FOR THE MONEY.



A COMPLETE RANGE OF MODILS AND ACCESSIONES FOR RESEARCH - INDUSTRY - EDUCATION Please send UNITRON's Microscope Catalog No. Q-4
Name

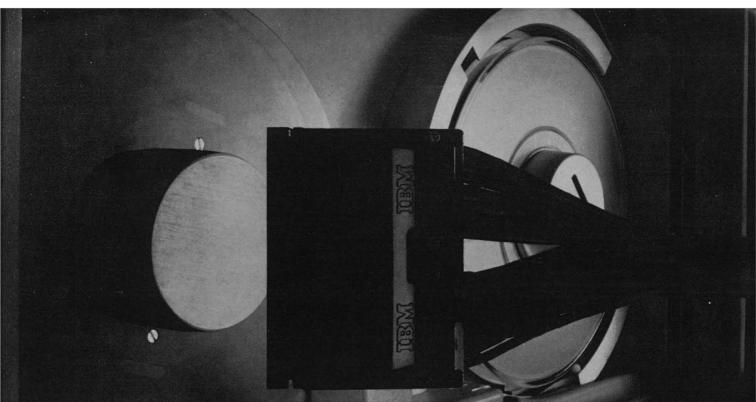
 Company
 Dept

 Address
 Zip

UNITRON

MICROSCOPE SALES DIV. 66 NEEDHAM STREET NEWTON HIGHLANDS MASSACHUSETTS 02161

Circle No. 21 on Readers' Service Card



# 1962. IBM plugs CalComp into IBM.

# 1972. A new plug.

It happened at the Seattle World's Fair. IBM displayed an early CalComp drum plotter. Driven by their 1620 computer.

They knew a good combination even then.

What's happened since is history. A lot of people have been plugging CalComp disk drives and plotters into just about every computer IBM makes.

And because we've been in and around the computer room for a long time, you would expect us to provide you with a superior tape drive system, as well.

We just have.

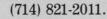
Our new plug. The 1040

Tape System.

As you've come to expect, our lease prices are lower than IBM's. And our terms are more flexible.

The equipment, itself—like our disk drives and plotters—is IBM compatible, designed to grow with your needs, and fully-serviced. Everywhere.

For information about the new 1040 tape system, write California Computer Products, Inc., Dept. SM-M4-72 , 2411 West La Palma Avenue, Anaheim, California 92801. Or call





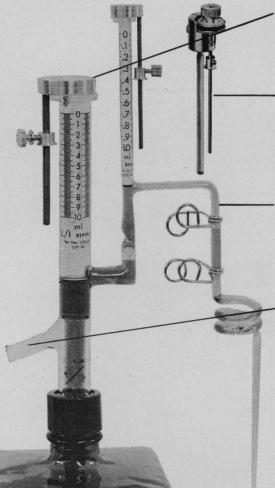
CACCOMP

Circle No. 6 on Readers' Service Card

## L/I REPIPETS® and Dilutors

As necessary as a pH meter for teaching and research

L/I Automatic Dilutor for aspirating and diluting



**AUTOMATIC DILUTOR** 

- 1. Simple operation. Just set volume with knife-edge pointer, lift plunger to aspirate, and depress plunger to deliver. (No mouth pipeting!)
- 2. LAMBDA-DIAL® increases accuracy. Replacing any 1 ml REPIPET or Dilutor plunger, the LAMBDA-DIAL boosts accuracy to a phenomenal 1% at 10 lambdas! Reset to 0.1 lambda at 100 lambdas. 1 division = 0.1 lambda.
- 3. All PYREX Construction. Handle *any* reagent, including concentrated acids, concentrated alkalies, chlorinated hydrocarbons, etc. Closed system eliminates odors and all contact with dangerous reagents.
- 4. Reagents stay pure. Integral filters keep out the atmosphere and protect valuable reagents.
- 5. High accuracy (1%) and reproducibility (0.1%). Each instrument is adjustable and accurate over its entire range.
- 6. Fit any reagent container. All REPIPETS and Dilutors can be supplied with caps and washers to fit your reagent containers. Or we will furnish containers to suit.

7. Wide selection. L/I stocks REPIPETS and Dilutors in ½, 1, 5, 10, 20 and 50 ml sizes. Micro and macro Teflon tips included. Amber round or square bottles optional at no extra charge.

Prices: REPIPETS \$55.00; Dilutors \$99.50; LAMBDA-DIALS \$49.50.

Order from Labindustries or your distributor. Major national distributors: Curtin Scientific, Fisher Scientific, Matheson Scientific, Packard Instruments, Scientific Products, VWR Scientific. Names of your regional distributors on request.



L/I Automatic REPIPET for dispensing

# REPIPETS® and Dilutors products of LABINDUSTRIES

1802M Second Street, Berkeley, California 94710 Phone (415) 843-0220. Cable LABIND, Berkeley, CA (USA)

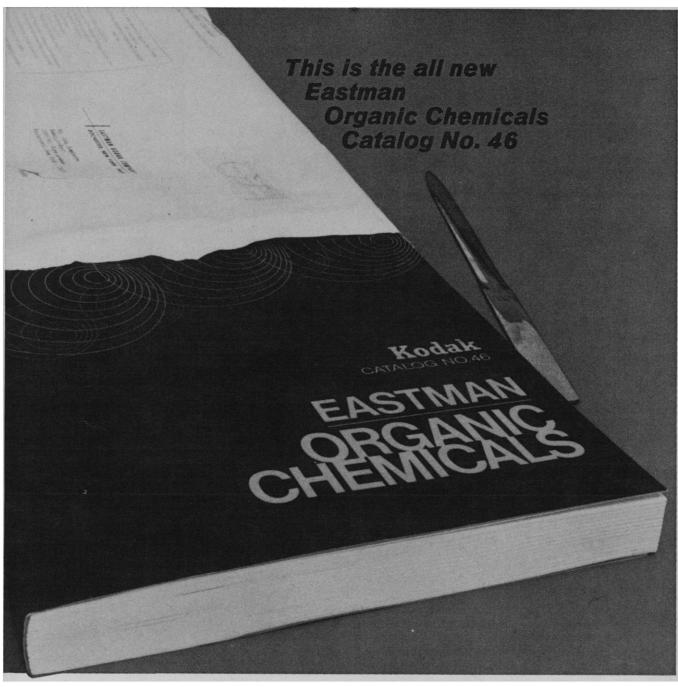
## Maryland makes more plastic cages than anybody.

Twelve different types in three different materials. Plus a complete line of accessories including molded spun polyester filters, stainless steel and zinc plated lids, bottles and sippers, and even cage racks.

From permanent Econo-Cages that can be autoclaved to Disposable Pre-bedded cage systems the Econo-Cage line is the largest in the industry.

If you are housing or breeding mice, rats, hamsters, guinea pigs, gerbils or dwarf hamsters you need a copy of our new catalog of Laboratory Animal Care Products. Ask your Econo-Cage Distributor for a copy; or, write directly to Maryland Plastics, Inc., Scientific Division, 9 East 37th Street, New York, N. Y. 10016

-	AN	IM/	ALS				CAG	ES	
Mice	Kats	Hmstrs.	G. Pigs	Gerbils	D. Hmst.	Cage Series	Nominal Dimensions (inches)	Materials	No. Cages Per Standard Rack
•		•				Series 10	11x8½x6		60
•	1	•		•	•	Series 20	11½x7¼x5	Available	84
•	1				•	Series 30	19x10½x5⅓		36
•		•		•		Series 40	19x10½x6⅓		30
		•		•		Series 50	14%x12%x6%	l in	20
•				•	•	Series 60	13%x8%x5%	polystyrene, polypropylene and	72
	•	•	•			Series 70	20x16x8½	polycarbonate	15
•				•	•	Series 80	19x8%x5%		36
•				•	•	Series 120	11½x5¼x5⅓		132
•	•	•	•			Series 140	19x10x8		30
•				•	•	Disposable Cage	11½x7¼x5	polystyrene	84
				•	•	Pre-Bedded Disposable Cage	11½x7¼x5		84



## More than just a catalog, it is a tool for the chemist

It contains these important sections:

- An Alphabetical Listing of chemicals with descriptions, quantities, and prices.
- A Numerical Listing by Eastman number
- ☐ An Empirical Formula Index
- ☐ A Functional Group Index
- A Special Products section with subsections on:
  - Analytical Chemistry
  - Biochemistry
  - Organic Chemistry
  - Physics and Physical Chemistry

It was designed to help you:

- ☐ Synthesize chemicals☐ Analyze chemicals
- ☐ Investigate chemicals
- ☐ Order chemicals

A copy has been sent to everyone on our mailing list. If you didn't get a copy, we probably don't have your name. Use the coupon to request your copy...you really shouldn't be without one.

Dept. 412L
Organic Chemical Markets
Eastman Kodak Company
Rochester, N.Y. 14650

Send Eastman Organic Chemicals
Catalog No. 46.

Name
Address
City
State
Zip
Kodak



#### **BRUSH 220 2-channel**

A versatile, rugged, accurate recorder. Easy to operate, able to withstand inexperienced operator abuse. It weighs only 25 lbs. Comes with built-in preamps with a measurement range from 1mV per division to 500V full scale. 4 pushbutton selected chart speeds from 1 to 125mm/sec. 2-40mm channels, 2 event markers. Frequency response is 40Hz f.s.

#### **BRUSH 440 4-channel**

Maximum versatility at low cost per channel. Exceptional reliability in laboratory or field application. 4-40mm channels and 2 event markers. Frequency response 40Hz, f.s. Sensitivity ±2.5V f.s. Pushbutton selected 8 chart speeds from 1mm/min. to 125mm/sec. Portable, or mobile console. Also available with 2-40mm and 1-80mm channels.





#### BRUSH 260 6-channel

This rugged recorder handles the bulk of recording tasks with high precision and maximum operator convenience. Built-in preamps provide a measurement range from 1mV per division to 500V full scale, 6-40mm channels and 4 event markers. Frequency response 40Hz f.s. 8 pushbutton selected chart speeds from 1mm/min. to 125mm/sec. Portable, rack or mobile cart mounted.



#### BRUSH 816 8-channel hi-speed multipoint

This recorder scans and displays up to 8 channels of data adjustable from 2 seconds per point to 16 points per second. Ideal for measuring temperature, pressure and other slow changing variables. Sensitivity ±2.5V f.s. Frequency response: to 1Hz f.s., flat to 35Hz at useable amplitudes. 3 modes of operation. Multipoint, intensified, continuous. Felt tip capillary writing. 12 pushbutton selected chart speeds from 0.02 in/min. to 1 in/sec. Portable and rack mounted models.



#### **BRUSH 480 8-channel**

A general purpose recorder suited for a wide range of applications. 8-40mm channels and 2 event markers. Frequency response 40Hz f.s. Sensitivity ±2.5V f.s. 12 pushbutton chart speeds from 0.05 to 200mm/sec. Portable or rack mounted.

## The Brush Recorder: performance that's made its mark.

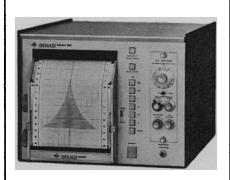
Whether it's all-purpose or high-performance recorders, Brush has an answer for you. Ten different recorders. A choice of 1, 2, 3, 4, 6, or 8 analog channels.

And all the Brush recorders feature a pressurized-ink writing system. (Standard on all but the 816 Recorder.) The pressurized ink system sees to it that the ink goes into the paper. Not onto it. So traces are always clear,

crisp, smudgeproof and uniform. And you never have to worry about clogging, skipping, or priming.

Another plus for the Brush Recorders is our Metrisite® non-contact servo-loop feed-back device. A system so accurate it enforces pen positioning at better than 99½% linearity.

And the Metrisite system also takes care



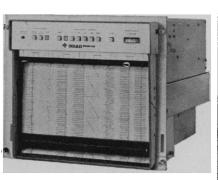
#### **BRUSH 250** single channel

Fast, versatile strip-chart recorder. Frequency response is flat ±2% f.s. from d-c to 10Hz on a full 4½" span. Useable response to 100Hz. Accepts all Brush plug-in preamps. Sensitivity ±2.5V f.s. Detachable chart paper magazine, 12 pushbutton selectable chart speeds from 5 in/sec. to 1/10 of an inch/min. (or 8 days of continuous recording.) Portable or rack mounted.



#### **BRUSH 240 4-channel**

Designed for versatility, maximum resolution, and precision. Modular design permits use of interchangeable preamps. Rack, cabinet or cart mounted, Frequency response to 55Hz on 40mm and 35Hz on 80mm channels. 2 event markers. 12 pushbutton chart speeds from 0.05 to 200mm/sec. Sensitivity ±2.5V.



#### **BRUSH 200 8-channel**

The world's standard for high performance direct writing recorders. The Brush 200 can be tailored to your specific requirements through a broad range of modular sub-systems. Choose rack or roll-around cabinets. Vertical or horizontal oscillographs and a wide range of penmotor and 80 and 40mm channel width combinations. 2 event markers. Frequency response 55Hz f.s. Useable response to 200Hz. 12 pushbutton chart speeds from 0.05 to 200mm/sec.

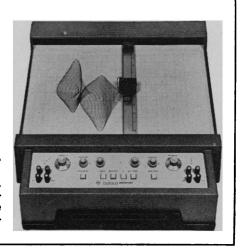


#### **BRUSH 280 2-channel**

Lets you analyze precise recorded data with accuracy and resolution never before possible in medium-frequency recorders. Double width 80mm channels and 2 event markers. 35Hz response f.s. Built-in preamps provide a measurement range from 0.5mV/div. to 500V f.s. 12 pushbutton selectable chart speeds from 0.05 to 200mm/sec. Portable or cart mounted.

#### **BRUSH 500 X-Y Recorder**

A rugged, low-priced recorder, 99.85% linearity. Pressurized ink writing plus electrostatic holddown. Built-in preamps with a sensitivity range from 100µV/div. to 1.0V/div. 40 inches-per-second writing speed. Portable or rack-mounted.



#### **BRUSH INSTRUMENTS**



of bothersome maintenance problems. Like dirty pots, wear, cleaning. The Metrisite also eliminates slide wires and all the maintenance problems they cause.

models come in either portable or rack-A range wide enough to let you select the Avenue, Cleveland, Ohio 44114.

conditioning best suited for your measure-

The Brush Recorders. If you'd like to know more about them, let us know. Contact your Electronics are all solid-state. And most nearest Brush Sales Engineer or Representative. Or write for detailed performance mounted versions. And all of them are com- information and specifications. Gould Inc., patible with our range of signal conditioners. Instrument Systems Division, 3631 Perkins

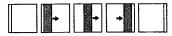
Circle No. 19 on Readers' Service Card

#### The 1957 Hasselblad. It's enjoying a revival. But not by Hasselblad.

A curious thing is happening in the camera business. Other people are just beginning to build what we discarded in 1957. A 2½" camera with a focal plane shutter.

At the root of the problem is the sudden recognition of the 2¼" picture size as one that couples large format quality with miniature camera versatility (something that Victor Hasselblad recognized 23 years ago). The trouble is, with everyone rushing in to make 2½" cameras, quality isn't always a big cos. quality isn't always a big con-

Which is why you should know —before you buy any 2¼" camera—why Hasselblad changed from a focal plane to a leaf shutter back in 1957.



The focal plane shutter has to move across the entire film area, exposing the negative piece by piece, through a travelling slit. When the subject is moving parallel to the film plane, like a moving car, the position of the subject has changed by the time the last slit is exposed. This time lag can create distortion—an elon-

ated or compressed car.

The same thing happens when taking pictures from a moving car or plane. The landscape tends to appear elongated.

In 35mm photography, focal plane shutter distortion is minimized by the short distance the shutter has to travel. But with 2½" cameras, where the shutter has to travel farther, the distortion becomes more noticeable.



The leaf shutter, on the other hand (which we call a Synchro-Compur shutter in the Hasselblad) exposes the entire negative area all at once. Which makes it a much more accurate and desirable shutter.

The focal plane shutter has another considerable disadvantage. It can only be synchronized with electronic flash at very low shutter speeds. Which makes it all but useless with strobe for action and sports photography. higher shutter speeds, only a strip of the film would get exposed. At slower speeds you end up with ghost images.)

up with ghost images.)
These problems are overcome by the leaf shutter which can be synchronized with all kinds of flash at all speeds and apertures (giving complete control over depth of field and background brightness). Making the leaf shutter far more versatile and useful

ASSELBLAD

to virtually every photographer. So in 1957, Hasselblad care-fully weighed the pros and cons of both shutter systems and de-cided to change over from the focal plane to the leaf shutter. We had to increase the camera price to do so, because the leaf price to do so, because the lear shutter is a more complex, so-phisticated mechanism. But the objective was to build the best camera possible, without being forced to compromise through economic necessity.

