SCIENCE

23 October 1964
Vol. 146, No. 3643

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SUBMARINE BASALT

in **SCIENCE** as in other fields...

it's the record that counts!

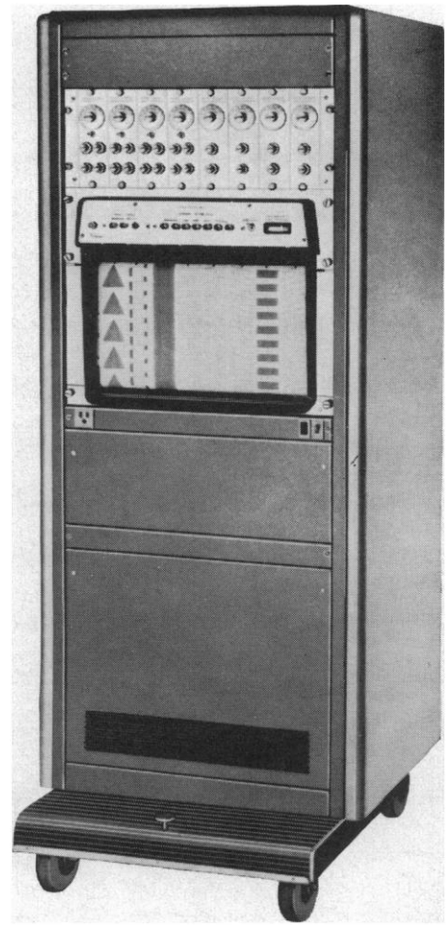
. . . and these high-performance direct writers produce records of such accuracy and clarity . . . with such ease of control and convenience . . . that you'll have to see to believe it!

Only *demonstration* does them justice. Ask to see —

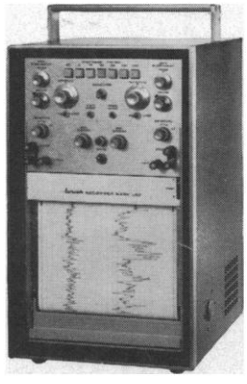
- The all-new solid state Brush Mark 200
- The *80-millimeter* high resolution Mark 280
- The Series 2300 — an *uncomplicated* light-beam recorder
- The Mark 10, new concept in potentiometric recorders

See pressurized ink recording in action . . . position feedback pen-control techniques that will not wear out . . . a complete line of functional preamplifiers, and other innovations that place recording instrumentation on a wholly new level.

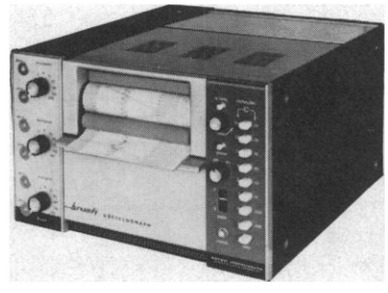
It's the record that counts. Write today for a demonstration.



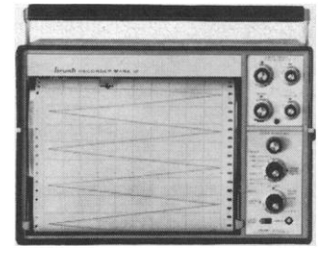
Recorder Mark 200, modular all-solid state design.



Compact Mark 280
—with 80 mm channels.
Doubled resolving power.



Series 2300 oscillograph—instant-start incandescent light source.

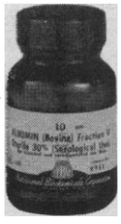


Mark 10 wide-channel potentiometric recorder—all solid state . . . even the ink!

brush INSTRUMENTS
DIVISION OF CLEVITE 37TH AND PERKINS, CLEVELAND 14, OHIO

Three purified blood proteins from NBC

Albumin (Bovine) Fraction V Sterile 30% (Serological Use)



Sterile isotonic powder (amber) purified electrophoretically. Serologically standardized for Rh procedures. NaCl 700-1000mgm % pH 6.9-7.1.

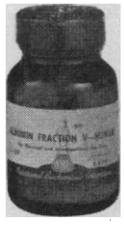
USES: 1. Rh antibody titrations. 2. Protein source in cross matching tests. 3. Diluent for many serological reagents.

PRICE SCHEDULE:

50 cc bottle	$11.40
6 x 50 cc bottle	9.69
12 x 50 cc bottle	9.12
1000 cc bottle	99.50
12 x 1000 cc bottle	95.00

Reference: Diamond and Denton, Jour. Lab. Clin. Med. 30, 821, (1945).

Albumin Fraction V Powder (for Microbiological Use)



Purity: Not less than 95% albumin of total protein content. Less than 6% moisture. Less than 0.5% ash. pH (1% solution) 7.0.

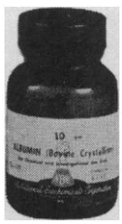
USES: 1. For increasing viscosity and protein content of Media. 2. Culture Media. 3. Diluent in Rh typing. 4. Separation of Leucocytes.

PRICE SCHEDULE:

5 kilo fibre drum . . . . . gram	$.25
1000 gram bottle . . . . . gram	.32
100 gram bottle . . . . . gram	.37
50 gram bottle . . . . . gram	.38
10 gram bottle . . . . . gram	.39

Reference: Cohn et.al., J.A.C.S, 68, 459, (1946).

Albumin, Bovine Crystalline



White powder form purity 100% by electrophoresis. Less than 4% moisture. Less than 0.5% ash. Less than 0.05% carbohydrates. Readily soluble at iso-electric point.

USES: 1. Antigen for immunological studies. 2. Bacteriological media. 3. Protein standard. 4. Viscosity of proteins. 5. Finding organic Ions. 6. Finding chloride Ions and moving boundary procedure. 7. Nutrient in tissue culture work. 8. Reagent in cancer studies, chloroquinone reaction work.