We then developed a full line

of ten interchangeable lenses, each with its own leaf shutter mounted between the lens ele-

mounted between the lens elements next to the diaphragm, in the most optically ideal position.

We increased the number of interchangeable film magazines to a total of six, providing a wide variety of different capacities and formats.

We added many accessories, including a microscope shutter and adapter, a gunstock tele-

photo lens mount, and a prism viewfinder with exposure meter. Giving greater flexibility to what was already the most flexible camera system. Leading NASA to choose Hasselblad as the space camera, using it aboard Mercury and Gemini flights, taking it to the moon on the Apollo flights, and for use on Skylab orbiting laboratories.

laboratories.

Many features of the 1957 Hasselblad were well worth copying. In fact we've copied many of them ourselves. But we also knew what not to copy. With the result that most 2\%" cameras now employ the shutter system

we abandoned 14 years ago.
Of course, if price is a consideration, you'll have to select a camera with a less costly focal plane shutter. But before you buy a new imitation of the old 1957 Hasselblad, look into the used camera ads. You can probably pick up the real thing for less.

#### HASSELBLAD Paillard Incorporated,

1900 Lower Road, Linden, N.J. 07036. Other products: Bolex movie equipment, Hermes typewriters and figuring machines.





This water is sterile and pyrogen-free.

It has a high specific resistance and less than 1 ppm total dissolved solids.

It's been used in biological and biochemical research because of its excellent qualities.

And it's never had a name.

Until now.

Last year we introduced a little book called The Barnstead Basic Book On Water. In it we named this perfect water "biopure".

This water is now being looked at by a lot of people who should be concerned about the water they're using.

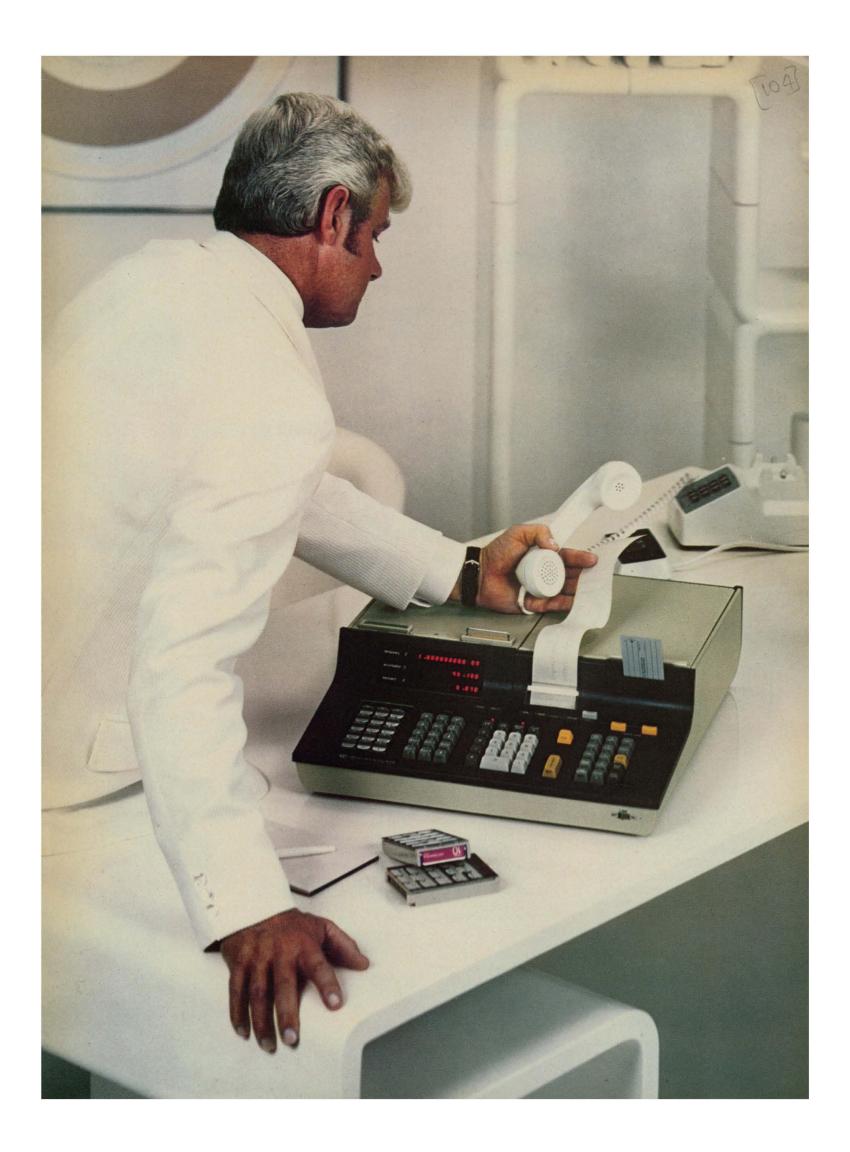
In laboratories and hospitals where instruments are sensitive to even minute traces of contamination. And by pharmaceutical companies who make products that people use internally and externally.

We're all going to hear a lot more about biopure water and the means for producing it.

You'll know a little more a lot sooner if you send for our free Biopure Water Systems booklet.

We're sure of that. And we're the people who know everything you need to know about water.

225 Rivermoo 617) 327-160 Mr. Norman N		ss. 02132,
☐ Please send produce BIOF	d me information on PURE water.	your systems to
Name		Title
Company		
Address		



# Accept No Substitutes!

The New HP Series 9800 is the best programmable calculator system now—and in the foreseeable future. Price. Performance. Simplicity of operation. No matter what criterion you use, there is absolutely no other system on the market that can match the Series 9800.

### Only HP Offers You All This For The Low Price Of \$2975

To build your personal desk-top computing system, start with the Series 9800/Model 10 Programmable Calculator. Your basic Model 10 comes with standard equipment that is either not available, or available only as an extra-cost option, on other machines.

If bad experiences have taught you that basic is synonymous with stripped—have no fear. The *basic* Model 10 can perform a complete regression analysis, or solve a system of 10 simultaneous equations.

#### Only HP Offers You A Fully Modular Calculator

The unique, modular/plug-in architecture of the Model 10 lets you "design" your own problem-solving system. You can expand the memory, add peripherals, or change the keyboard of your existing Model 10, at any time.

### Only HP Gives You A Fully Expandable Dual Memory

The Model 10 has a unique dual memory system —one memory for programs and one for data. You can expand from the basic 500 program steps *and* 51 data registers to 2036 program steps *and* 111 data registers.

Beware of simple number comparisons with other calculators. The refinements in the memory design and the keyboard make the Model 10 so efficient that in most cases it requires fewer steps to execute a given problem.

#### Only HP Lets You Design Your Own Keyboard

Interchangeable keyboard plug-in blocks give you a choice of powerful *Statistics* or *Mathematics* functions, complete with their own memories, under single keystroke command. Another option, the *User Definable Function* plug-in, lets *you* customize individual keys with operations uniquely important to *you*.

#### Only HP Offers An Alphanumeric Printer

By simply inserting the exclusive HP Alphanumeric Printer Plug-in, you can automatically generate labels, program instructions, or messages—in English—right on the printer tape.

### Only HP Gives You A Wide Choice of Sophisticated Peripherals

The I/O bus of the Model 10 lets you plug-in a Marked Card Reader, Paper Tape Reader, Digitizer, Typewriter, Tape Cassette, or the *exclusive* X-Y Plotter that plots linear, log-log, semi-log, or polar plots, and writes alphanumerics.

#### Only HP Offers You A Totally New System

The Series 9800 is no paper tiger. It's available now to free you from the drudgery of problem-solving so you can get on with your job of innovative thinking and designing. For more information or a "hands-on demonstration" at your desk, write: Hewlett-Packard, P.O. Box 301, Loveland, Colorado 80537. In Europe: 1217 Meyrin-Geneva Switzerland.

Circle No. 46 on Readers' Service Card

CO91/5

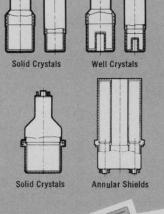


# BICRON

# for superior performance in sodium iodide scintillation detectors

Make Bicron your "other" source. We're second to one in size. We're second to none in quality and reliability. Check these features: \*Unsurpassed Resolution—6.4% at 662 Kev, a record \*Lowest Background—Low-mass Kleen Krome housings; less than 1 ppm potassium \*Greatest Reliability—2-year extended warranty \*Special Designs—Detectors from smallest to largest, special windows, etc. \*Fastest Delivery—Standards or specials. Bicron is coming on strong.







Write for your free copy of "Bicron Detectors," (standard and customized units); "Bicron Monoline Detectors" or "Scintillation Detector Instruction Manual."

## BICRON

the "other" scintillation detector people.



#### **BICRON CORPORATION**

**12345 KINSMAN ROAD NEWBURY, OHIO 44065**Telephone (216) 564-2251

THERE ARE OVER
100 GOOD REASONS
WHY YOU SHOULD HAVE
THE NEW WHATMAN
PRODUCTS CATALOG...
THESE ARE

4 OF THE

**NEWEST...** 

WHATMAN
BENCHKOTE
PROTECTS
BENCHTOPS
AGAINST STAINS,
CORROSION,
DIRT

WHATMAN
GAMMA-12
HIGH
PERFORMANCE
IN-LINE
FILTER UNIT



WHATMAN
1PS
PHASE
SEPARATING PAPER
THE WORLD'S
FIRST
DISPOSABLE
SEPARATORY
FUNNEL





WHATMAN
GLASS FIBER
FILTER PAPERS
OFFER EFFICIENT
RETENTION OF
MICRON (µm) SIZE
PARTICLES AND
VERY HIGH
FLOW RATE



Registered trademark of W. & R. Balston, Ltd.,
 Springfield Mill, Maidstone (Kent), England

THE OTHER 96 GOOD REASONS CAN BE FOUND IN THE NEW 24-PAGE WHATMAN PRODUCTS CATALOG. USE THE COUPON BELOW TO GET YOUR FREE COPY.

Please ser	nd I	me	the	new	
Whatman	Pro	duc	ets (	Catalog	٩

Name\_\_\_

Institution\_

Address.

City\_

tate\_\_\_\_Zip

SOLE DISTRIBUTORS IN NORTH AMERICA

breeve angel 9 BRIDEWELL PLACE, CLIFTON, NEW JERSEY 07014

Circle No. 26 on Readers' Service Card

## Stereo IV is designed for research. And for photography. But some researchers need to draw.

Another example of the versatility of the zoom Stereo IV. The zoom Stereo IV is the most versatile stereomicroscope ever made—truly an instrument designed for the scientist. For instance, with the drawing attachment shown below, the entomologist, dissecting microscopist, geneticist or geologist can trace accurate pictures of objects where the depth of field exceeds that which can be obtained photographically. And the physicist or electronic engineer can superimpose diagrams over the microscopic image for a direct comparison with a microcircuit.

**Simultaneous viewing and photography, too.** With the use of the unique Zeiss beam splitter and camera attachments, Stereo IV is also great for photography—the most severe critic of any optical system. Attach the camera, and you are insured

of photomicrographs with great definition, evenly illuminated, sharp from edge to edge. With camera and drawing attachment, you can retrieve any information your eye can see. And, since Zeiss optics are the world's greatest optics, you can see more through Stereo IV.

Send for 24-page brochure. The complete line of all five Zeiss Stereomicroscopes is described in a new 24-page booklet. If you're looking for a stereomicroscope designed for the scientist, chances are you'll find there what you need for your particular requirements.

Write: Carl Zeiss, Inc., 444 5th Ave., New York, N.Y. 10018. Or call (212) 736-6070.

Nationwide service.

ATLANTA, BOSTON, CHICAGO, COLUMBUS, DALLAS, DENVER, FORT LAUDERDALE, HOUSTON, KANSAS CITY, LOS ANGELES, PHILADELPHIA, PHOENIX, SAN FRANCISCO, SEATTLE, WASHINGTON, D.C.



# Don't Miss This One!

Be sure to read the great news for science teachers in the Bausch & Lomb advertisement on page 119.



Plan to see and try out for yourself the exciting new Made in U.S.A. Academic StereoZoom Series at any of these convention exhibits:

National Catholic Educational Association, Philadelphia, April 4-6;

National Science Teachers Association, New York City, April 7-14;

Department of Elementary School Principals, Miami, April 8-13;

Federation of American Societies for Experimental Biology,

National Association of Biology Teachers, San Francisco, October 26-28.

Atlantic City, April 10-14;

Get Bausch & Lomb catalog 31-2395 and check the prices against those of any competitive models, foreign or domestic.

#### BAUSCH & LOMB

SCIENTIFIC INSTRUMENT DIVISION
20704 Bausch St., Rochester, N.Y. 14602

the project at M.I.T. and is not a report on the output of the project. The book was an unsponsored personal effort. The project sponsored by the Club of Rome and the Volkswagen Foundation has been for the purpose of extending the model, modifying and documenting the assumptions, and discussing the inputs as well as the consequences by working with scientific research groups in other institutions who have relevant information and opinions. The published results of the project will begin to appear soon.

JAY W. FORRESTER Alfred P. Sloan School of Management, Massachusetts Institute of Technology, Cambridge 02139

Unlike many of my colleagues who are extremely skeptical about largescale simulation, data banks, and the organized use of politico-socioeconomic models, I believe (and am on record as believing) that an effort of the magnitude of the United States space program should be mounted to do this work. Where Forrester and I differ is that, although we may both see the limitations of econometrics and the importance of model building in areas where measures are hard to obtain, we have different views of what is feasible and useful. In my reading of his Industrial Dynamics and World Dynamics and glancing at Urban Dynamics, I have not seen anything to suggest that the models presented are other than extremely simplistic, given the current state of knowledge in the social sciences. I fear that if Forrester, with his drive, energy, and intelligence, were to obtain large funding for his work at the national level, he might easily be the source of a fad for producing grossly oversimplified models, which after a few years would bring about a reaction that would seriously set back progress in simulation, data bank creation, and largescale social-scientific investigation. . . .

In reply to the specific points in Gabor's letter, I should say first that it appears to me the burden of proof of the relative worth of Forrester's work lies somewhat with its proponents. I have not seen this proof forthcoming. No evidence is given in Forrester's books that his results are insensible to the details of the assumptions. Furthermore, contrary to Gabor's assumption, such insensibility is not always a merit. Those who have worked with industrial, economic, social, or psychological simulations (Orcutt, Simon, Coleman, Abelson, Adelman, Crecine, Clarkson, to

name a few) are well aware of the difficulties of obtaining a good first-approximation model. If it is too insensitive to parametric sensitivity analysis, the model is probably concentrating on the wrong variables. If it is highly sensitive, then data sufficiently accurate for the purposes at hand are probably impossible to obtain.

The application of careful dimensional analysis and the specification of good measures in the right dimensions are all difficult and critical. For instance, what is a measure of "welfare"? Even given a measure, what is its operational significance? Answers to questions such as these call for an intimate knowledge of subjects such as economics, sociology, psychology, and political science. Why are so few social scientists referred to by Forrester? Are there none whose knowledge is worth considering when building models of social, political, economic processes? In fact, there are many who have both deep substantive knowledge and the ability to use computers and who are convinced that the computer and computer models are critical for good social scientific exploration. Consider, for example, the Brookings SSRC model, Tinbergen's work on planning, Oroutt's simulation, or Klein's econometric models. Forrester in his writings does not tell us why such other workers' applications, their sensitivity analysis methods and model building, are not as good as his.

I believe that a proper scientific evaluation of the work on planning and forecasting models in the social sciences is of great importance. This, of course, should include Forrester's work. I propose to Gabor, to the Club of Rome, to the AAAS, to NSF, and others that a project be sponsored or at least a conference be held to initiate such an evaluation. It may turn out that Forrester's work is better than, as good as, or worse than that of Balderston and Hoggatt, Clarkson, Kalman Cohen, Coleman, Crecine, Cyert and March, Gordon, Klein, Leontief, Manne, Markowitz, Meyer, Naylor, or Orcutt, to name a few. An examination of Forrester's contribution to this large body of work in such a context could be of benefit to all. It might provide him with the opportunity to join with members of the growing body of social scientists working on social systems. I should be happy to supply him with a list of eminently qualified judges of work of this nature, in the fields of artificial intelligence, computer science, communications, eco-

## **Laboratory Instruments** designed with a point of view



pH meters with digital readout give faster, more accurate readings regardless of operator fatigue.

Digital pH meter Expanded-scale precision Readable to 0.001 pH Well worth the price: \$600.