PRICE SCHEDULE:

100 grams . . . . . gram	$3.25
10 grams . . . . . gram	3.50
1 gram . . . . . gram	3.75

Reference: Cohn et. al., J.A.C.S, 60, 1753, (1947).

THE LITERATURE REFERENCES SHOULD NOT BE INTERPRETED AS EITHER AN ENDORSEMENT OR DISAPPROVAL OF THE BIOCHEMICAL BY THE CITED INVESTIGATOR.

PHONE COLLECT, 216-662-0212. NUTRITIONAL BIOCHEMICALS CORP. GUARANTEES SHIPMENT ON ANY OF OUR MORE THAN 3,000 RESEARCH BIOCHEMICALS WITHIN 60 MINUTES OF YOUR CALL. ONE DAY DELIVERY ANYWHERE IN CONTINENTAL U.S.A.

S

NUTRITIONAL BIOCHEMICALS CORPORATION

21010 Miles Avenue • Cleveland, Ohio 44128

Send for our free August 1964 catalog containing more than 3,000 items. Fill out coupon and mail today for your copy.

Name _____

Organization _____

Address _____

Citv _____ State _____

23 October 1964
Vol. 146, No. 3643

SCIENCE

LETTERS Cities in the Seas: *P. E. Cloud, Jr.*; Determinism: Bias and Complementarity: *C. B. Wooster* and *A. D. McLaren*; The Cultures on the Campus: *H. E. Young* and *J. Jeppson* 471

EDITORIAL Advice for Congress 475

ARTICLES Igneous Rocks of the East Pacific Rise: *A. E. J. Engel* and *C. G. Engel* 477

Infrared Spectroscopy and Catalysis Research: *R. P. Eischens* 486

Biomedical Science in Europe: *R. P. Grant, C. P. Huttrer, C. G. Metzner* 493

Churchill College—A Modern University College: *J. Cockcroft* 502

NEWS AND COMMENT Nobel Awards: Medicine and Physiology——British Elections: Labor Squeaks In—— Money for Science: NAS Studies——Politics: A Point of Difference——More Scientists for Johnson 504

BOOK REVIEWS *The Lower Tertiary Floras of Southern England*, reviewed by *J. Gray*; other reviews by *E. P. Volpe, C. A. Brown, G. B. Price, H. Jarrett, D. Montgomery, J. I. Tracey, Jr.* 510

REPORTS Interpretation of Ranger Photographs: *J. A. O'Keefe* 514

Carbonate Deposits and Paleoclimatic Implications in the Northeast Pacific Ocean: *Y. R. Nayudu* 515

Strontium Content and Variable Strontium-Chlorinity Relationship of Sargasso Sea Water: *F. T. Mackenzie* 517

Crystal Structure of Weddellite: *C. Sterling* 518

High-Pressure Polymorphs in the Silver Iodide Phase Diagram: *B. L. Davis* and *L. H. Adams* 519

Effect of Traces of Large Molecules Containing Nitrogen on Hydrogen Overvoltage: *W. Juda, M. S. Frant, D. N. Kramer* 521

SCIENCE is published weekly by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with T **Scientific Monthly**®. Second-class postage paid at Washington, D.C. Annual subscriptio $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 35¢. School year subscriptions: 9 months, $7; 10 months, $7.50. Provide 4 weeks' notice for chan of address, giving new and old address and zip numbers. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Semipermeable Microcapsules: *T. M. S. Chang* 524

Gene-Enzyme Relations in Histidine Biosynthesis in Yeast: *G. R. Fink* 525

Replication of the RNA of Bacteriophage R17: *M. L. Fenwick, R. L. Erikson, R. M. Franklin* 527

Amino Acids: Incorporation into α- and β-Chains of Hemoglobin by Normal and Thalassemic Reticulocytes: *J. D. Heywood, M. Karon, S. Weissman* 530

Human Wart Virus: In vitro Cultivation: *S. Oroszlan* and *M. A. Rich* 531

5-Bromodeoxyuridine: Effect on Myogenesis in vitro: *F. Stockdale* et al. 533

Enolase: Multiple Molecular Forms in Fish Muscle: *H. Tsuyuki* and *F. Wold* 535

Enzymatic Mechanism for the Escape of Certain Moths from Their Cocoons: *F. C. Kafatos* and *C. M. Williams* 538

Plant Damage Caused by Irradiation of Aldehydes: *I. J. Hindawi* and *A. P. Altshuller* 540

Spore Discharge Mechanism in Basidiomycetes: *L. S. Olive* 542

Infestation of the Copepod *Acartia tonsa* with the Stalked Ciliate *Zoothamnium: S. S. Herman* and *J. A. Mihursky* 543

Inducing Resistance to Freezing and Desiccation in Plants by Decenylsuccinic Acid: *P. J. C. Kuiper* 544

Potassium and Sodium Content of Tissues of Hamsters and Ground Squirrels during Hibernation: *J. S. Willis* 546

Nematode-Trapping Fungi: Evaluation of Axenic Healthy and Galled Roots as Trap Inducers: *D. W. Iffland* and *P. V. Allison* 547

Human Blood Group A_1 Specific Agglutinin of the Butter Clam *Saxidomus giganteus: H. M. Johnson* 548

Complex Visual Concept in the Pigeon: *R. J. Herrnstein* and *D. H. Loveland* 549

Comments on Reports: Circadian Leaf Movements in Bean Plants: Earlier Reports: *E. Bunning* 551

MEETINGS Magnetic Resonance in Biological Systems: *O. Jardetzky*; Estuaries: *G. H. Lauff*; Bacterial Structure and Replication: *R. M. Cole*; Subunit Structure of Proteins: *S. Lacks*; Forthcoming Events 552

DEPARTMENTS New Products 569

COVER

Submarine lava flow of pillowed, tholeiitic basalt erupted from the earth's mantle onto the west flank of the East Pacific Rise. This primary oceanic basalt contains much less potassium, uranium, and thorium than most other oceanic and continental basalts. Depth of water, 2400 meters. See page 477. [Fred Dixon]

J.T. Baker speeds delivery of reagent chemicals

No matter where you're located. You get fast delivery of 'Baker Analyzed' reagents. Check the page opposite for a list of distributors in your area. Specify 'Baker Analyzed' reagents on your next order and be sure of getting the finest reagent chemicals available. You'll also benefit from the personalized service of a laboratory supply representative. He's a good source of information on the latest laboratory chemicals and equipment.

J. T. Baker Chemical Co. J.T.Baker CHEMICAL **Phillipsburg, N. J.**

ALABAMA
E. H. Sargent & Co.
Birmingham
251-5125

ARIZONA
Van Waters & Rogers, Inc.
Phoenix
ALpine 4-6111
Van Waters & Rogers, Inc.
Tucson
793-9371

CALIFORNIA
E. H. Sargent & Co.
Anaheim
PRospect 2-3550
Van Waters & Rogers, Inc.
Los Angeles
269-9311
Van Waters & Rogers, Inc.
San Diego
262-0711
Van Waters & Rogers, Inc.
San Francisco
DElaware 4-2600
Van Waters & Rogers, Inc.
West Sacramento
FRontier 1-7600

COLORADO
Van Waters & Rogers, Inc.
Denver
388-5651

CONNECTICUT
Brand-Nu Laboratories, Inc.
Meriden
BEverly 5-7989

DISTRICT OF COLUMBIA
Henry B. Gilpin Co.
Washington
567-4500
J. T. Baker Chemical Co.
Muirkirk, Md.
776-7434

FLORIDA
W. H. Curtin & Co.
Jacksonville
ELgin 5-5426

GEORGIA
W. H. Curtin & Co.
Atlanta
355-6944
Will Scientific Inc. (Ga.)
Atlanta
874-3872
Estes Surgical Supply Co.
Atlanta
JA 1-1700

HAWAII
Van Waters & Rogers, Inc.
Honolulu
50-7431

ILLINOIS
A. Daigger & Co.
Chicago
644-9438
LaPine Scientific Co.
Chicago
735-4700
E. H. Sargent & Co.
Chicago
SPring 7-2700
Schaar Scientific Co.
Chicago
NAtional 5-7000
Scientific Glass App. Co., Inc.
Elk Grove Village
HEmpstead 9-2500
Stansi Scientific Co.
Chicago
276-8737
Wilkens-Anderson Co.
Chicago
EVerglade 4-4433

INDIANA
Curtis & French, Inc.
Indianapolis
WAlnut 6-5301

KENTUCKY
Preiser Scientific, Inc.
Louisville
636-3307
Steidle Chemical Co., Inc.
Louisville
583-3183

LOUISIANA
W. H. Curtin & Co.
New Orleans
524-0475

MARYLAND
Will Scientific Inc. (Md.)
Baltimore
DIckens 2-4850

MASSACHUSETTS
Doe & Ingalls, Inc.
Everett
617-4610
Hampden Color & Chem. Co.
Springfield
RE 2-2112
Howe & French, Inc.
Boston
426-5910
Macalaster-Bicknell Co., Inc.
Sub. of Will Scientific, Inc.
Cambridge
547-6933

MICHIGAN
Eberbach & Son Co.
Ann Arbor
662-5634
Haviland Products Co.
Grand Rapids
EMpire 1-6691
E. H. Sargent & Co.
Detroit
WEbster 1-0337

MINNESOTA
Lerlab Supply Co.
Hibbing
AMherst 2-3456
Physicians & Hosp. Supply Co.
Scientific & Laboratory Div.
Minneapolis
333-5251
Geo. T. Walker & Co.
Minneapolis
333-3343

MISSOURI
Kansas City Lab. Supply Co.
Kansas City
JEfferson 1-7745

NEW JERSEY
J. & H. Berge, Inc.
S. Plainfield
757-8100
Macalaster Bicknell Co.
Millville
825-3222
Para Lab. Supply Co.
Trenton
TUxedo 2-4545
E. H. Sargent & Co.
Springfield
DRexel 6-7050
Scientific Glass App. Co., Inc.
Bloomfield
748-6600
Seidler Chem. & Supply Co.
Newark
MArket 2-4495

NEW MEXICO
Van Waters & Rogers, Inc.
Albuquerque
344-3407

NEW YORK
Albany Laboratories, Inc.
Albany
434-1747
Amend Drug & Chem. Co., Inc.
New York
MUrray Hill 3-1142
Collier Chemicals, Inc.
Binghamton
723-5455
Greiner Scientific Corp.
New York
WOrth 6-4700
LaPine Scientific Co.
Irvington-on-Hudson
LYric 1-8900
New York Lab. Supply Co.
New York
CAnal 6-6504
Will Scientific of Buffalo, Inc.
Buffalo
885-6383
Will Scientific of N.Y.C., Inc.
New York
CYpress 4-3000
Will Scientific, Inc.
Rochester
BRowning 1-8200

NORTH CAROLINA
Carolina Biological Supply Co.
Burlington
584-8801

OHIO
Chemical Rubber Co.
Cincinnati
771-8192
Chemical Rubber Co.
Cleveland
781-8330
K & L Scientific Co.
Columbus
CApitol 8-5527
Rigby Scientific Co.
Toledo
882-2028

OKLAHOMA
W. H. Curtin & Co.
Tulsa
LUther 5-5757
Melton Company, Inc.
Oklahoma City
CEntral 5-7481

OREGON
Scientific Supplies Co.
Div. of Van Waters
& Rogers, Inc.
Portland
CApital 2-1721