Circle No. 8 on Readers' Service Card

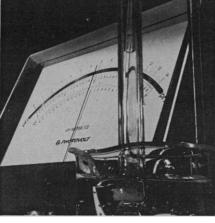


Digital printout simplifies electrophoresis. Electrophoresis densitometer

Printout automates separations and eliminates tedious counting.

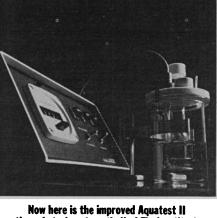
No floppy strips, pipetting or variable operations.

Circle No. 11 on Readers' Service Card



No need to be without an expanded scale pH meter -it's only \$425.

Expand 4 pH units to full scale. Read and reproduce to  $\pm$  0.005 pH. Accurate to within 0.01 pH. Expand 140 mv to full scale. You need an expanded scale pH meter. Circle No. 9 on Readers' Service Card



the only truly automatic Karl Fischer titrator.

Now measure water content of solids or liquids with ease. Sensitivity is ±10 micrograms of Just inject sample...flip switch... step back...read answer!

Digital readout! Circle No. 10 on Readers' Service Card



Linear/Log Laboratory Recorder, Varicord 43

> Super-sensitive Laboratory Recorder, Microcord 44

Thin Layer Densitometer

Complete line of pH Meters and Electrodes

WRITE FOR **COMPLETE CATALOG** 



**Automatic Enzyme Rate Analyzer** with direct read-out in Enzyme Units.

Simple to use. Starts, times, computes enzyme activity completely, automatically. Detects  $0.0001 \triangle A$  at 340 nm. Readings in 15 seconds. Reruns instantly.

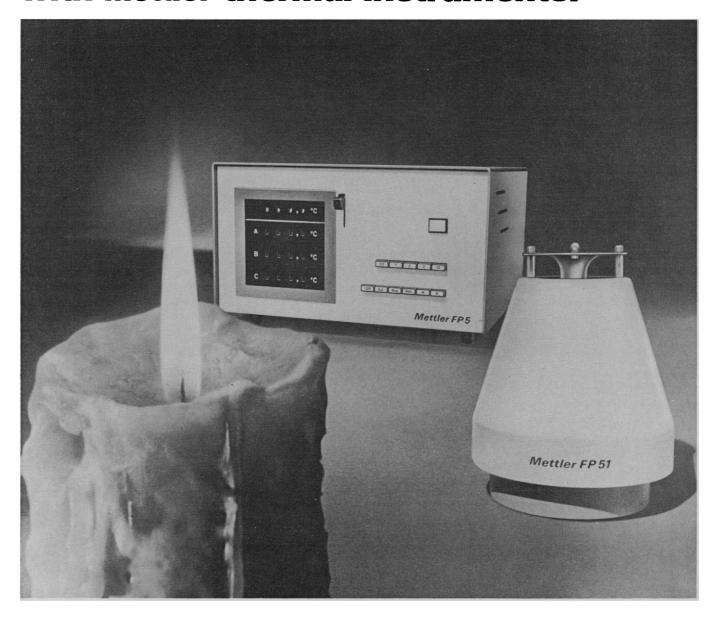
Use with any protocol or reagent.

Circle No. 12 on Readers' Service Card



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

# Determine melting points automatically with Mettler thermal instruments.



This new generation of Mettler thermal instruments provides high-precision, electronically controlled, linear (to ±0.1°C) heating and cooling with extremely fast response over the -20 to +300°C range. Temperatures at which significant thermal events occur are digitally displayed. Accurate, reliable platinum resistance sensors, closely matched by Mettler, enable you to choose the furnace which suits your needs.

With the FP51 furnace, you can automatically determine melting and boiling points without any possibility of misinterpreting results

By attaching an FP52 furnace to your laboratory microscope, you can determine exact melting ranges of polymer films and fibers, liquid crystal preparations, and sub-microgram quantities of organic compounds, using depolarized light thermal microscopy.

Using the FP53 furnace, you can automatically obtain digital dropping points of lubricants, food fats, paraffins and waxes—and softening points of coal tar pitch, resins and other materials.

You can't conduct determinations any faster, easier, or more accurately than with the modular Mettler FP system. Write for literature.

Mettler Instrument Corporation, Box 100, Princeton, N.J. 08540.

TILETELET

nomics, future studies, operations research, political science, philosophy of science, psychology, statistics, and other pertinent subjects.

MARTIN SHUBIK
Department of Administrative Sciences,
Yale University,
New Haven, Connecticut 06520

#### **Test Bias**

The letter (24 Dec. 1971, p. 1278) by Kenneth Clark and Lawrence Plotkin was meant to correct what they describe as "three egregious misstatements" in Stanley's article "Predicting college success of the educationally disadvantaged" (19 Feb. 1971, p. 640) where he discussed, among many other studies, one by Cleary (1). Clark and Plotkin took out of context a single sentence in the 7½-page article: "Cleary tried to replicate the findings of Clark and Plotkin [2] with a better controlled design, but failed." This conclusion referred to Stanley's prior quotation from the Clark and Plotkin study: "... Clark and Plotkin ... had reported results of a study based on 'alumni' classes of the National Scholarship Service and Fund for Negro Students in which they concluded that:

... scholastic aptitude test scores are not clearly associated with college grades. It is suggested that college admissions officers weigh test scores less, since they do not predict the college success of Negro students in the same way they do for whites. This study indicates that motivational factors are probably more important than test scores in the demonstrated superiority of Negro students in completing college."

Stanley was not questioning their conclusion that an able, highly motivated group of black students persisted well to graduation in a variety of interracial colleges during the 1950's. (For example, see note 19 in Stanley's article.) He did, however, cite much evidence-including Cleary's studythat Scholastic Aptitude Test scores and high school records tend to predict the college grades of blacks at least as well as they do those of nonblacks. In their letter Clark and Plotkin disregard this other evidence and thereby imply that Stanley's whole case rests on the Cleary study alone, which they seem to perceive as part of an Educational Testing Service plot against them ("Accustomed as we have become for our study to be the launching pad for ETS papers. . ."). Although one need not

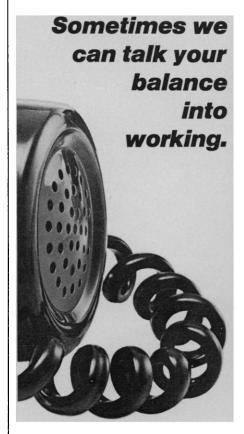
defend the professional integrity of researchers at ETS (3), we note that neither Stanley's article nor most of the reports he cites were done at ETS. Some of the strongest evidence came from investigations by black non-ETS researchers such as S. O. Roberts, Joseph P. McKelpin, and Charles Leo Thomas and from studies in Illinois. Maryland, Georgia, and the Seven Sisters colleges. Even a glance at the bibliography in the Stanley article would indicate the broad data on which he based his conclusions. (Indeed, only three lines of his paper were devoted to the Cleary article.)

Since Clark and Plotkin have chosen to criticize the Cleary article, let us consider the points they make. Clark and Plotkin say that their data were better than Cleary's because they "had data on over 1200 Negro subjects (with questionnaire response from over 500) drawn from all sections of the country and distributed in hundreds of diverse colleges." The quality of data is, of course, always relative to the purpose they are to serve. For the conclusion of Clark and Plotkin that an admissions officer (who necessarily works within a single institution) should weigh test scores less, distribution of the sample among "hundreds of diverse colleges" is a disadvantage rather than an advantage. For the admissions officer, Cleary's within-college analysis is clearly more relevant. Since Cleary was able to analyze data in only three colleges, she limited her conclusions: "The schools used in this study do not represent the full spectrum of colleges in the United States, so general conclusions cannot be reached." But there are many studies other than Cleary's in which the within-college analysis has been performed, and most of these were reviewed in the Stanley article. With each new analysis, the Clark and Plotkin conclusion becomes less credible.

In their criticism of the Cleary article, Clark and Plotkin persist in their emphasis of correlation coefficients to the exclusion of regression lines. It is well known that the size of a correlation coefficient is a function of the variability of the group: when the range of scores is restricted, the correlations are attenuated. For this reason and others, the comparison of regression lines is a more appropriate analysis. Clark and Plotkin computed no correlation coefficients or regression equations, nor did they even work within colleges. Instead, they pooled college grades from 187 different colleges and Just call us. Since little usually goes wrong with a Mettler balance it's often simple to spot the problem and advise you by phone how to correct it quickly yourself. But not always. Then one of our 40 factory-trained technicians, located nearest you, can take care of it.

While it's rare for a Mettler to require repair, *scheduled* preventive maintenance is a low-cost way to further minimize the chance of untimely breakdowns. Our coast-to-coast network of technicians already provides regular service for over 40,000 balances.

So if your balances—whether Mettler or any other make—require attention, a call will bring you a technician in five days or less anywhere in the country. For information on preventive maintenance or service, contact your nearest Mettler Instrument Corporation regional office: Princeton, N.J. (609) 448-3000 Chicago, III. (312) 299-1078 Houston, Texas (713) 522-1659 S. San Francisco, Cal. (415) 583-3806







Circle No. 86 on Readers' Service Card

universities (2, pp. 58-59), thereby treating grades at highly selective institutions as equivalent to grades at unselective ones. (We recognize that they had no choice in this matter: at the time of their study, institutions of higher education were so severely segregated that a useful within-college analysis in integrated colleges was impossible.)

Rather than focus on correlations, Cleary proposed a definition of test bias that was to be examined in her study (1, p. 115):

A test is biased for members of a subgroup of the population if, in the prediction of criterion for which the test was designed, consistent nonzero errors of prediction are made for members of the subgroup. In other words, the test is biased if the criterion score predicted from the common regression line is consistently too high or low for members of the subgroup. With this definition of bias, there may be a connotation of "unfair," particularly if the use of the test produces a prediction that is too low. If the test is used for selection, members of a subgroup may be rejected when they were capable of adequate performance.

She was able to conclude that, in these colleges, the SAT was as appropriate for the prediction of college grades of blacks as of whites (1, p. 123):

In the two eastern schools, there were not significant differences in the regression lines for Negro and white students. In the one college in the southwest, the regression lines for Negro and white students were significantly different: the Negro students' scores were over-predicted by the use of the white or common regression lines. When high school grades or rank-in-class are used in addition to the SAT as predictors, the degree of positive bias for the Negro students in-

In their letter Clark and Plotkin state that one has to examine Cleary's tables to find the differences in correlations for blacks and whites, because she fails to mention them in her text. In fact, in both the earlier Research Bulletin (4) which they cite and the journal article (1) cited by Stanley, three paragraphs are devoted to correlation coefficients; the differences are pointed out and explanations are proposed.

Clark and Plotkin are correct that there may have been some misidentification of race in the Cleary study: in only one school were records of race available from the college; in the other two colleges identification was made from photographs, with corroboration provided from an NAACP list in one

of the colleges. Gross errors in classification would be required, however, to change the results markedly.

Testing and Fair Employment (5) is cited by Clark and Plotkin to indicate that differential racial validity is a problem in industrial settings. This is really not relevant to the question of the SAT in educational prediction. Even so, several important points may be noted: (i) the book routinely examines correlation coefficients, rather than regression lines; (ii) all but one of the studies has very small samples of Negroes, usually about 31, and yet large numbers of correlation coefficients are computed and compared; (iii) in the only study with a reasonably large sample (98 Negro and 437 white), differential validities were not found; and (iv) in the one educational study that they say contradicts Cleary's results, the Negro and white students were in different schools, although they took the same criterion tests (State Examinations in Nursing).

In two recently published studies of educational predictions, Temp (6) and Davis and Temp (7) argue strongly for validity studies in all institutions that are using the SAT (or any other admission tests or predictors) for the selection of students. We agree with this recommendation. The College Board provides, through the Educational Testing Service, free validity studies to any institution that uses the SAT in its admissions process. Users of the SAT are encouraged to study the separate regression lines for Negro and white students (as well as other groups such as males and females) so that they can make reasoned judgments about the utility of the test for groups of students in their institution.

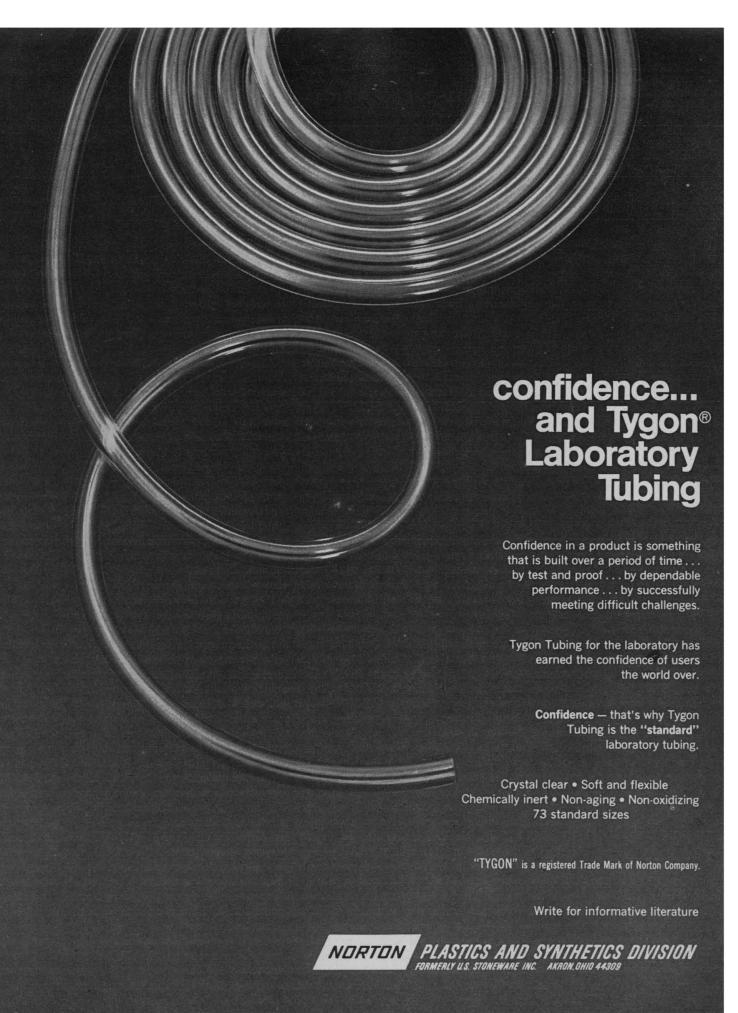
T. ANNE CLEARY College Entrance Examination Board, 888 Seventh Avenue, New York 10019 JULIAN C. STANLEY

Department of Psychology, Johns Hopkins University, Baltimore, Maryland 21218

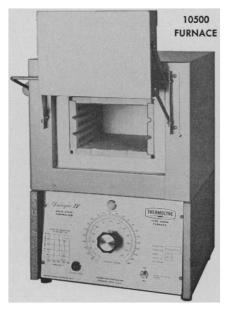
#### References and Notes

- T. A. Cleary, J. Educ. Meas. 5, 115 (1968).
   K. B. Clark and L. Plotkin, The Negro Student at Integrated Colleges (National Scholarship Service and Fund for Negro Students, New York, 1963).
- 3. For a rejoinder to one of Clark and Plotkin's
- complaints about ETS, see R. O. Fortna, Science 175, 706 (1972).

  T. A. Cleary, Research Bulletin RB-66-31 (Educational Testing Service, Princeton, N.J., 1966). 1966).
  5. J. J. Kirkpatrick, R. B. Ewen, R. S. Barrett,
- R. A. Katzell, Testing and Fair Employment (New York Univ. Press, New York, 1968).
  6. G. Temp, J. Educ. Meas. 8, 245 (1972).
  7. J. A. Davis and G. Temp, College Board Rev.
- 81, 4 (1971).







10500 Furnace with Solid-State Control

#### **NEW ORDER OF RELIABILITY**

New solid-state controller, Dubuque IV, raises reliability to a new level . . . long life silicon controlled rectifier and transistor establishes positive reliability . . . No tube replacement.

#### PROPORTIONING BUILT-IN

Automatic proportioning action accurately compensates for temperature lag and overshoot in furnace . . . cyclic temperature variations are minimized.

#### QUICK RESPONSE HEATING ELEMENTS

Special "low-mass" elements respond quickly to controller demand . . provide balanced heat distribution. New features combine to give highest dollar value in a small furnace

Chamber size—5½" W x 3%" H x 6½" D 1093C (2000F) Model\_\_\_\_\_\$352

1177C (2150F) Model\_\_





Circle No. 85 on Readers' Service Card

#### Psychology and Health Care

John Walsh (News and Comment, 3 Dec. 1971, p. 1003) reports on "Health manpower training: Funding levels at issue" and describes certain inherent problems of fiscal, political, and manpower balance. Both Walsh's comment and the legislation that was enacted omit realistic consideration of a major health profession—psychology.

In terms of hospital beds, patients affected, community services provided, professionals involved, or funds expended-to say nothing of social cost -mental disorders constitute a very major and substantial health problem. Yet the ourrent national-level proposals for health insurance and the broad range of existing prepaid health coverage largely exclude or seriously limit coverage for mental disorder. These proposals and existing coverage commonly exclude the services of psychologists or fail to recognize psychologists as the independent health practitioners that they are-licensed in 44 states and the District of Columbia and represented by a national organization of over 33,000 members, the American Psychological Association.

If there is any doubt that psychology has major substantive relevance and capacity to deliver in this arena, or that mental disorder is not a major health problem, I would recommend a review of the ten reports (published as separate texts by Basic Books, New York) of the Joint Commission on Mental Illness and Health appointed by President Kennedy. Six of these texts were authored, and one coauthored. by psychologists, perhaps evidence both of the preeminent scope of knowledge which my profession has to contribute to this field and its documented willingness to participate in the resolution of health problems at the national level. HERBERT DÖRKEN

Department of Mental Hygiene, State of California, Human Relations Agency, 744 P Street, Sacramento 95814

#### **Research Management**

In the editorial (1 Oct., p. 11) that was excerpted from the 1945–1946 Carnegie Institution yearbook (1), Vannevar Bush seems to imply that fundamental research cannot be managed, but only supported, with the management of a program left to the scientist conducting the research. Quite the con-

trary! Experience in industry has repeatedly shown that the scientist conducting the research is frequently the poorest choice as manager due to his lack of objectivity, or removal from personal involvement. It has been far more successful for the manager to be a separate person from the researcher, although also a scientist.

The "managed" approach has also more successfully kept the final objective in clear focus. The alternative course, as advocated by Bush, frequently results in a diffuse approach, which either never comes to grips with the central problem, or takes a considerably longer time to do so.

The managed approach is not without its disadvantages or risks. But even Bush's "eminent" scientists must make judgments and take the chance of making a wrong choice. The central issue is to make sure that the managers or management groups are properly staffed. If the scientists are anywhere as eminent as Bush contends, they should have no difficulty convincing their managers of the wisdom of their choices. None of us likes to be called to account for our work and forced to justify the direction we have chosen. But in the balance, this is preferable in the case of any national commitments we might choose to make, now or in the future.

F. Louis Floyd

Post Office Box 197 Spring House, Pennsylvania 19477

#### Reference

1. Report of the President, Carnegie Inst. Washington Yearb. 45, 1-13 (1946).

#### The College Professor

Because the AAAS has recently made efforts to reform its governance, I decided to read the list (18 Feb., p. 804) of AAAS officers, committees, and representatives. An intriguing pattern began to emerge; of the scores of academic men and women listed, only two are affiliated with an undergraduate college (if we regard Dartmouth, the City College of New York, and Queens College as entities greater in scope and size than a "college"). Of these two, Rhoda Dorsey, who is on the Committee on Minorities in Science, is apparently a representative not only of the majority sex in America but also of a significant minority in academia, the college professor. The other, Donald Aitkin, is on the Youth Council.

Why does the AAAS have active



participation from all components of its membership save from those colleges that do not grant doctorates? These institutions represent an important segment of our educational system, and prepare many of our future teachers, doctors, and (hopefully) scientifically aware citizens. I hope that the AAAS officers will recognize that science is not the province only of the university, the corporation, and the government.

CARL STEPHEN PIKE

Department of Biology, Franklin and Marshall College, Lancaster, Pennsylvania 17604

#### **Machine Translation**

H. Wallace Sinaiko comes to substantially the same conclusion in his letter (17 Dec., p. 1182), "Translation by computer," as that of a National Academy of Sciences-National Research Council committee in 1966. The members of that committee (chairman John R. Pierce, John B. Carroll, Eric P. Hamp, David G. Hays, Charles F. Hockett, Anthony G. Oettinger, Alan Perlis) are gratified at this confirmation.

JOHN R. PIERCE

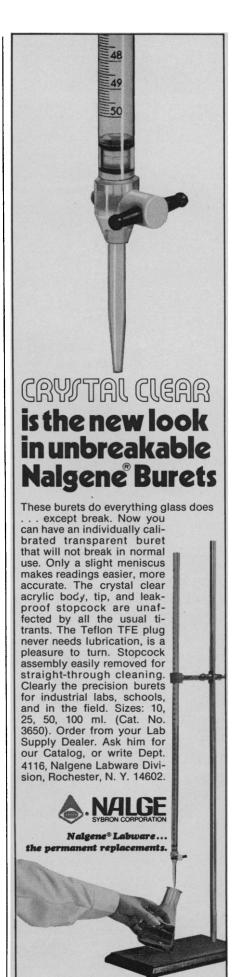
Department of Electrical Engineering, California Institute of Technology, Pasadena 91109

#### Reference

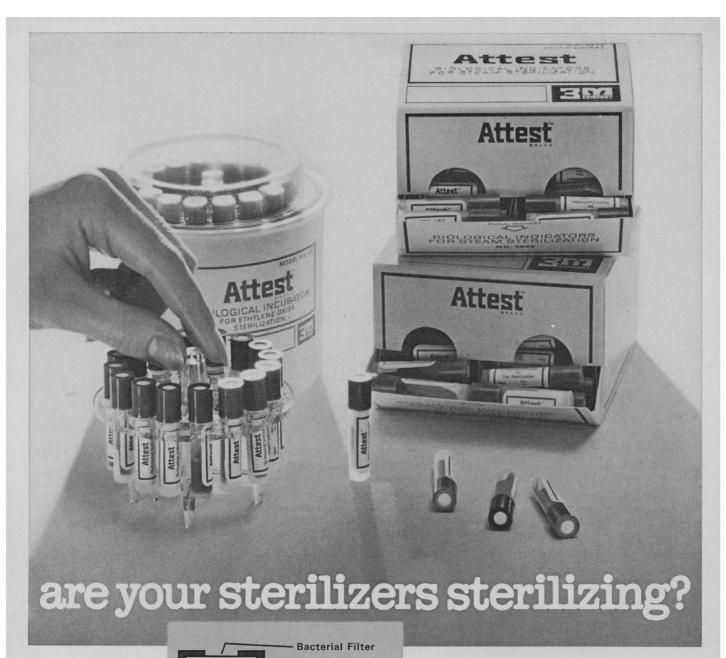
1. Language and Machines, Computers in Translation and Linguistics, report of the Automatic Language Processing Advisory Committee (Publ. No. 1416, National Research Council, Washington, D.C., 1966).

#### **Lunar Basalts**

We agree with most of Allen L. Hammond's review (Research News, 25 Feb., p. 868) of the history and structure of the moon. However, there is one important point that should be clarified. He says, "Within this period, two major phases of thermal evolution have been identified: (i) widespread melting that apparently occurred about the time of the moon's formation; and (ii) partial melting beginning as early as 4.1 billion years ago to form basalts enriched in potassium, rare earth elements, and phosphorus (KREEP basalts), and somewhat later, flooding of preexisting basins with lava to form the lunar maria between 3.1 and 3.7 billion years ago." He makes other remarks that are not clear about the times at which the basalts were formed.



Circle No. 90 on Readers' Service Card



Crushable
Glass Ampule

Modified
Tryptic Soy
Broth Medium

Flexible
Plastic Vial

Dry
Spore Strip

Plastic Cap

Schematic of ATTEST Indicator. After indicator is removed from sterilizer and becomes cool, ampule is crushed between thumb and forefinger, then placed in ATTEST Incubator. New **Attest** Biological Monitoring System includes indicators and incubators color-coded for either steam or gas sterilizers.

- Accurate results obtained after only 24-48 hours of incubation.
- Results interpreted easily by definite color change.
- Far lower in cost than current techniques.
- Allows daily, or even each-load monitoring.
- System completely self-contained—virtually no chance of contamination.
- Simple, reliable, inexpensive.
- Convenient recording forms available for accurate documentation of results.
   Get more details about the ATTEST Brand Biological Monitoring System that allows more frequent monitoring by writing:

Medical Products Division Schmany
3M Center • Saint Paul, Minnesota 55101 @ 3M Company, 1971

Circle No. 14 on Readers' Service Card

We conclude that the maria basalts acquired their gross composition 4.5 to 4.7 billion years ago, and that this composition was only slightly modified in the second melting about 3.1 to 4.0 billion years ago. This point was discussed at the Second Lunar Science Conference by Urey et al. (1), and it has been clearly established by Wasserburg et al. (2) with an isochrone plot of 87Rb against 87Sr in the average soils of Apollos 11, 12, 14, 15, and Luna 16. We must conclude that these basalts were formed about 4.6 billion years ago, and that a closed-system melting process occurred later. Our explanation for the closed-system melting is as follows: When melting (of undifferentiated terrestrial material) occurs in a strong gravitational field, for example, that of the earth, the liquid separates and forms an extensive pool which, after considerable accumulation, bursts through to the surface. This liquid has the composition of basalt, and

the unmelted material below has another composition. The rubidium-strontium composition differs in the two fractions. Because the moon has a weak gravitational field, liquid and solid separate less completely or not at all; when a previously formed basalt melts, solid and liquid flow out together, and the mixture has the same composition as that of the original pack of basaltic rock. The relative distribution of rubidium and strontium in different minerals was changed in the remelting process, although the overall ratio of Rb to Sr was not changed; hence, two isochrones are secured, one when the data from individual crystals of mare basalts are plotted, and the second when the gross compositions of the different mare basalts are plotted. This is the observation of Wasserburg et al. (1). Our arguments are somewhat different and involve the uranium and thoriumlead dates as well, but we arrive at the same conclusion. We also give a suggestion about the thermal history of the moon, but what we wish to emphasize is that the basaltic composition of the lunar-ash flows must have been acquired 4.5 to 4.7 billion years ago, in the primitive melting and crystallization process, and remained approximately unchanged in the second melting process.

> H. C. UREY KURT MARTI

Department of Chemistry, University of California, San Diego, La Jolla 92037

#### References and Notes

- H. C. Urey, K. Marti, J. W. Hawkins, M. K. Liu, Proceedings of the Second Lunar Science Conference (M.I.T. Press, Cambridge, Mass., 1971), vol. 2, pp. 987-998.
- 2. G. J. Wasserburg, G. Turner, F. Tera, F. A. Podosek, D. A. Papanastassiou, J. C. Huneke, Lunar Science-III, Lunar Science Institute, Contribution No. 88 (Lunar Science Institute, Houston, 1972), p. 788; D. A. Papanastassiou and G. J. Wasserburg, Earth Planet. Sci. Lett. 13, 368 (1972).
- 3. We acknowledge support from NASA contract NGR 05-009-150.

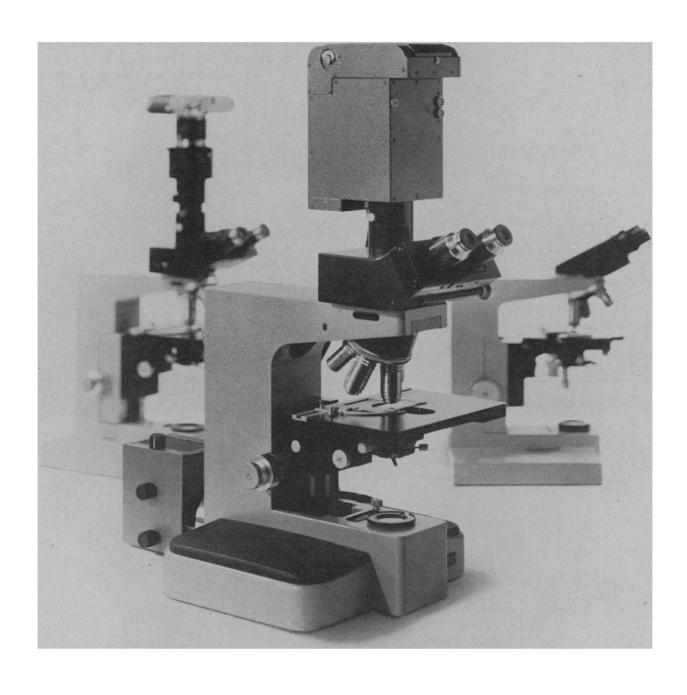


#### Academic StereoZoom Series Microscopes . . . Made in U.S.A. . . . priced unbelievably low!

Totally designed for science teaching: Every feature of the innovative design of this newest addition to the StereoZoom Microscope Series has been built with the user in mind. The superiority of Bausch & Lomb's quality Zoom Optical System and a completely new mechanical concept provide a level of performance never before approached in educational stereomicroscopes.

Every model will withstand the roughest, toughest treatment with full assurance of completely satisfactory service and low maintenance expense.

Write for the new full color catalog, 31-2395, and our free demonstration offer. Bausch & Lomb, Scientific Instrument Division, 85604 Bausch St., Rochester, New York 14602.





#### AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in Science—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

#### **Editorial Board**

1972

ALFRED BROWN
JAMES F. CROW
THOMAS KUHN
ELLIOTT W. MONTROLL

FRANK PRESS
FRANK W. PUTNAM
WALTER O. ROBERTS

1973

H. S. GUTOWSKY ARTHUR D. HASLER RUDOLF KOMPFNER DANIEL E. KOSHLAND, JR. GARDNER LINDZEY
RAYMOND H. THOMPSON
EDWARD O. WILSON

#### **Editorial Staff**

Editor

PHILIP H. ABELSON

Publisher William Bevan Business Manager
HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editor: NANCY TEIMOURIAN

News and Comment: John Walsh, Deborah Shapley, Robert Gillette, Nicholas Wade, Constance Holden, Scherraine Mack

Research News: Allen L. Hammond, William D. Metz

Book Reviews: Sylvia Eberhart, Katherine Livingston, Kathryn Mouton

Cover Editor: GRAYCE FINGER

Editorial Assistants: Margaret Allen, Isabella Bouldin, Blair Burns, Eleanore Butz, Ronna Cline, Annette Diamante, Mary Dorfman, Judith Givelber, Marlene Glaser, Corrine Harris, Oliver Heatwole, Christine Karlik, Marshall Kathan, Margaret Lloyd, Jane Minor, Daniel Rabovsky, Patricia Rowe, Leah Ryan, Lois Schmitt, Ya Li Swigart, Alice Theile

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: Leonard Wray; Subscriptions: Bette Seemund; Addressing: Thomas Bazan

#### Advertising Staff

Director EARL J. SCHERAGO Production Manager BONNIE SEMEL

Advertising Sales Manager: RICHARD L. CHARLES

Sales: New York, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); Medifield, Mass. 02052: Richard M. Ezequelle, 4 Rolling Lane (617-444-1439); CHICAGO, ILL. 60611: John P. Cahili, Room 2107, 919 N. Michigan Ave (312-DE-7-4973; Beverly Hills, Callf., 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area code 202) Central office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321, Reviewing: 467-4440. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv. Science, 24 December 1971. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

#### Who Should Ultimately Own the Data?

I have just been informed that, in the next meeting of a National Institute of Mental Health review committee on which I serve, 31 research proposals will be assessed. If the committee has a good weekend, we shall allot \$1 million or more of public funds. Scores of other such committees, within federal, state, and city agencies, will award much larger amounts. A good part of the tax monies involved will end up paying for the collection or production of data. The question is what happens to this data, and what ought to happen to it, once the original researchers lose interest.

Often the data rots, disintegrates, or is otherwise lost or inaccessible. Decks, tapes, and records are stored in attics or basements at home or on the campus. In some cases, the bewildered widow of the deceased researcher asks his colleagues to "clear away the junk"; in others, it is thrown away with yellowing blue books, early drafts of manuscripts, and books that came apart when the professors moved, as they frequently do.

Data stored on the campus often fares little better. Data decks warp and get moldy; tapes may erase. Most important, code books are not kept with the material or are not updated as the decks and tapes are changed, making the data unusable. Records, unprotected, turn into dust.

More than the original investment is lost. Often the data cannot be duplicated (for example, public opinion polls of views people held in the 1940's). Continuity is undermined, since one researcher cannot build on the efforts of earlier researchers. Also, as the published portions of the studies often do not contain sufficient data to allow for replication, the mutual check by colleagues on the validity and quality of the research findings suffers.

I therefore suggest that government agencies and foundations which finance mass collection or preparation of quantitative data should require that the data generated will eventually be made available to other researchers, by depositing a copy of the data (tape, decks, and so on) in a data bank or library. It would be up to the recipients of the funds to decide when they no longer need to keep the data exclusively for their use (that is, when they have published all they hope to get out of it or their interest has moved elsewhere) and which data bank or library will benefit from their copies. It will also be up to each researcher to decide if his data is sensitive (for example, highly personal or political), in which case some omissions may be called for (for example, no personal identification of the subjects should be provided in medical data about venereal disease).