PENNSYLVANIA
Arthur H. Thomas Company
Philadelphia
MArket 7-5600
Bellevue Surgical Supply Co.
Reading
376-2991
Edward P. Dolbey & Co., Inc.
Philadelphia
EVergreen 2-6100
J. T. Baker Chemical Co.
Pittsburgh—Penn Hills
371-5488
Scientific Equipment Co.
Philadelphia
BAring 2-5655

PUERTO RICO
H. V. Grosch Co.
San Juan

TENNESSEE
Fillauer Surgical Supplies, Inc.
Chattanooga
267-1161

TEXAS
W. H. Curtin & Co.
Dallas
RIverside 7-2503
W. H. Curtin & Co.
Houston
WAlnut 3-1661
E. H. Sargent & Co.
Dallas
FLeetwood 2-8411

UTAH
Van Waters & Rogers, Inc.
Salt Lake City
DAvis 8-1112

VIRGINIA
Phipps & Bird, Inc.
Richmond
MIlton 4-5401

WASHINGTON
Scientific Supplies Co.
Div. Van Waters & Rogers, Inc.
Seattle
MUtual 2-3460

WEST VIRGINIA
Preiser Scientific, Inc.
Charleston
343-5515
Will Scientific Inc. (W. Va.)
S. Charleston
POplar 8-1281

WISCONSIN
Roemer-Karrer, Inc.
Milwaukee
271-0468

CANADA

EDMONTON, ALBERTA
Canadian Lab. Supplies, Ltd.
454-6514
Van Waters & Rogers of
Canada, Ltd.
454-1577

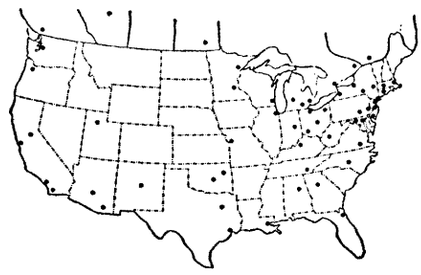
MONTREAL, QUEBEC
Canadian Lab. Supplies, Ltd.
748-8773

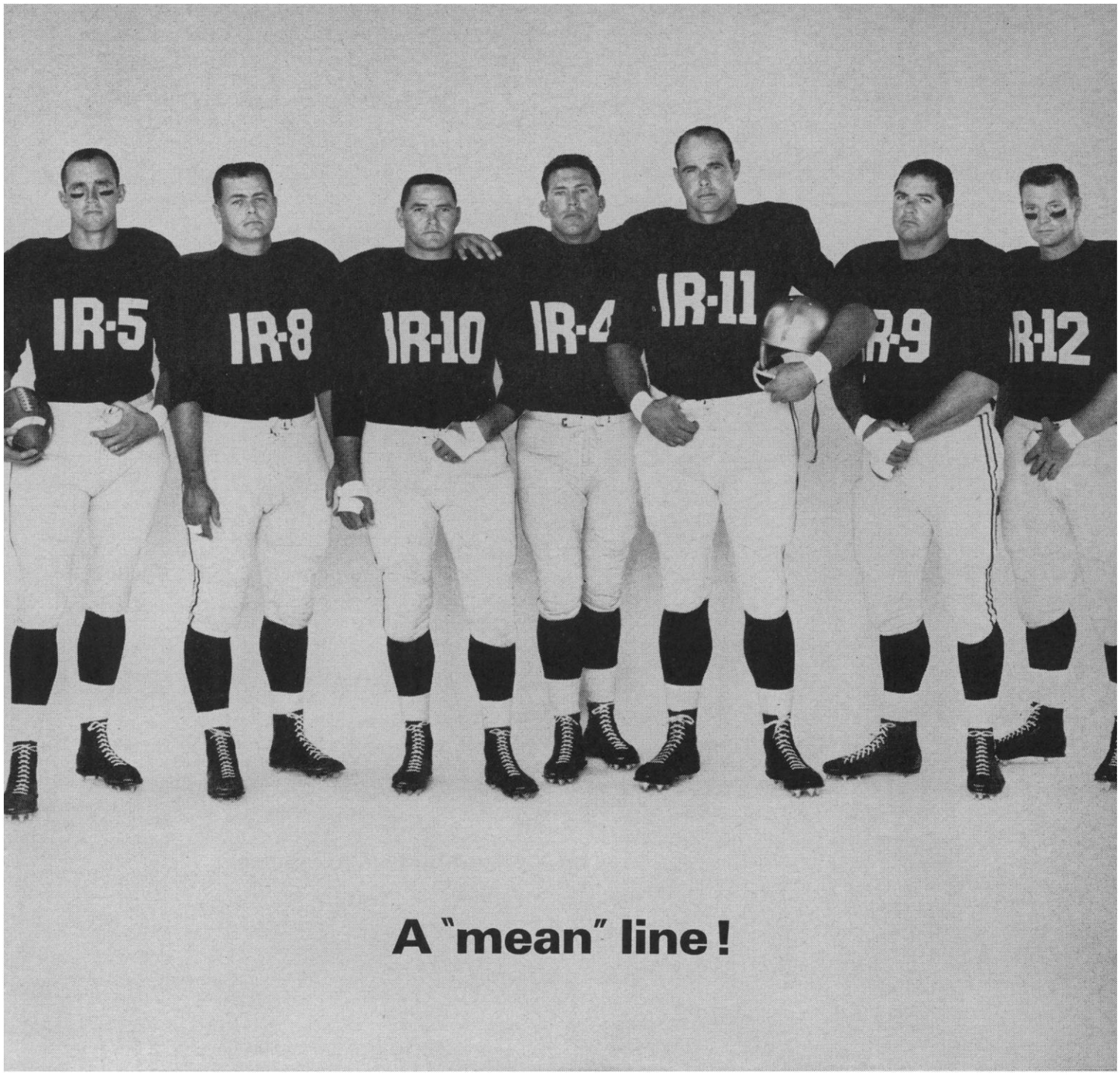
OTTAWA, ONTARIO
Canadian Lab. Supplies, Ltd.
729-5183

TORONTO, ONTARIO
Canadian Lab. Supplies, Ltd.
Toronto
255-5501

VANCOUVER, B. C.
Canadian Lab. Supplies, Ltd.
682-4291
Van Waters & Rogers of
Canada, Ltd.
HEmlock 3-0521

WINNIPEG, MANITOBA
Canadian Lab. Supplies, Ltd.
SPruce 4-1945





A "mean" line!