The data should be deposited in a way that renders it usable by others—by including code books, for example. Appropriate and specific budgetary provisions for preparing such copies (which are not costly) should be made on all grants and contracts.

If such measures are taken, perhaps initially only for those studies in which the investment in the data is \$100,000 or higher, it must be expected that the public's investment in research will yield fruit that can be shared more widely, enjoyed for longer periods, and, not least, be of better quality.—Amital Etzioni, professor of sociology, Columbia University, Director, Center for Policy Research, 475 Riverside Drive, New York 10027

# Who said that multi-user programming for a liquid scintillation system is a new idea?

The multi-user concept was born several years ago with our program selector cap.

Each user just dials the selector to the program that matches his optimized counting requirements and slips the cap over the first sample in his sample group. The right program, from up to 12 separate choices, will now be *automatically* selected.

That's the procedure with the 300sample, temperature-controlled Mark II™ Liquid Scintillation System. You use the program selector cap to pre-program optimized counting conditions into the Mark II, and you get maximum performance and versatility plus high E²/B.

This same concept applies to the all-new Isocap/300 Liquid Scintillation Systems. Whether temperature-compensated or temperature-controlled, Nuclear-Chicago's liquid scintillation systems are available with the program selector cap.

Multi-user programming is new? Not at Nuclear-Chicago. Ask your Nuclear-Chicago sales engineer or write to us for the facts on the Isocap/300<sup>™</sup>or Mark II Systems. And ask about the PDS/3 Programmable Data System — it's a whole new way to have data reduction capability for true DPM, and more.

. . . . .



2000 Nuclear Drive, Des Plaines, Illinois 60018, U.S.A. Donker Curtiusstraat 7, Amsterdam W. The Netherlands





Circle No. 20 on Readers' Service Card

#### **RIVER ECOLOGY AND MAN**

edited by RAY T. OGLESBY, Cornell Univ., CLARENCE A. CARLSON, Cornell Univ., and JAMES A. McCANN, Univ. of Mass.

A Volume of ENVIRONMENTAL SCIENCES
Series Editors: DOUGLAS H. K. LEE, E. WENDELL HEWSON, and
DANIEL A. OKUN

Here is a carefully integrated series of reports by scientists, engineers, and social scientists, unusual for the wealth and breadth of the information it presents on rivers and man's interaction with them. The book contains such information as: descriptions of the flora, fauna, chemical composition, and geomorphometry of rivers; case histories of specific rivers throughout the world; full discussions of the effects of various river uses on morphometry, discharge, and sedimenta-tion; and detailed analyses of the impact of heat, radionuclides, pesticides, and industrial wastes on river ecosystems. 1972, 492 pp., \$11.50

#### STRUCTURAL AND FUNCTIONAL ASPECTS OF PHYTOCHEMISTRY

edited by V. C. RUNECKLES, Univ. of British Columbia, Canada, and T. C. TSO, U. S. Dept. of Agriculture, Beltsville, Md.
Volume 5 of RECENT ADVANCES IN PHYTOCHEMISTRY

This volume provides an up-to-date review of chemical, metabolic and functional aspcts of the chemicals and chemical groups influencing plant growth and utilization. It covers a wide variety of topics—ranging from energy conversion in photosynthesis through chemical aspects of plant pigments, the chemistry of plant-insect and plant-pathogen interactions, and herbicide metabolism, to the roles of phytochemicals in tea and tobacco.

1972, 364 pp., \$17.50

#### PHASE LOCKED AND FREQUENCY-FEEDBACK **SYSTEMS**

**Principles and Techniques** 

by JACOB KLAPPER, Newark College of Engineering, N. J., and JOHN T. FRANKLE, RCA Global Comm. Inc., N. Y.

CONTENTS: Introduction. Review of Concepts. Loop Components and Systems Considerations. FM Feedback Loop Principles. Phase-Locked Loop Principles. Design of Phase-Locked Loops for FM Demodulation. Design of Frequency-Feedback Loops for FM Demodulation. Design of Compound and Multiple Loops for Low-Threshold Demodulation. Digital FM and Other PLL Applications. Testing and Evaluation Procedures. Appendixes,

1972, 412 pp., \$19.50

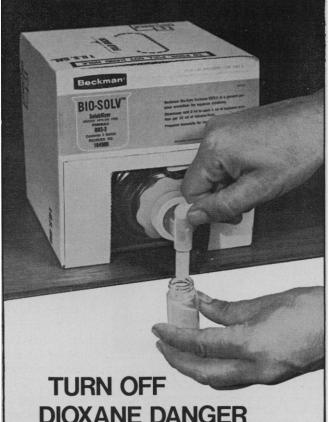
#### **BIOCHEMICAL ACTIONS OF** HORMONES, Volume 2

edited by GERALD LITWACK, Temple Univ. School of Medicine, Philadelphia, Pa.

CONTENTS: G. M. THOMKINS and T. D. GELEHRTER: The Present Status of Genetic Regulation by Hormones. R. W. BUTCH-ER, G. A. ROBISON, and E. W. SUTHERLAND: Cyclic AMP and Hormone Action. R. W. TURKINGTON: Multiple Hormonal Interactions. The Mammary Gland, G. A. ROBISON, R. W. BUTCHER, and E. W. SUTHERLAND: The Catecholamines. G. LITWACK and S. SINGER: Subcellular Actions of Glucocorticoids. I. B. FRITZ: Insulin Actions on Carbohydrate and Lipid Metabolism. E. V. JENSEN and E. R. DeSOMBRE: Estrogens and Progestins. H. G. WILLIAMS-ASHMAN and A. H. REDDI: Androgenic Regulation of Tissue Growth and Function. R. I. DORFMAN: Mechanism of Action of Gonadotropins and Prolactin. J. J. FERGUSON, Jr.: The Mechanism of Action of Adrenocorticotropic Hormone, H. F. DeLUCA and M. J. MEL-ANCON, Jr.: 25-Hydroxycholecalciferol: A Hormonal Form of Vitamin D. G. R. WYATT: Insect Hormones. 1972, 558 pp., \$26.00

#### ACADEMIC PRESS

NEW YORK AND LONDON 111 FIFTH AVENUE, NEW YORK, N.Y. 10003



DIOXANE DANGER AND HIGH COST.

Turn on Beckman's Bio-Solv™ Solubilizers to blend aqueous solutions into toluene cocktails.

Exclusive with Beckman, these solubilizers give highest liquid scintillation counting efficiency, while eliminating the problems of phosphorescence, chemiluminescence, and the high cost of dioxane cocktails.

Only 1 to 2 ml of nontoxic Bio-Solv lets you safely incorporate any aqueous solution into a toluene cocktail that is phase-stable at refrigerated or ambient temperatures, won't change in counting characteristics with time. Two formulations available, with generous samples of each in a trial-size kit.

Bio-Solv is one more example of Beckman nuclear supplies quality, like the exceptional Value Vials™, best buy in counting vials on the market today. For ordering information and literature on the complete line of Beckman nuclear supplies, contact your local Beckman office or write for Data File 1323, Scientific Instruments Division, Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif. 92634.



INSTRUMENTS, INC.

HELPING SCIENCE AND INDUSTRY IMPROVE THE QUALITY OF LIFE.



#### **CHROMATOGRAPHY** CATALOG NO.5A

**Product Specifications & Prices** 

- O Chromatography & Electrophoresis Paper with Chart of Relative Values
- Standard, Ashless, Impregnated & **Acetylated Papers**
- O Column Chromatography Items: Standard Celluloses Ashless Celluloses Acetylated Celluloses Ion Exchange Celluloses
- O TLC/Ion Exchange Types DEAE ECTEOLA TEAE PEI QAE CM P
- O TLC Powders of Cellulose, Silica Gel & Polyamide
- O Prepared TLC Ready-Plates **Plain Cellulose Powders** Acetylated 21 x 45% Ion Exchange-Anion & Cation **Polyethyleneimine** Silica Gel **Polvamide** Polyamide/Acetylated

the first name in filtration... SCHLEICHER & SCHUELL (603) 352-3810



Schleicher & Schuell, Inc. Keene, New Hampshire 03431	S-716			
Please send Chromatography Catalog No. 5A				
Name				
Affiliation				
Address				
City	······			
State	Zip			

Circle No. 89 on Readers' Service Card

priorities and with the development of mechanisms for public policy decisionmaking, J. V. Neel (University of Michigan Medical School), after sketching a number of present and potential genetic developments, presented four possible criteria for setting priorities: reduction of the proportion of persons with genetic disease, improvement of the expression of existing genotypes. creation of genetically superior individuals, and protection of the present gene pool by a world population policy. His conclusion is that we are not yet scientifically, ethically, or socially in a solid enough position to make wise choices among the possible priorities.

The conditions for achieving the necessary kind of consensus for deciding on priorities and for public policymaking were analyzed by D. A. Kindig and V. W. Sidel (Montefiore Hospital; Einstein College of Medicine) and by H. P. Green (George Washington University Law School). The former paper pressed for a more complete relating of genetic problems to other social issues and priorities in society. The need for better social and political processes to carry this out is evident, they said. Kindig and Sidel agreed with Green that decisions in this area must be made by an informed public and not by elite groups. This point was underscored by D. Eaton (All Soul's Unitarian Church, Washington, D.C.), who noted that genetic disease is a much greater preoccupation with whites than with blacks. In addition, Green contended that, if the public is to have genuine options and to become fully informed, there must be public debate and a resort to the adversary system. This method does not always guarantee truth or wisdom, but it does facilitate open discussion, a minimum necessity for wise public decision-making, K. Ludmerer (Johns Hopkins Medical School) stressed, in this context, the importance of public education for an understanding of the capabilities as well as limitations of science.

Where is the future likely to take us in genetics? This question, which kept surfacing throughout the conference, was directly confronted by R. L. Sinsheimer (California Institute of Technology), who asked whether future scientific developments are an "ambush or opportunity"? His clear answer was "opportunity," even if laced with dangers. Higher states are possible for the human species, intellectual, emotional, and moral; the price of not pursuing them would be "to stagnate in fear and

doubt." J. V. Neel responded from the floor that he did not agree with Sinsheimer's thesis. Others agreed in part and objected in part. That typified the entire conference.

D. CALLAHAN

Institute of Society, Ethics and the Life Sciences, Hastings-on-Hudson, New York 10706

#### **Forthcoming Events**

#### April

20-21. Cooperative Education, 1st natl. conf., Newton, Mass. (M. B. Zerwick, Commco PR Inc., 310 Madison Ave., New York 10017)

21-22. New Mexico Acad. of Science, Socorro. (Miss L. M. Shields, New Mexico Highlands Univ., Las Vegas 87001)

24-27. American Physical Soc., Washington, D.C. (W. W. Havens, Jr., APS, 335 E. 45 St., New York 10017)

24-28. Inter-American Congr. of Cardiology, San Francisco, Calif. (A. M. Bennett, American Heart Assoc., 44 E. 23 St., New York 10019)

24-28. Structural Engineering-An Overview for the Seventies, American Soc. of Civil Engineers, Cleveland, Ohio. (H. Hands, ASCE, 345 E. 47 St., New York 10017)

24-29. American Acad. of Neurology, Palm Beach, Fla. (S. A. Nelson, AAN, 4005 W. 65 St., Minneapolis, Minn. 55435)

24-6. Psychotherapy Week, 22nd, As-Training, soc. for Psychotherapeutic Lindau, Germany. (H. Stolze, Lindauer Psychotherapiewochen, Adalbert-Stifterstrasse 31, D-8 Munchen 81, Germany)

25-26. Scanning Electron Microscope Symp., 5th annual, Chicago, Ill. (O. Johari, IIT Research Inst., 10 W. 35 St., Chicago 60616)

25-28. Significance of Insect and Mite Nutrition, Lexington, Ky. (J. G. Rodriguez, Dept. of Entomology, College of Agriculture, Univ. of Kentucky, Lexington 40506)

26-28. Biometric Soc., Eastern North American regional, Ames, Iowa. (F. B. Cady, Jr., Biometric Unit, 337 Warren Hall, Cornell Unv., Ithaca, N.Y. 14850)

26-28. Operations Research Soc. of America, New Orleans, La. (R. M. Oliver, Operations Research Center, Univ. of California, Berkeley 94720)

27-29. Eastern Psychological Assoc., Boston, Mass. (W. W. Cumming, 353 Schermerhorn Hall, Columbia Univ., New York 10027)

27-29. Red Cell Metabolism and Function, 2nd intern. conf., Ann Arbor, Mich. (G. F. Brewer, Dept of Human Genetics, Univ. of Michigan, Ann Arbor 48104)

27-30. Association of Clinical Scientists, Elkhart, Ind. (F. W. Sunderman, Jr., Drawer B, Newington, Conn. 06111)

28. Georgia Acad. of Science, Athens. (E. A. Stanley, Dept. of Geology, Univ. of Georgia, Athens 30601)

28-29. Indiana Acad. of Science, Notre

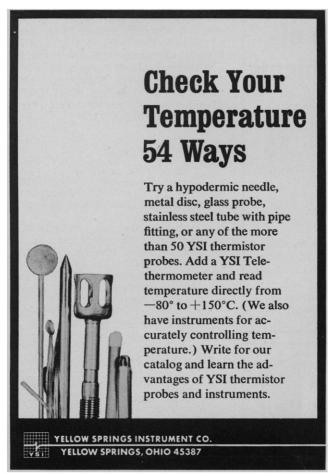


Hellma—the largest assortment of highest precision glass and quartz cells. Standard · Flow-through · Constant-temperature Anaerobic · Special Designs Also available—ULTRAVIOLET LIGHT SOURCES Deuterium Lamps · Mercury Vapor Lamps Hollow Cathode Lamps · Power Supplies



Write for literature Box 544 Borough Hall Station Jamaica, New York 11424 Phone (212) 544-9534

Circle No. 107 on Readers' Service Card



Your Lab is More Efficient with

#### TIME CONSECUTIVE NUMBERING **SYSTEMS**

Use to Number: **Test Tubes Requisition Forms** Containers . . . Control Lots . . .



There are many ways a Time Consecutive Numbering System can save you time through increased efficency. Inexpensive and easy-to-use, Time Consecutive Number Labels are self-sticking—adhere to any surface in temperatures ranging from—70°F. to +250°F. Numbers can be repeated from 1 to 10 times on a choice of seven different color stocks. Available in handy precut tablet or clinically safe BACTERIOSTATIC roll form.

Adaptable to any numbering system you develop, these labels are supplied with a standard "No." prefix or any of 5 other prefixes. Think of the efficient, economical systems you can develop using Time Consecutive Numbers.

Write today for free samples, and more information on Time Consecutive Numbers and other TIME Products for the Laboratory. We will also send the name of your nearest dealer.

NOTE: NEW ADDRESS. We have recently moved into new facilities; enlarged and automated to serve you better.



PROFESSIONAL TAPE COMPANY, INC.

DEPARTMENT 12
144 TOWER DR., BURR RIDGE (HINSDALE), ILL. 60521

Circle No. 110 on Readers' Service Card



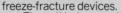
# Electron Microscopists do important work. They shouldn't spend a lot of time getting everything ready to do it.

Our vacuum evaporators give you precision specimen preparation and replication for electron microscopy.

microscopy.
With very little time and effort

on your part.
We have both automatic and manual versions. And all the accessories you need for complete

vacuum deposition.
Like rotary coaters and shadowers. Filament and boat evaporators. Carbon rods and sharpeners. Instrumentation feed throughs. And



They all help you with your important work by doing more of it for you.

We've been making more kinds of vacuum pumping equipment than anyone else for over 64 years.

And we'd like to tell you in detail about our high vacuum evaporators. Just send for Booklet #3102

Booklet #3102.
Kinney Vacuum Co.,
3529 Washington Street,
Boston, Massachusetts
02130. Tel. (617)
522-7100.



We spend a lot of time thinking about our vacuum products. So you won't have to.

Circle No. 92 on Readers' Service Card

# Shandon gets to the bottom of your chromatography tank problems

The bottom of a Shandon Model 500 Panglas® Chromatank® is different because it's absolutely flat. Press molding eliminates the mound found at the bottom of ordinary tanks, giving you an even distribution of solvent throughout the tank and saving solvent, especially in ascending techniques.

Press molding also gives the Panglas Chromatank stronger corners and heavier walls. It's made *entirely* of glass, without metal or plastic fittings, to eliminate solvent contamination.