Beckman fields a rugged, dependable line.

It's tough to beat seven all-star infrared spectrophotometers. They take all the punishment you care to give, and still deliver with speed and precision.

No matter how you judge performance, Beckman IR spectrophotometers are winners. They work harder for more seasons – and with greater precision. All have flatbed recorders for wide range, single-chart spectra, with faster, easier operation.

The line is backed up by direct sales and service people, ready to serve within 24 hours through 42 local offices. Beckman application and engineering people have been coached to solve your specific IR problems, quickly.

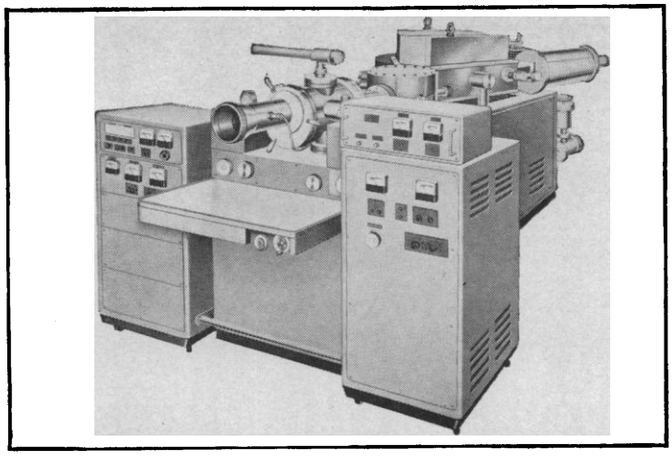
There's a Beckman IR spectrophotometer to match every requirement. For extremely high resolution with double-beam accuracy the familiar IR-4 and IR-9 or the wide range IR-12 are your choice. For double-beam performance to explore the far infrared to 300 microns it's the champion IR-11. For routine investigations or quality control at low cost you can't beat the IR-5A, the IR-8, or the IR-10.

Get to know these seven all-Americans better. Ask your local Beckman Sales Engineer or write for Data File LIR-165.

Beckman INSTRUMENTS, INC.

SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA • 92634

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA



mass

High Resolution (M/ Δ M)
Spark Ion Source — 5,000
Electron Bombardment Ion Source — 20,000

The JEOL (Japan Electron Optics Laboratory Co.) Double Focusing Mass Spectrometer, JMS-01U is an unconventional Mattauch type instrument. It features, in one instrument, the use of either or both types of ion sources — spark and electron bombardment, and either or both detection methods — photographic and electrical. This flexibility allows high resolution analysis of metals and semiconductor impurities and high molecular weight organic structures. The basic analyzer tube is very easily adjustable through a unique mechanism for ion beam focusing and intensity control to attain exceptionally high resolution, sensitivity and reproducibility. Direct sample inlet and reservoir type heated inlet systems are optionally available as well as a peak matching device and emission outlet. Specially designed and convenient front panel controls assure simple operation. JEOLCO (U.S.A.), Inc. has established a fully staffed servicing network in the United States to provide technical assistance and assure continuous trouble-free service. For complete technical and sales information please call or write JEOLCO (U.S.A.), Inc., 461 Riverside Avenue, Medford, Massachusetts 02155, telephone 396-6241, area code 617.

JEOLCO

New pasteurized animal diets . . .

Purina® PUR-PAK™ Chows

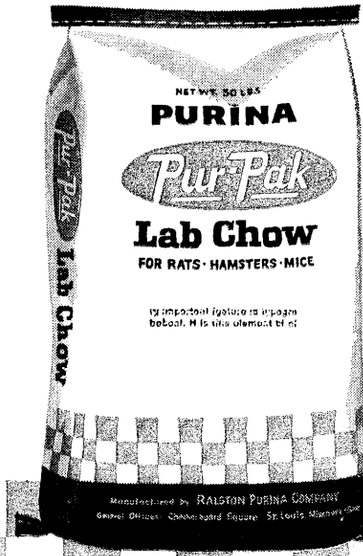
This man is no astronaut. He's wearing a "space suit" to prevent contamination of the new pasteurized diets, Purina Pur-Pak Lab Chow and Purina Pur-Pak Mouse Breeder Chow.

These Chows are formulated with very high vitamin levels, then pressure processed to eliminate potentially harmful microorganisms.