The Model 500 is the largest tank of its kind, measuring 20" x 8" x 22" high, accommodating either sheets or strips for ascending or descending chromatography. It will also accept 46 cm by 57 cm sheets making it ideal for two-way chromatography.

For more information, write for Bulletin L383, Shandon Southern Instruments, Inc., 515 Broad Street, Sewickley, Pa. 15143 (Pittsburgh District).



Dame. (J. D. Webster, Hanover College, Hanover, Ind. 47243)

28-29. Society for Investigative Dermatology, Atlantic City, N.J. (J. S. Strauss, Boston Univ. Medical Center, 80 E. Concord St., Boston, Mass. 02118)

28-29. Nebraska Acad. of Sciences, Lincoln. (C. B. Shultz, 101 Morrill Hall, Univ. of Nebraska, Lincoln 69508)

28-29. South Dakota Acad. of Science, Aberdeen. (W. L. Hoffman, Dept. of Physics, Univ. of South Dakota, Vermillion 57069)

28-29. Illinois State Acad. of Science, Macomb. (N. R. Brewer, ISAS, 5757 Drexel Ave., Chicago, Ill. 60637)

28-29. Pests and Pesticides, Missouri Acad. of Science, Cape Girardeau. (H. D. Rutledge, Dept. of Physics, Southeast Missouri State College, Cape Girardeau 63701)

28-30. Wisconsin Acad. of Sciences, Arts and Letters, Stevens Point. (J. P. Batt, 5001 University Ave., Madison, Wis. 53705)

28-30. American Acad. of Psychoanalysis, Dallas, Tex. (Mrs. C. Bruskin, 40 Gramercy Park North, New York 10010)

29. American College of Psychiatrists, Dallas, Tex. (P. A. Martin, 857 Fisher Bldg., Detroit, Mich. 48202)

29. Synthetic Fibers, 9th annual symp., American Inst. of Chemical Engineers, Tidewater-Virginia Section, Williamsburg, Va. (C. E. Armengol, E. I. du Pont de Nemours & Co., Inc., P.O. Box 27001, Richmond, Va. 23261)

30-1. American Soc. for Clinical Investigation, Atlantic City, N.J. (P. Calabresi, Roger Williams General Hospital, Providence, R.I. 02908)

30-4. Environmental Progress in Science and Education, Inst. of Environmental Sciences, New York, N.Y. (Technical Program Committee, IES, 940 E. Northwest Highway, Mount Prospect, Ill. 60056.

30-4. Experimental NMR Conf., 13th, Pacific Grove (Monterey), Calif. (B. L. Shapiro, Dept. of Chemistry, Texas A&M Univ., College Station 77843)

#### May

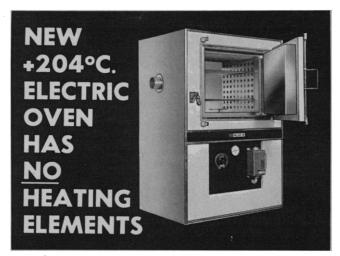
1. Society for Applied Anthropology, Montreal, P.Q., Canada. (T. Weaver, Dept. of Anthropology, Univ. of Arizona, Tucson 85721)

1-3. Rocky Mountain Bioengineering Symp., 9th, and Biomedical Sciences Instrumentation Symp., 10th, Instrument Soc. of America, Omaha, Neb. (Rocky Mountain Bioengineering Symp., Inc., P.O. Box 59, U.S. Air Force Acad., Colorado Springs, Colo. 80840)

1-3. Conference on Chemical and Molecular Lasers, St. Louis, Mo. (W. Q. Jeffers, McDonnell Douglas Research Labs., Dept. 223, Bldg. 34, St. Louis 63166)

1-3. Offshore Technology Conf., 4th annual, American Inst. of Mining, Metallurgical, and Petroleum Engineers, Houston, Tex. (A. R. Scott, AIMMPE, 345 E. 47 St., New York 10017)

1-4. Environmental Progress in Science and Education, Inst. of Environmental Sciences, New York, N.Y. (K. Dambach, IES, 940 E. Northwest Hwy., Mount Prospect, Ill. 60056)



#### (YOU CAN'T BUY A SAFER ONE)

No heating elements . . . no electrical controls . . . 100% proportional performance. Air movement generates heat . . . with no hot spots, no cold ones. No point in this oven can exceed the in-

cold ones. No point in this oven can exceed the indicated air temperature. Temperature rises simultaneously in all portions of the chamber. Heated environment inside the work chamber unaffected by external conditions. Ideal for hazardous applications, life-testing and other exacting work.

If you need a safe oven, send for this brochure. Write: Blue M Engineering Company, A Division of Blue M Electric Company; Corporate Headquarters: Blue Island, Illinois 60406.

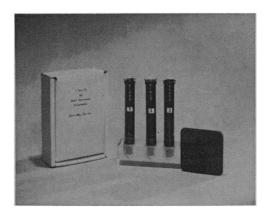


SEND FOR \*PERCTION-ARESTNO
INFORMATION \*Percent Product



Circle No. 101 on Readers' Service Card

#### **KLETT-SUMMERSON TEST KIT**



#### **NEW FROM KLETT**

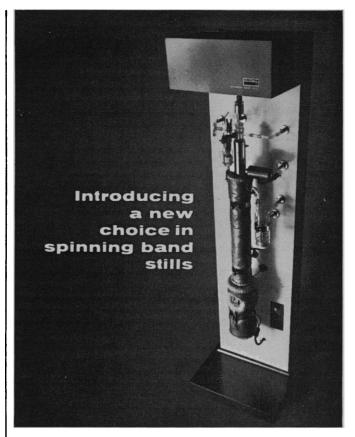
A Test Kit to check your Klett Summerson Colorimeter. Set consists of 3 Glass Standards and a Filter. There are no solutions to mix and the results are immediate.

#### 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.





The Kontes Spinning Band Micro Still—a greatly improved modification of the Piros-Glover\* spinning band still.

We've redesigned and repackaged a still of remarkable accuracy and convenience. And we've manufactured it to be shipped completely assembled and ready for operation!

The operating characteristics of this new Kontes still tell the story: Size of charge: 2 to 70 ml. Pressure range: Atmospheric to less than 1 mm. Hg absolute. Holdup: Using di-butyl phthalate, holdup was found to be between 0.5 and 0.7 ml. at normal boilup rates and a 1 mm. Hg absolute head pressure. Boilup rate: Varies from 20 to 100 ml/hr. Take-off rate: Rate is held below 2 ml/hr. for efficient fractionation. Efficiency to 155+ H.E.T.P. dependent upon boilup rate, rotor speed, and sample characteristics. Pressure drop: at a 40 ml/hr. boilup rate of di-butyl phthalate at 1 mm. Hg at the head, the pressure drop through the column is 1.5 mm. Hg.

And, since control is such an important aspect of precise fractionation, we've developed compact, solid-state controls for an air preheater, column jacket, and pot isolation chamber and pot.

The motor speed control—also solid state— is an integral part of the unit, as can be the direct reading pyrometer gage and the thermocouple switching junction. This junction allows monitoring of seven locations throughout the system.

For complete technical data, prices and information on accessories, write for Bulletin SBS-10, or contact your Kontes man.

\*As manufactured by our affiliate Kontes/Martin under patent #2,608,528



Regional Distributors: KONTES OF ILL., Evanston, III. . KONTES OF CALIF., Berkeley, Calif.

Circle No. 54 on Readers' Service Card

## The Brinkmann Gel Column

#### Slicing It Pretty Thin

It's a safe bet you won't find one in every household. Or in every labora-

every household tory. But if you of specialized an analysis of RN you have to ser acrylamide gels types think tl SLICER is th delicatessens. It figures.

How else can you cut a frozen gel column up to 10 cm long and 1 cm thick into flaw-

less slices of less than 1.0 mm, in increments of 0.1 mm, and leave the rest of the column undisturbed?

Cutting force and blade angle are adjustable for hard-frozen dilute gels, or softer, concentrated cylinders. Slices are easily collected for processing and scintillation counting.

Twenty cuts per minute. Foot switch leaves hands free. Electromagnetic counter keeps score on slices. Write for complete details.

#### How To Look Good, Fast.

Costs being what they are today, the guy (or gal) who can save a few dollars gets the hero medal. Here's a way to look good while you're looking good and fast (while you're rap-



idly scanning polyacrylamide gel columns optically, that is). Be the first to recommend purchase of the

VICON LINEAR GEL SCANNER—the attachment that fits right into your Zeiss PMQ II Spec. cell compartment without modification (and avoids costly instrument duplication).

It scans at 6 mm/min—even faster (25 mm/min) for coarser separations—in either direction. Resolution? Slit aperture is 100 u thin to catch those narrow bands. Columns to 10 x 100 mm can be handled. Wavelength is variable from 200 to 750 mu. And there are a host of options available to meet your specific needs. Want to scan fast? Want to look good? Get the details. Write:



i.C. n Instruments, Inc. : Road, , N.Y. 11590 7500)

n Instruments , Ltd. , Boulevard, Toronto), Ontario 1-5. American Psychiatric Assoc., Dallas, Tex. (W. E. Barton, 1700 18th St., NW, Washington, D.C. 20009)

2-5. Virginia Acad. of Science, Lexington. (B. M. Bruner, P.O. Box 8454, Richmond. Va. 23226)

mond, Va. 23226)

2-5. Titanium, 2nd intern. conf., American Soc. for Metals, Metallurgical Soc., and Inst. of Metals (London) (jointly), Cambridge, Mass. (H. M. Burte, Air Force Materials Lab. (LL), Wright-Patterson Air Force Base, Fairborn, Ohio 45433)

n Assoc. of University Prorleans, La. (B. H. Davis, Massachusetts Ave., NW, C. 20036)

n Assoc. for Cancer Renual, Boston, Mass. (H. J.) r Cancer Research, 7701 Philadelphia, Pa. 19111) ern Psychological Assoc., (Miss W. F. Hill, Dept. of thwestern Univ., Evanston,

al Medicine, 2nd intern. e, Switzerland. (2° Symp. le médecine biologique, ne 11, CH-1004 Lausanne)

4-7. Symbiosis in the Sea, Georgetown, S.C. (W. B. Vernberg, Belle W. Baruch Research Inst., Univ. of South Carolina, Columbia 29208)

0

5. Future Patterns in Health Care Delivery, Professional Group on Engineering in Medicine and Biology, Philadelphia, Pa. (Miss H. Yoman, IEEE Office, Univ. of Pennsylvania, Philadelphia 19104)

5-6. Minnesota Acad. of Science, Marshall. (M. I. Harrigan, MAS, 3100 38th Ave., S., Minneapolis 55406)

5-6. North Dakota Acad. of Science, Dickinson. (B. G. Gustafson, Div. of Continuing Education, Univ. of North Dakota, Grand Forks 58201)

5-6. Trace Elements in Our Environment, Wisconsin Acad. of Sciences, Arts & Letters, Stevens Point. (J. R. Batt, 5001 University Ave., Madison, Wis. 53705)

6. American Soc. for Clinical Nutrition, Atlantic City, N.J. (C. E. Butterworth, Jr., Univ. of Alabama School of Medicine, Birmingham 35233)

6-11. American Ceramic Society, Inc., 74th annual, Washington, D.C. (F. P. Reid, ACS, 4055 N. High St., Columbus, Ohio 43214)

7-12. Electronics Div., Electrochemical Soc., Houston, Tex. (H. Huff, Texas Instruments Inc., P.O. Box 5936, M/S 144, Dallas 75222)

7-12. Society of Photographic Scientists and Engineers, 25th annual (includes repeat of seminar on Novel Audio-Visual Imaging Systems), San Francisco, Calif. (R. H. Wood, SPSE, 1330 Massachusetts Ave., NW, Washington, D.C. 20005)

8-10. American Soc. for Quality Control, Washington, D.C. (R. W. Shearman, ASQC, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203)

8-11. Quantum Electronics Conf., American Inst. of Physics and Inst. of Electrical and Electronics Engineers, Montreal, P.Q., Canada. (Miss D. Edgar, Courtesy Associates, Suite 700, 1629 K St., NW, Washington, D.C. 20006)

8-12. Instrument Soc. of America, 13th natl. chemical and petroleum instrumenta-

## NEW SELF-DECONTAMINATING INCUBATOR



No need to be frustrated by bacteria and fungal spores in your incubator again! Hotpack's advanced CO2 Incubators offer built-in effective, rapid and practical decontamination of annoying vegetative bacteria and fungal spores...and with very little work by you. With built-in elevated humidity to 95% RH and temperature to 90°C, simply press the decontaminate control button and the work chamber is safe in minutes! Built-in moist air does the job where other incubators fail. Hotpack's unique blower and mechanical air convection system circulates the moist heat quickly and uniformly throughout the chamber.

Temperatures are controlled for incubation by a solid state, fully proportional controller with thermistor sensing within  $\pm 0.1$ °C! You get full power even after repeated door openings! An automatic safety thermostat prevents excessive temperatures and possible spoilage. The incubator features a built-in constant flow CO2 system that permits direct setting of tension from 0 to 20%, push button CO2 recovery, and a CO2 sampling port. The work chamber is constructed of rust-resistant stainless steel, including adjustable shelving. Write for complete information on Hotpack's new self-decontaminating incubators today: Hotpack Corporation, 5086 Cottman Ave., Phila., Pa. 19135 or call (215) 333-1700.



VISIT US AT FASEB BOOTHS A-121, 122, 123, 124

Circle No. 87 on Readers' Service Card

tion symp., Philadelphia, Pa. (W. A. Bajek, UOP Process Div., 30 Algonquin Rd., Des Plains, Ill. 60016)

9. Mycotoxins and Mycotoxicoses, Symp., Univ. of Missouri, Columbia. (Office of Conferences and Short Courses, 103 Whitten Hall, Univ. of Missouri, Columbia 65201)

9-12. International Symp. on Modeling Techniques in Water Resources, Ottawa, Ont. Canada (A. B. Biswas, Water and Renewable Resources Sector, Dept. of Fisheries and Forestry, Ottawa)

10-12. Federal Grants, Contracts, and Other Funding for Colleges, Universities, Hospitals, Nonprofit, and Other Institutions, Washington, D.C. (Fifth Inst., Natl. Graduate Univ., 1630 Kalmia Rd., NW. Washington, D.C. 20012)

10-13. German Röntgen Soc., 53rd congr., Stuttgart. (F. Heuck, Zentral-Röntgeninstituts des Katharinenhospitals der Stadt Stuttgart, 7000 Stuttgart 1, Kriegsbergstr. 60)

10-13. Society of Technical Writers and Publishers, Boston, Mass. (C. T. Youngblood, Suite 421, 1010 Vermont Ave., NW, Washington, D.C. 20005)

11-13. Radionuclide Carcinogenesis,

11-13. Radionuclide Carcinogenesis, 12th symp., Richland, Wash. (Mrs. J. A. Harrison, Biology Dept., Battelle, Pacific Northwest Lab., Richland 99352)

11-13. Symposium on X- and Gammaray Astronomy (joint IAW/COSPAR), Madrid, Spain. (R. Giacconi, American Science and Engineering, Inc., 955 Massachusetts Ave., Cambridge, Mass. 02139)

14-18. Radiation Research Soc., 20th annual, Portland, Ore. (R. J. Burke, Jr., RRS, 4211 39th St., NW, Washington, D.C.