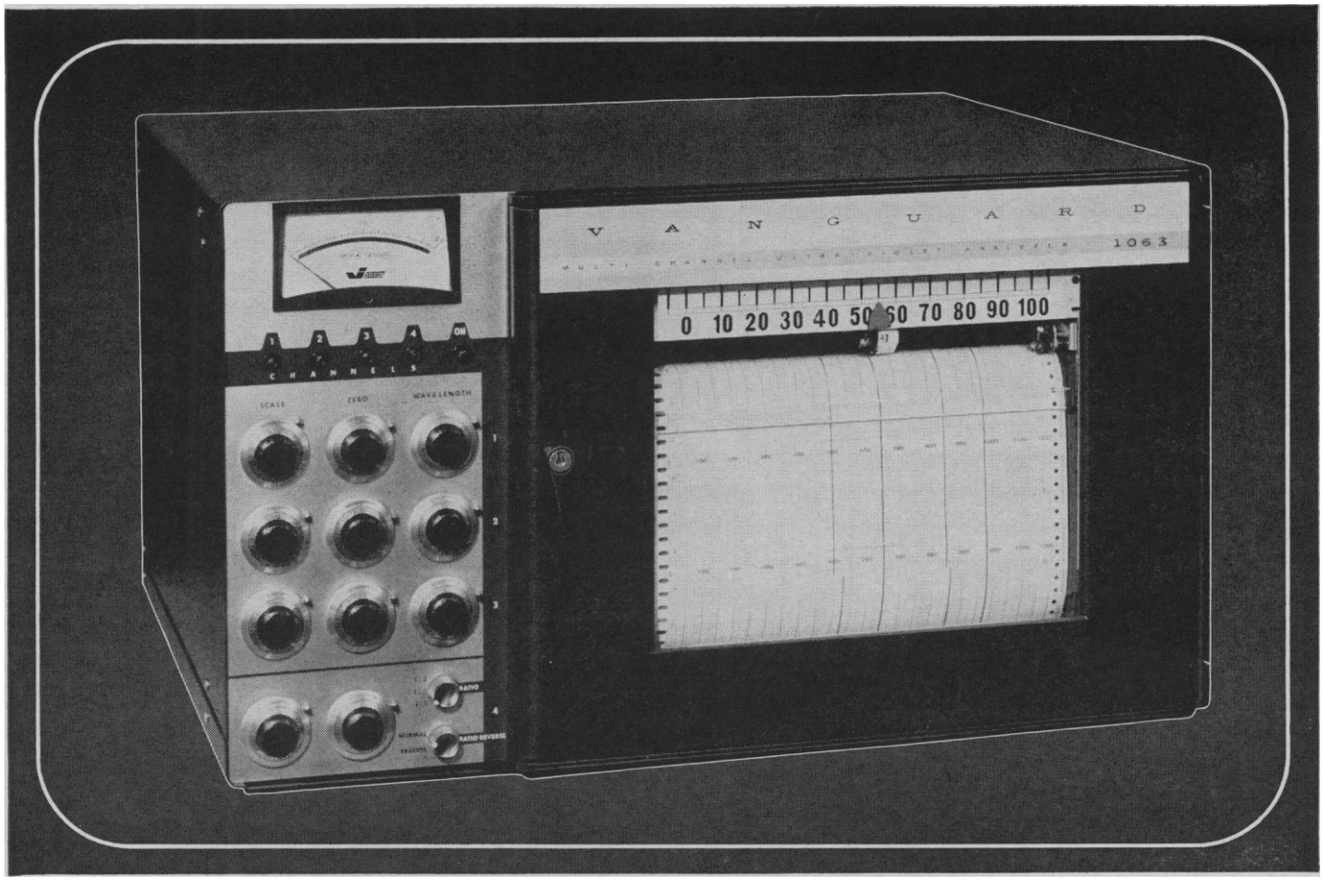
They are double heat sealed in plastic bags within a sanitary room, then protected with multi-wall paper.

These diets provide you a new measure of nutritional and bacteriological control in critical laboratory animal experiments.

They are available from your Purina dealer or salesman. Call them or write Mr. H. A. Graff, Ralston Purina Company, Checkerboard Square, St. Louis, Missouri, for prices, samples and further information.

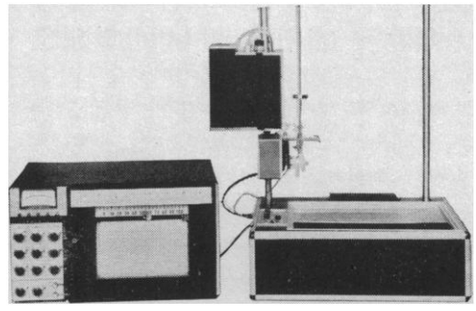


PURINA . . . world's leading manufacturer of laboratory animal diets



new automatic multi-channel ultra-violet analyzer (od)

Vanguard's Model 1063 Automatic Multi-Channel Ultra-Violet Analyzer provides the investigator with heretofore unavailable versatility. This instrument presents a recording of the optical density of the effluent from a chromatographic column at three different wavelengths. In addition, it provides a recording of the ratio of the optical density of the effluent at two of these wavelengths. Two of Vanguard's logarithmic converters are used in each channel to provide a recording linear with optical density. The ratio is recorded as the logarithm to provide a compact scale. ■ Space-saving design—Model 1063 measures only 27¾″ wide, 15½″ high and 21¼″ deep ■ Precision plane diffraction grating monochromator of highest quality ■ Matched quartz cuvettes designed for minimum hold-up and mixing ■ Completely transistorized for dependable, maintenance-free operation ■ Detection system completely self-contained and light-shielded.



Model 1063 with Model 1011 Automatic Fraction Collector. Model 1063 is compatible with all Fraction Collectors.

All these features plus many others provide the investigator with complete information on every elution. For specifications on the Model 1063 Multi-Channel Ultra-Violet Analyzer (and the Model 1011 Fraction Collector shown at left), send for new informative brochure. For immediate information and/or a quotation, call your nearest Vanguard office.

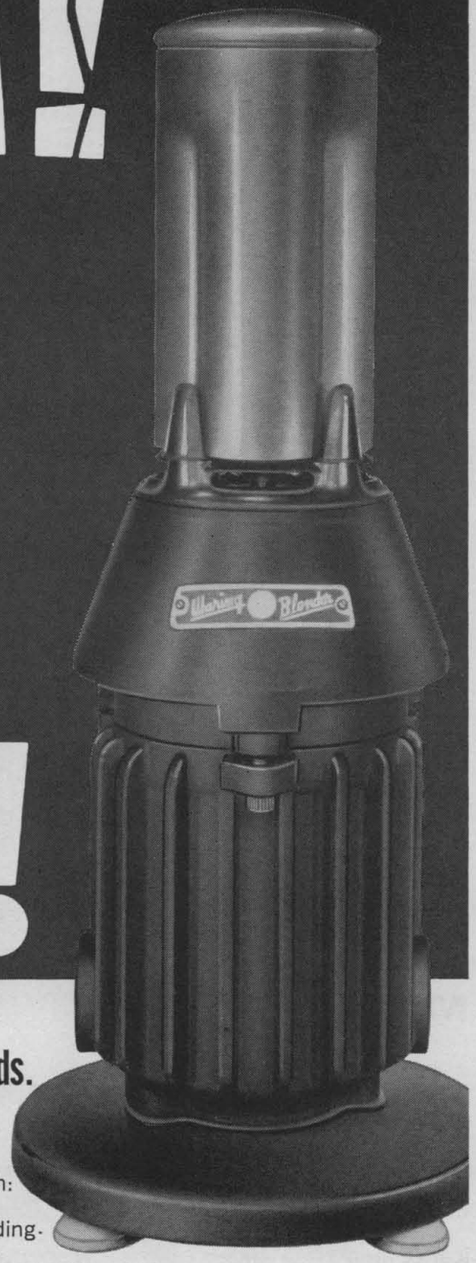
VANGUARD INSTRUMENT CORPORATION
subsidiary of
TECHNICAL MEASUREMENT CORPORATION

Designers and Manufacturers of Precision Instrumentation for Research • P. O. Box 244, LaGrange, Illinois 60526, FL 2-1600

New York, 103 Park Ave., Suite 1204, TN 7-1998 • Boston, 1156 Broadway, Somerville, 491-4589
San Francisco, 115 New Montgomery St., EX 2-0511 • Baltimore, 217 North Calvert St., 727-3666
Houston, 1213 Capitol Ave., CA 5-5757 • Los Angeles, 9460 Wilshire Blvd., Suite 414, Beverly Hills, 275-3567

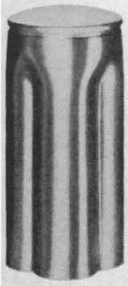
BOOM!

NEVER!



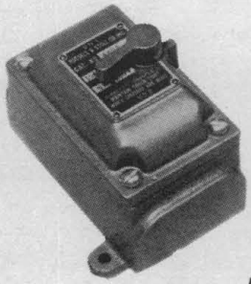
Waring's Explosion-Proof Blendor Base* Protects You in Hazardous Atmospheres or when Blending Hazardous Compounds.

This is the only Blendor Base for use in blending explosive materials. It is the only Blendor Base for use in areas where gases, vapors or particles are found in explosive quantities. Because exposed motor arcing is eliminated, the Waring Explosion-Proof Blendor Base can be operated safely in atmospheres permeated with: Acetone/Methyl Alcohol/Benzene/Petroleum/Ether/Natural Gas/Butane/Propane/ Gasoline/Naptha. The powerful 2-speed lifetime lubricated motor gives total blending of all volatile substances quickly, efficiently, safely. Ask your supplier about the Waring Explosion-Proof Blendor. Your lab — and your life — may depend on it. **$289.00** No. EP-1



STAINLESS STEEL CONTAINER NO. SS510

Made from 302 Stainless to assure greater durability and chemical resistance. Surgical steel blending blades. **$24.95**



EXPLOSIVE-PROOF SWITCH NO. EPS-2

- Specially designed unit for 2-speed operation.
- May be connected via conduit for remote control of Explosion-Proof Blendor Base. **$29.95**

Please write for full specifications or for answers to any questions you may have.

WARING PRODUCTS CO.
Division of
DYNAMICS CORPORATION of AMERICA

WINSTED, CONN.

*Shown with SS510 Stainless Steel container

MORE THAN DEPENDABILITY

Next to dependability, time is the most important element in modern laboratory practice. To help make your time most productive, Brook diagnostic aids and chemical reagents are easier for you to order and easier for you to identify in use. Complete information is included in this simplified Brook catalog along with useful conversion and reference tables — and a cross reference of clinical instrument procedure manuals. It's yours on request from your Aloe Scientific Representative or send coupon.

ALOE SCIENTIFIC *Serving the Sciences that Serve Mankind*

For your FREE copy . . .

Clip and mail to
Aloe Scientific ® Division of Brunswick
1831 Olive Street, St. Louis 3, Mo.

Name_____

Title_____

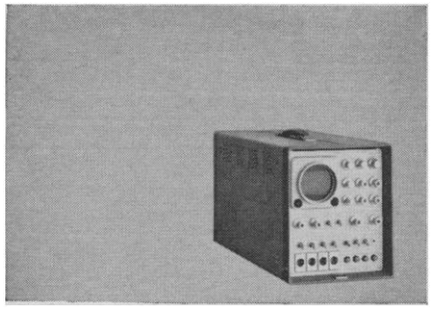
City_____

State_____

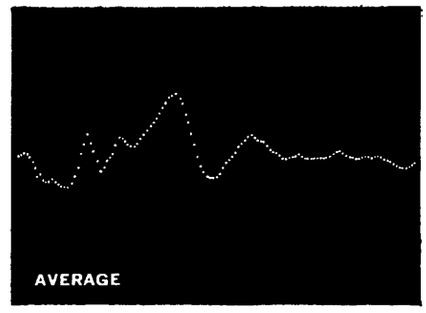
SC-10

Here is a data processing system designed to grow with your research needs

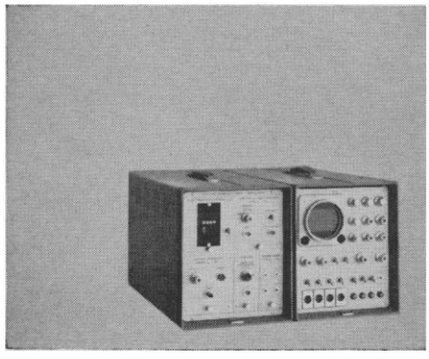
Start with a Computer of Average Transients . . .