14-19. American Radium Soc., Boca Raton, Fla. (J. M. Vaeth, ARS, 1600 Divisadero St., San Francisco, Calif. 94115)

15-17. American Inst. of Chemists, Niagara Falls, N.Y. (P. B. Slawter, Jr., AIC, 79 Madison Ave., New York 10016)

15-18. Symposium on Biochemistry of Gene Expression in Higher Organisms, Intern. Union of Biochemistry, Sydney, Australia. (J. W. Lee, Australian Biochemical Soc., CSIRO Wheat Research Unit, Private Bag, P.O. North Ryde, New South Wales 2113)

15-19. American **Industrial Hygiene** Assoc., San Francisco, Calif. (E. L. Schall, AIHA, 210 Haddon Ave., Westmont, N.J. 08108)

15-19. Society of Plastics Engineers, Chicago, Ill. (C. C. Campbell, SPE, 656 W. Putnam Ave., Greenwich, Conn. 06830)

16-18. Biting Flies and the Environment, Edmonton, Alta., Canada. (S. Mc-Iver, Dept. of Parasitology, School of Hygiene, Univ. of Toronto, Toronto 181, Ont., Canada)

16-18. Carbon and the Biosphere, Brookhaven Symp. in Biology No. 24, Upton, N.Y. (G. M. Woodwell, Dept. of Biology, Brookhaven Natl. Lab., Upton 11973)

16-18. Computer Conf., American Federation of Information Processing Societies, Inc., Atlantic City, N.J. (T. C. White, AFIPS, 210 Summit Ave., Montvale, N.J. 07645)

17-19. **Drug Information** Assoc., New York, N.Y. (J. J. Harris, Galloping Hills Rd., Kenilworth, N.J. 07033)



Circle No. 30 on Readers' Service Card

- 18. Memorial Symp. on Human Development and Reproductive Biology, Washington, D.C. (L. V. Leak, Dept. of Anatomy, College of Medicine, Howard Univ., 540 W St., NW, Washington, D.C. 20001)
- 18-19. Southern Textile Research Conf., American Assoc. of Textile Chemists and Colorists, Hilton Head Island, S.C. (A. Giamara, 59 Route 10, East Hanover, N.J. 07936)
- 21-24. Underground Transmission Conf., 1st, Pittsburgh, Pa. (Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)
- 21-25. Institute of Food Technologists, Minneapolis, Minn. (C. L. Willey, IFT, 221 N. LaSalle St., Chicago, Ill. 60601)
- 22-24. International Microwave Symp., Inst. of Electrical and Electronics Engineers, Inc., Chicago, Ill. (P. P. Toulios, IIT Research Inst., 10 W. 35 St., Chicago
- 23-26. Society for Experimental Stress Analysis, Cleveland, Ohio. (B. E. Rossi, 21 Bridge Sq., Westport, Conn. 06880) 25-26. Storage Polyglucosides, New
- York Acad. of Sciences, New York, N.Y. (J. F. Frederick, Research Labs., Dodge Chemical Co., Bronx, N.Y. 10469)
- 25-27. Mechanisms and Regulation of Craniofacial Morphogenesis, Nymegen, The Netherlands. (F. Van der Linden, Dept. of Orthodontics, Univ. of Nymegen, "Heyendael," Philips van Leydenlaan 25, Nymegen)
  - 28-2. National Conf. on Social Welfare,

99th, Chicago, Ill. (J. R. Hoffer, 22 W. Gay St., Columbus, Ohio 43215)

28-3. International College of Surgeons, 18th intern. biennial congr., Rome, Italy. (P. Stefanini, 1516 Lake Shore Dr., Chicago, Ill. 60610)

30-2. International Federation of Associations of Textile Chemists and Colorists, 9th congr., Munich, Germany. (Secretariat, 9th FATCC Congr., Rohrbacker Str. 76, D-6900 Heidelberg-1, Germany)

30-4. Space Simulation, Inst. of Environmental Sciences, New York, N.Y. (IES, 940 E. Northwest Highway, Mount Prospect, Ill. (60056)

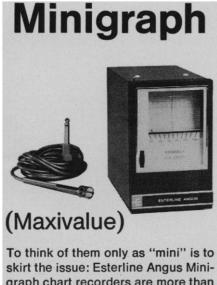
31-2. Endotoxin Conf., Warrenton, Va. (EC, Channing Lab., Boston City Hospital, Boston, Mass. 02118)

31-2. American Inst. of Industrial Engineers, Anaheim, Calif. (J. F. Jericho, AIIE, 345 E. 47 St., New York 10017)

- 1-2. Environmental and Water Resources Engineering Conf., Nashville, Tenn. (E. L. Thackston, Dept. of Environmental and Water Resource Engineering, Vanderbilt Univ., Nashville 37203)
- 1-2. Laboratory Animal Considerations in Toxicology and Related Disciplines, East Brunswick, N.J. (W. H. Mitchell, P.O. Box 130, New Britain, Pa. 18901)
- 1-3. Cancer Chemotherapy, natl. conf., American Cancer Soc. and Natl. Cancer Inst., New York, N.Y. (S. L. Arje, ACS, 219 E. 42 St., New York 10017)

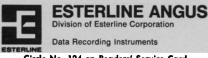
- 2. Endotoxin Conf., Warrenton, Va. (EC, Channing Lab., Boston City Hospital, Boston, Mass. 02118)
- 4-8. Special Libraries Assoc., Boston, Mass. (F. E. McKenna, SLA, 235 Park Ave. S., New York 10003)
- 4-8. Tissue Culture Assoc., Los Angeles, Calif. (R. H. Kahn, Dept. of Anatomy, Univ. of Michigan, Ann Arbor 48104)
- 4-9. Mass Spectroscopy and Allied Topics, American Soc. for Mass Spectrometry, Dallas, Tex. (F. E. Saalfeld, Naval Research Laboratory, Code 6110, Washington, D.C. 20390)
- 5-7. Natural Gas Research and Technology, 2nd conf., American Gas Assoc., Atlanta, Ga. (L. A. Sarkes, AGA, 1515 Wilson Blvd., Arlington, Va. 22209)
- 5-7. Intestinal Microflora, 2nd intern. symp., Columbia, Mo. (Conference Section, Continuing Medical Education, M-175 Medical Center, Columbia 65201)
- 5-7. American Physical Soc., Albuquerque, N.M. (W. W. Havens, Jr., APS, 335 E. 45 St., New York 10017)
- 5-8. Coastal Mapping Symp., American Soc. of Photogrammetry, Washington, D.C. (ASP, 105 N. Virginia Ave., Falls Church, Va. 22046)
- 5-8. United Nations Conf. on the Human Environment, Stockholm, Sweden. United Nations Headquarters, New York 10017)
- Pleasure, Reward, Preference: 5\_9. Their Nature, Determinants, and Role in Behaviour, NATO-sponsored symp., Elsinore, Denmark. (D. E. Berlyne, Dept.



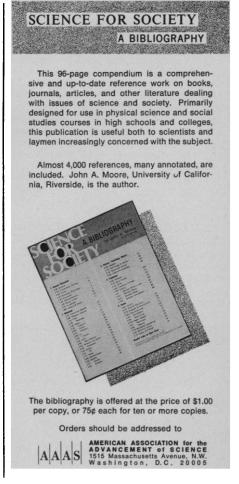


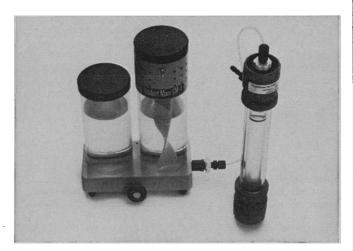
graph chart recorders are more than just small. They're good. And low cost (priced from \$99.50).

Analog or event, single channel or multi-channel. For industry, laboratory or field use. Find out about the Minigraphs maxiquick. Write Box 24,000, Indianapolis, Indiana 46224. Or call 317/244-7611.



Circle No. 124 on Readers' Service Card





## Which?

#### Ion Exchanger • Column • Gradient Mixer

#### **SEPHADEX® ION-EXCHANGERS**

Two anion exchangers and two cation exchangers cover the whole range pH 2—12. High capacities for proteins, polynucleotides and other biopolymers MW 1000—200,000 are ensured as each ion-exchanger type is available in two porosities. 1 gram protein can be fractionated on a 30 ml bed of DEAE-Sephadex A-50 using only 10 % of its available capacity.

#### **PHARMACIA COLUMNS**

Fast separations using columns of the K15 and K16 series exploit to the full the high capacities and superior resolution of Sephadex ion-exchangers. Columns K 16/20 and K 15/30 are particularly suitable for bed volumes up to 40 or 50 ml. Thermostat jacket and flow control valve are standard on the K16 columns.

#### **PHARMACIA GRADIENT MIXER GM-1**

The prime requirement for the production of linear ionic strength gradients is efficient mixing of the components of the gradient. In the Pharmacia Gradient Mixer GM-1 this is achieved by a blade configuration which lifts the dense incoming solution from the bottom of the mixing chamber and distributes it evenly throughout the whole eluant at a low stirring speed. Gradients in aqueous and most organic solvents can be formed with the GM-1.

Used together, Sephadex ion-exchangers and apparatus from Pharmacia Fine Chemicals provide practical chromatographic systems capable of the highest resolution in the ion-exchange chromatography of biopolymers.

Pharmacia Fine Chemicals Inc. 800 Centennial Avenue PISCATAWAY New Jersey 08854



Pharmacia (Canada) Ltd. 110 Place Crémazie, Suite 412, Montreal 11, P. Q.

Monuries quiside U.S.A. and Canada should be directed to PHARMACIA FINE CHEMICALS. Uppsala. Sweden.)

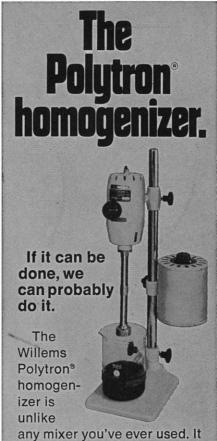
Circle No. 50 on Readers' Service Card



The new EU-801E Mini-Computer Interface allows owners of any PDP-8 family computer (with positive I/O bus) to take full advantage of their mini's capabilities...by allowing direct input of measurement data and output of processed data and control information. The 801E is ideal for interfacing a variety of digital instruments...designing complex dedicated interfaces...or just learning about interfacing. All connection points necessary for a functioning interface are readily available outside the computer: all signals required for any given data transfer operation are legibly and logically presented on the top of a plug-in card in the 801E ADD unit. Connection points on the card top include 12-bit digital inputs and outputs (Accumulator In, Accumulator Out and Buffered Memory Bus), three control lines, five timing lines and two status lines, And because the 801E is a patch system using positive-contact connectors and ordinary hook-up wire, there is no soldering. Simple data transfer circuits can be patched and tested in a few minutes. Signal modification and device control circuits can be quickly developed and refined. For detailed information on the new Heath/Schlumberger EU-801E Mini-Computer Interface, send coupon below for free brochure...and learn how you can turn your PDP-8 into a maxi-mini.

EU-801E System, 42 lbs. ......\$1250.00\*

EU-801E Interface with buffer
HEATH
Heath/Schlumberger Scientific Instruments Department 511-194. Benton Harbor, Michigan 49022
☐ I'm convinced and I need a maxi-mini now. Enclosed is \$
Name
Title
Company/Institution
Address
CityStateZip
*Mail Order price; F.O.B. Benton Harbor, Michigan EK-329



any mixer you've ever used. It works on a unique principle—kinetic plus ultrasonic energy. And it often succeeds where other instruments fail.

Homogenization by sound waves means that tissues are broken down quickly to subcellular level without destruction of enzyme activity. You'd be hard-pressed to do that with other kinds of mixers.

In the applications field, the Polytron has proved so effective in inducing physical and chemical change that it has already revolutionized many procedures. Whether it be for dispersing, homogenizing, emulsifying or disrupting, a Polytron is available in the size to meet your specific requirements.

Contact us if you have any questions. Both literature and a demonstration are available on request.



Brinkmann Instruments, Inc. Cantiague Road, Westbury, L. I., N.Y. 11590 Brinkmann Instruments (Canada), Ltd. 50 Galaxy Boulevard, Rexdale (Toronto), Ontario. of Psychology, Univ. of Toronto, Toronto 181, Ont., Canada)

5-9. Stratigraphy, Structure, and Evolution of the Northern Piedmont, Geological Soc. of America, Frederick, Md. (E. B. Eckel, GSA, P.O. Box 1719, Colorado Bldg., Boulder, Colo. 80302)

5-9. Thermionic Electrical Power Generation, 3rd intern. conf., jointly by European Nuclear Energy Agency and Intern. Atomic Energy Agency, Jülich, Germany. (P. von Handel, Kernforschungsanlage Jülich GmbH, D-5170 Jülich, Postfach 365, Germany)

6-10. Animal Reproduction, 7th intern. congr., Munich, Germany. (H. H. Messerschmidt, Arbeitsgemeinschaft, Deutscher Rinderzuchter, e V, Adenaurallee 176, 53 Bonn/Rh, Germany)

7-9. **Development Aspects of Vision**, 7th symp., Center for Visual Science, Rochester, N.Y. (J. L. Brown, CVS, University of Rochester, River Campus Sta., Rochester 14627)

7-10. American Rheumatism Assoc., Dallas, Tex. (Miss L. Bonfiglio, ARA, 1212 Avenue of the Americas, New York 10036)

8-9. Cellular Modification and Genetic Transformation by Exogenous Nucleic Acids, 6th Miles intern. symp., Baltimore, Md. (C. J. O'Donovan, Miles Labs., Inc., Elkhart, Ind. 46514)

8-10. International Assoc. for Cereal Chemistry, Vienna, Austria. (IACC, A-2320 Schwechat, Schmidgasse 3-7, Austria)

9-11. American Assoc. of Neuropathologists, Chicago, Ill. (E. P. Richardson, Jr., Neuropathology Lab., Massachusetts General Hospital, Boston 02114)

10-11. Animal and Human Conditioning: Techniques and Theories in Drug Abuse Research, Portland, Ore. (P. E. Blachly, Univ. of Oregon Medical School, Portland 97201)

11-15. Medical Library Assoc., Inc., San Diego-Coronado, Calif. (Mrs. H. B. Schmidt, MLA, 919 N. Michigan Ave., Chicago, Ill. 60611)

11-16. American Soc. of Medical Technologists, Minneapolis, Minn. (S. B. Friedheim, ASMT, Suite 1600, Hermann Professional Bldg., Houston, Tex. 77025)

12-14. Computers in the Undergraduate Curricula, Atlanta, Ga. (Southern Regional Education Board, 130 Sixth St., NW. Atlanta. Ga. 30313)

12-14. Improvement of the Capabilities of Small Research and Development Firms in a Declining R&D Environment, National Science Foundation/Small Business Administration Conf., Washington, D.C. (J. D. Johnson, Center for the Study of Private Enterprise, American Univ., Washington, D.C. 20016)

12-14. Society for Industrial and Applied Mathematics, 20th, Philadelphia, Pa. (H. B. Hair, SIAM, 33 S. 17 St., Philadelphia 19103)

12-14. American Neurological Assoc., 97th annual, Chicago, Ill. (S. A. Trufant, Cincinnati General Hospital, Cincinnati, Ohio 45229)

12-15. American Assoc. for the Advancement of Science, Pacific Div., Eugene, Ore. (R. C. Miller, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)

12-15. Immunology, 3rd intern. conf., Buffalo, N.Y. (N. R. Rose, Center for Immunology, Room 203, Sherman Hall, State Univ. of New York School of Medicine, Buffalo 14214)

12-16. Western Inst. of **Drug Problems**, Portland, Ore. (P. H. Blachly, Univ. of Oregon Medical School, Portland 97201)

12-16. Life Stress and Illness, NATO-sponsored symp., Beito, Norway. (E. K. E. Gunderson, Operational Psychiatry Div., Dept. of the Navy, Navy Medical Neuro-psychiatric Research Unit, San Diego, Calif. 92152)

12-17. International Federation of Automatic Control, 5th congr., Paris, France. (Meetings Officer, Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)

12-17. Health Physics Soc., 17th annual, Las Vegas, Nev. (J. S. Coogan, Environmental Protection Agency, Western Environmental Research Lab., P.O. Box 15027, Las Vegas 89114)

12-17. Pollution: Engineering and Scientific Solutions, 1st intern. conf., Soc. of Engineering Science (cosponsored by Environmental Protection Agency, National Oceanic Atmospheric Administration, and Washington Univ.) Tel-Aviv, Israel. (E. Y. Rodin, Dept. of Applied Mathematics, Washington Univ., St. Louis, Mo. 63130)

13-16. Canadian Federation of Biological Societies jointly with Canadian Soc. of Microbiologists, Quebec, P.Q., Canada. (D. T. Armstrong, Dept. of Physiology, Univ. of Western Ontario, London 72, Ont., Canada)

13-16. Simulation Conf., San Diego, Calif. (M. K. Horn, Cities Service Oil Co., P.O. Box 50408, Tulsa, Okla. 74150)

14-16. International Symp. on Metabolism and Membrane Permeability of Erythrocytes, Thrombocytes, and Leucocytes, Vienna, Austria. (K. Moser, Wiener Medizinische Akademie, Alserstrasse 4, 1090 Vienna)

14-17. American Medical Women's Assoc., Seattle, Wash. (Mrs. G. F. Conroy, AMWA, 1740 Broadway, New York 10019)

14-18. American Assoc. of Bioanalysts and California Assoc. of Bioanalysts (joint), Scottsdale, Ariz. (D. Birenbaum, AAB, 411 N. 7 St., St. Louis, Mo. 63101)

18-19. Soc. of Wood Science and Technology, Dallas, Tex. (E. L. Schoffer, SWST, P.O. Box 5062, Madison, Wis. 53705)

18-21. American Dairy Science Assoc., Blacksburg, Va. (C. Cruse, ADSA, 113 N. Neil St., Champaign, Ill. 61820)

18-22. International Congr. on **Lipids**, Göteborg, Sweden. (R. Marcuse, Intern. Soc. for Fat Research, Lipidforum, c/o SIK, FACK, S-400 21 Göteborg 16)

18-22. Association of Food and Drug Officials, 76th annual, Monticello, N.Y. (K. A. Silver, Room 700, 850 Third Ave., Brooklyn, N.Y. 11232)

18-22. American Medical Assoc., San Francisco, Calif. (L. W. Prang, Records Section, AMA, 535 N. Dearborn St., Chicago, Ill. 60610)

18-22. American Nuclear Soc., Las Vegas, Nev. (H. Coffer, CER Geonuclear Corp., P.O. Box 15090, Las Vegas 89114)

# unique

Packard introduces the new Model 419 Becker Gas Chromatograph with the exclusive lift-top oven. The entire analytical package-inlets, columns, detectorslifts up to give 360° eye level access for quick changing of columns or can be lifted off for rapid exchange of analytical systems. Large column oven with digital control of temperature parameters from -150°C to 500°C . . . a true proportional cryogenic attachment . . . and the unique multiflex injection system are only a few of the total flexibility features of the 419. And with every 419 comes Packard's world-wide sales and service organization. Write for additional information-request Bulletin 1168.



PACKARD INSTRUMENT COMPANY, INC. 2200 WARRENVILLE RD. . DOWNERS GROVE, ILLINOIS 60515 PACKARD INSTRUMENT INTERNATIONAL S. A. TALSTRASSE 39 8001 ZURICH, SWITZERLAND BUBSIDIARIES OF AMBAC INDUSTRIES, INC.



Circle No. 52 on Readers' Service Card

Years and years, thousands of installations helped build our line of environmental research chambers and rooms...

### get it all in minutes.

Sherer's file folder of specification sheets details all the information you need on the industry's most complete line of Controlled Environment Chambers. It also explains how we work with you on design, construction and installation of complete rooms. Write for it today.



ENVIRONMENTAL DIVISION, SHERER DUAL JET, Marshall 3, Michigan 49068

DIVISION OF KYSOR



INDUSTRIAL CORPORATION

Circle No. 56 on Readers' Service Card

209

MODEL 83-10

# Advanced osmometers for exact measurement of concentration in biological solutions

UNIQUE, SPECIFIC CLINICAL OR RESEARCH INSTRUMENT

**CLINICAL APPLICATIONS:** fluid therapy in shock and trauma, electrolyte imbalance, renal function and dialysis, ADH secretion, total body water, dehydration and other metabolic disturbances.

**RESEARCH APPLICATIONS:** water purity, column chromatography, fixative media, molecular weight, and physiological and biological experimentation.

**HOT-LINE® INFORMATION:** contact us for information or help with your application.

**CALL OR WRITE TODAY!** 



## ADVANCED INSTRUMENTS, INC.

1000 Highland Avenue / 617-449-3000 Needham Heights, Massachusetts 02194

Circle No. 104 on Readers' Service Card



### FREE TRIAL SUPPLY

EIN

See for yourself why Holtzman Rats are specified by more laboratories each year. They're the result of modern techniques in caesarian derivation, partial inbreeding, nutrition and animal husbandry.

All Holtzman Rats are air-shipped in close weight and age groups. Safe arrival and satisfactory quality guaranteed. Extra rats included in every order.

For your free trial supply, just fill out and mail coupon. Let us prove what we say.

Mail to:	Holtzman Comp P.O. Box 4068 Madison, Wisconsin		pt. S	
Air-Ship	me a complimentary	supply o	of the	Holtzman
Rat. I pre	efer	(type)		
Name		Title		
Institution_				
Address				
City	Sta	ite	Zip	)

Circle No. 109 on Readers' Service Card

THE
PSYCHIATRIC
PROGRAMMING
OF
PEOPLE:



Neo-Behavioral Orthomolecular Psychiatry

Pergamon General Psychology Series, Volume 25 1972 SBN 08-016791-8 \$7.75

H.L. Newbold, M.D., a New York psychiatrist, details an exciting new theory which engages behavior modification and psychochemicals, including megavitamin therapy, especially for the treatment of schizophrenia. Using a cybernetic model, Dr. Newbold cites cases which illustrate conditioning techniques and the use of drugs as corrective agents for stabilizing psychiatric patients with a variety of problems. Unlike other psychiatrists, he advocates treating the patient's "hardware" as well as his "software."

THE PSYCHIATRIC PROGRAMMING OF PEOPLE: Neo-Behavioral Orthomolecular Psychiatry is now available wherever good books are sold or direct from Pergamon Press.

#### PERGAMON PRESS, INC.

Maxwell House, Fairview Park, Elmsford, New York 10523

Circle No. 103 on Readers' Service Card





precision lathes • mills • grinders multipurpose and N/C equipment

write: American Edelstaal, Inc., Dept. KKD-2, 1 Atwood Avenue, Tenafly, N.J. 07670.

18-23. Clinical Chemistry, 8th intern. congr., Copenhagen, Denmark. (Secretariat, 8th Intern. Congr. of Clinical Chemistry, Rigshospitalet, Blegdamsvej 9, DK-2100, Copenhagen 8)

18-23. International Congr. of Endocrinology, 4th, Intern. Soc. of Endocrinology, Washington, D.C. (G. D. Aurbach, Section on Mineral Metabolism, Natl. Inst. of Health, Bethesda, Md. 20014)

18-24. Water Pollution Research, 6th intern. conf., Jerusalem, Israel. (Organizing Committee, 6th Intern. Conf. on Water Pollution Research, P.O. Box 16271, Tel Aviv, Israel)

19-21. Colloid Symp., 46th natl., Div. of Colloid and Surface Chemistry, American Chemical Soc., Amherst, Mass. (R. L. Rowell, Dept. of Chemistry, Univ. of Massachusetts, Amherst 01002)

19-21. American College of Preventive Medicine, San Francisco, Calif. (W. Bentley, 801 Old Lancaster Rd., Bryn Mawr, Pa. 19010)

19-21. Surface Properties and Surface States of Electronic Materials, Rolla, Mo. (W. J. James, Graduate Center for Materials Research, Space Sciences Research Center, Univ. of Missouri, Rolla 65401)

19-21. Watersheds in Transition, American Water Resources Assoc., Fort Collins, Colo. (T. G. McLaughlin, Water Resources Div., U.S. Geological Survey, Denver, Colo.)

19-22. Air Pollution Control Assoc., 65th annual, Miami Beach, Fla. (Public Relations Dept., APCA, 4400 Fifth Ave., Pittsburgh, Pa. 15213)

19-22. American Soc. for Engineering Education, Lubbock, Tex. (L. B. Williams, ASEE, Suite 400, 1 Dupont Circle, Washington, D.C. 20036)

19-22. American Vacuum Soc., Pittsburgh, Pa. (AVS, 335 E. 45 St., New York

19-23. Influence of Culture on Ergonomics, Oosterbeck, The Netherlands. (A. Chapanis, Dept. of Psychology, Johns Hopkins Univ., Baltimore, Md. 21218)

21-23. Experimental Medicine and Surgery in Primates, 3rd conf., Lyon, France. (J. Moor-Jankowski, LEMSIP, New York Univ. Medical Center, 500 First Ave., New York 10016)

21-23. Plastics in Packaging, Pullman, Wash. (R. A. V. Raff, Research Div., College of Engineering, Washington State Univ., Pullman 99163)

21-23. Role and Value of Measurement (jointly sponsored by American Soc. for Quality Control, Inst. for Electrical and Electronics Engineers, Instrument Soc. of America, Natl. Bureau of Standards, Natl. Conf. of Standards Labs., and Precision Measurements Assoc.), Boulder, Colo. (G. Goulette, 130 Academy Bldg., Univ. of Colorado, Boulder 80302)

22-23. Legal Aspects of Computerized Information Systems, intern. symp., Federal Council of Science and Technology, Washington, D.C. (J. H. Farmakides, Office of Science Information Services, COSATI, National Science Foundation, Washington, D.C. 20550)

22-24. American Assoc. of Physics Teachers, Albany, N.Y. (W. F. Johnson, AAPT, 1785 Massachusetts Ave., NW, Washington, D.C. 20036)

22-25. Optical Manufacturers Assoc., St. Louis, Mo. (Albert A. Kohler Co., Inc., 15 Wilmot Lane, Riverside, Conn. 06878)

22-28. Coordination Chemistry, 14th intern. conf. (sponsored by National Research Council of Canada and Chemical Inst. of Canada), Toronto, Ont., Canada. (C. J. L. Lock, Inst. for Materials Research, McMaster Univ., Hamilton, Ont.)

24-25. American Diabetes Assoc., Washington, D.C. (J. R. Connelly, ADA, 18 E. 48 St., New York 10017)

25-30. National Education Assoc., Atlantic City, N.J. (S. M. Lambert, NEA, 1201 16th St., Washington, D.C. 20036)

25-30. American Soc. for Testing Materials, 75th annual, Los Angeles, Calif. (H. H. Hamilton, ASTM, 1916 Race St., Philadelphia, Pa. 19103)

25-1. American Library Assoc., Chicago, Ill. (C. J. Hoy, ALA, 50 E. Huron St., Chicago, Ill.)

26-28. Institute of Navigation, West Point, N.Y. (R. E. Freeman, IN, Suite 832, 815 15th St., NW, Washington, D.C. 20005)

26-29. Law of the Sea: Needs and Interests of Developing Countries, 7th annual conf., Kingston, R.I. (Law of the Sea Inst., Univ. of Rhode Island, Kingston 02881)

26-29. American Assoc. of Physicists in Medicine, Philadelphia, Pa. (B. M. Galkin, Stein Research Center, 920 Chancellor St., Philadelphia 19107)

26-29. Society for the Study of Reproduction, 5th annual, East Lansing, Mich. (J. M. Yochim, Dept. of Physiology and Cell Biology, Univ. of Kansas, Lawrence 66044)

26-29. Weather Modification, 3rd conf., American Meteorological Soc., Rapid City, S.D. (R. A. Schleusener, Inst. of Atmospheric Sciences, South Dakota School of Mines and Technology, Rapid City 57701)

26-2. Radiation Commission, Intern. Assoc. of Meteorology and Atmospheric Physics, intern. symp., Sendai, Japan. (J. London, Univ. of Colorado, Boulder 80302)

27-30. Cheiron: The International Soc. for the Behavioral and Social Sciences, Calgary, Alta., Canada. (R. G. Weyant, Dept. of Psychology, Univ. of Calgary, Calgary 44)

27-30. International Study Group for Research in Cardiac Metabolism, 5th annual, Winnipeg, Man., Canada. (N. S. Dhalla, Dept. of Physiology, Faculty of Medicine, Univ. of Manitoba, Winnipeg

#### July

2-7. Environment, 36th annual conf., Natl. Environmental Health Assoc., New York, N.Y. (N. Pohlit, NEHA, 1600 Pennsylvania Ave., Denver, Colo. 80203)

5-8. Shock Tube Symp., 8th intern., London, England. (Symp. Secretary, Dept. of Aeronautics, Imperial College, Prince Consort Rd., London, S.W. 7)

6-8. RF Plasma Heating, American Physical Soc., Lubbock Tex. (M. O. Hagler, Dept. of Electrical Engineering, Texas Tech Univ., Lubbock 79409)



Lourdes' Beta-Fuge. You ought to look into it. Write Vernitron or contact your local dealer .... today. And you, too, will praise the Lourdes.



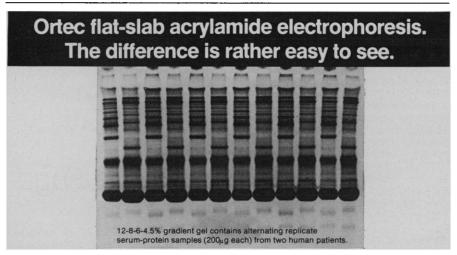
Vernitron Medical Products, Inc. Empire Blvd. & Terminal Lane, Carlstadt, N.J. 07072

# Revco is More than a freezer... It's a System.

You get more than dependable ULTra-low® temperature when you buy a Revco freezer. We adapt the freezer to your particular use through the proper accessories from our inventory control systems. Let us show you how Revco provides the total answer to your ULTra-low® temperature needs. Available in sizes from 1-1/2 to 25 cubic feet, including the standard 6.5, 9, 12 and 17 cubic foot sizes, in chest models and upright.



Circle No. 80 on Readers' Service Card



- 12 easily-compared samples sideby-side in the same gel slab, 24 samples per run.
- Precision glass cells maintain even cross-sectional field strength, bond firmly to gel to give far better results than plastic cells or round tubes.
- You can move from analytical to preparative separations without changing cells.
- Pulsed constant power controls heating—no need for external cooling, even when separating labile enzymes.
- No pH discontinuities required in unique Ortec electrochemical system.

- Ideal for isoelectric focusing and two-dimensional work.
- Separations can be easily watched taking place in clear Ortec tank unencumbered by cooling coils.

Write for Bulletin LS-100, which tells the whole story about really high-resolution electrophoresis. Ortec Incorporated, 110 Midland Road, Oak Ridge, Tenn. 37830; or phone (615) 482-4411. *In Europe:* Ortec Ltd., Dallow Road, Luton, Bedfordshire, England; or Ortec GmbH, 8 München 13, Frankfurter Ring 81, West Germany.



5326

Circle No. 94 on Readers' Service Card

- 9-12. Molecular Beams, 4th intern. symp., Cannes, France. (F. M. Devienne, Laboratoire de Physique Moléculaire des Hautes Energies, B.P.2 (06), Peymeinade, France)
- 9-14. American Malacological Union, Galveston, Tex. (A. S. Merrill, Biological Lab., Natl. Marine Fisheries Service, Oxford, Md. 21654)
- 9-14. Power Engineering Soc., San Francisco, Calif. (Meetings Officer, Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)
- 10-12. DNA Synthesis in vitro, 2nd annual Steenbock symp., Madison, Wis. (Mrs. M. Parker, Dept. of Biochemistry, 420 Henry Mall, Univ. of Wisconsin, Madison 53706)
- 10-14. Interaction of Radioactive Contaminants with the Constitutents of the Marine Envronment, Seattle, Wash. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)
- 10-14. Rarefied Gas Dynamics, 8th intern. symp., Stanford, Calif. (K. Karamcheti, Dept. of Aeronautics and Astronautics, Stanford Univ., Stanford 94305)
- 11-15. National Soc. of **Professional Engineers**, Denver, Colo. (P. H. Robbins, NSPE, 2029 K.St., NW, Washington, D.C. 20006)
- 16-20. American Veterinary Medical Assoc., New Orleans, La. (M. R. Clarkson, AVMZ, 600 S. Michigan Ave., Chicago, Ill. 60605)
- 16-28. Technology and the People, Inst. on Man and Science, Rensselaerville, N.Y. (G. A. Enk, IMS, Rensselaerville 12147) 17-21. Electron Probe Analysis Soc. of America, 7th natl. conf., San Francisco, Calif. (C. G. Cleaver, General Electric Co., Vallecitos Nuclear Center, Bldg. 105, Pleasanton, Calif. 94566)
- 18-21. Cyclotron Conf., 6th intern., Vancouver, B.C., Canada. (N. Brearley, Univ. of British Columbia, Vancouver 8)
- 18-21. Hormones, the Brain, and Behavior, 3rd intern. symp., Intern. Soc. of Psychoneuroendocrinology, London, England. (R. P. Michael, Inst. of Psychiatry, De Crespigny Park, Denmark Hill, London SE5 8AF)
- 19-21. **Defects in Semiconductors**, intern. conf., Reading, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London S.W.1, England)
- 19-22. Calorimetry Conf., 27th, Park City, Utah. (J. M. Sturtevant, Dept. of Chemistry, Yale Univ., New Haven, Conn. 06520)
- 23-28. Illuminating Engineering Soc., Tulsa, Okla. (P. C. Ringgold, IES, 345 E. 47 St., New York 10017)
- 24-30. Angiology, 8th intern. congr., Rio de Janeiro, Brazil. (D. F. M. Bunce, Dept. of Physiology, College of Osteopathic Medicine and Surgery, Sixth at Center, Des Moines, Iowa 50309)
- 26-31. Inter-American Meeting of Neuroradiology, Rio de Janeiro, Brazil. (A. Tomax Rezende, Caixa Postal 9031, ZC-02, Rio de Janeiro, Gb)
- 27-29. Intracranial Pressure, 1st intern. symp., Hannover, Germany. (M. Brock, Neurochirurgische Klinik, Medizinische Hochschule Hannover, 3 Hannover-Kleefeld, Roderbruchstrasse 101, Germany)