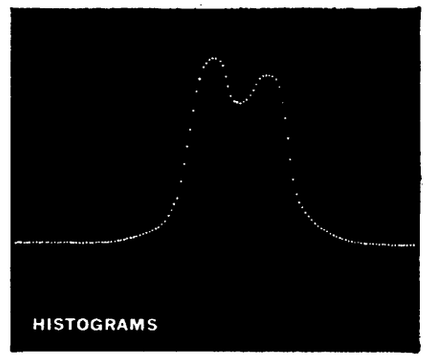
Four years of successful application of the Mnemotron 400B CAT (Computer of Average Transients) in neurophysiology, cardiology, ophthalmology and other biology research laboratories has established the versatility and reliability of this multi-purpose digital computer. Its circuitry derives and accumulates data from a succession of responses masked by random activity or background, and provides CRT display or output in analog or digital form for permanent record or further processing by general purpose computers.



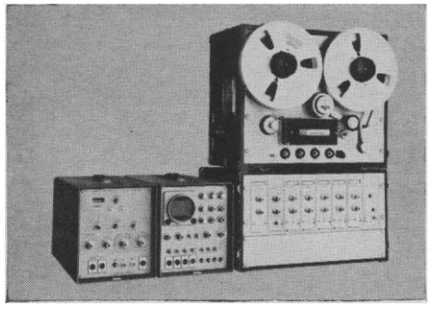
Add on units as statistical needs develop . . .



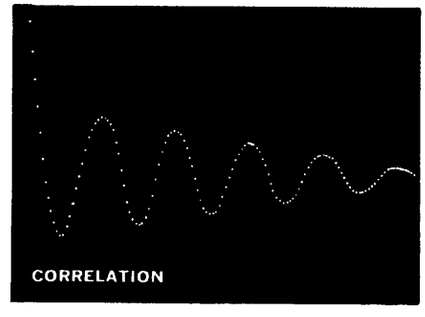
Automatically processing quantities of data gives fresh insights into evoked potentials in neurophysiological studies, electrocardiography, pupillography and numerous other biological investigations. Such increased understanding suggests new approaches, thus requiring further statistical analysis of the data. The 522 Resolver/Integrator and 600 Series units can be added to expand CAT capabilities to compute Histograms of wide variety. Interspike intervals, action potential firing rates, P-R-T amplitude distributions, reaction time distributions, spontaneous firing rates — suggest a few of the studies implemented by these added capabilities.



Add further data handling capability . . .



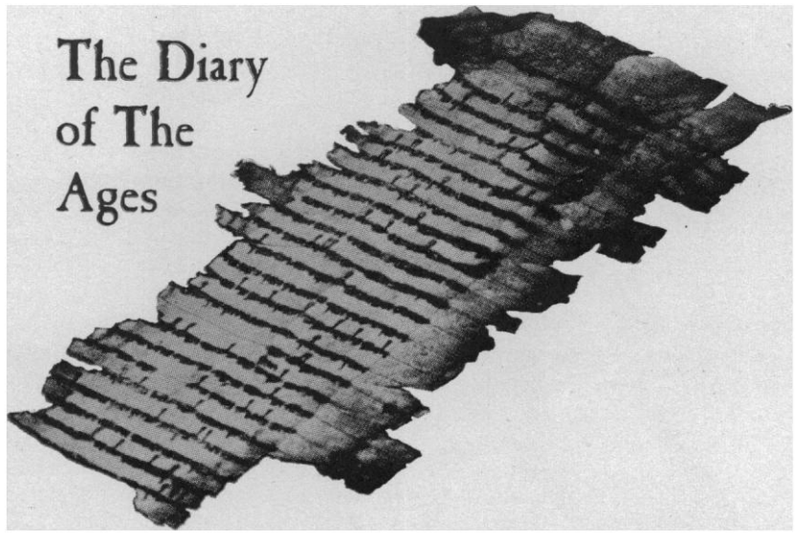
Occasionally, experimental conditions indicate information could be gained from autocorrelation of successive signals or cross-correlation of two related signals. Addition of the COR 256 makes these capabilities available. Further, recording the experimental data on magnetic tape can add several dimensions to the data reduction system. The TMC 700/1400 Magnetic Tape Recorder Systems can record up to 14 channels of experimental data for subsequent processing by the CAT, or for storage of data accumulated in the CAT memory.

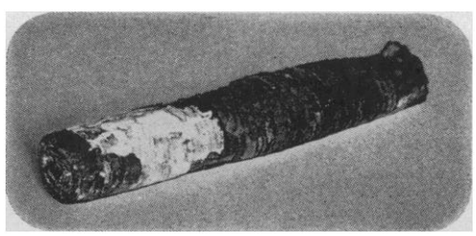


A new 30-page brochure describing the CAT and its associated accessories has just been published. It contains specifications, suggested applications, theory of operation and a bibliography of over 50 representative references. A free copy is available on request. You may also wish to take advantage of the broad experience of our application engineers who will welcome an inquiry about your specific application. Write Technical Measurement Corporation, 441 Washington Avenue, North Haven, Connecticut.

TMC **TECHNICAL MEASUREMENT CORPORATION**

See us at the American Heart Association Meeting, booth 29, Atlantic City, October 23-28 or at the IEEE 11th Nuclear Science Symposium, October 28-30, Philadelphia, Pa.





Photographs of Dead Sea Scrolls courtesy of The Christian Science Monitor.

The Model 560 series Carbon Dating Laboratory

is a compact system of proven reliability for dating finds of organic origin in archaeological, geological, and climatological studies. The sample is converted to methane, which is used as the counting gas.

This proven carbon dating system, pioneered and perfected by Radiochemistry, Inc. using Baird-Atomic, Inc. electronics, is the authoritative method for establishing the age of the artifact-signposts in the development of man. It can fix the dates of world-wide climatic changes as well as recent geologic events. The reliability of the Carbon-14 dating method is well established.

The Radiochemistry/ Baird-Atomic system offers in one compact, self-contained console an easily operated, efficient laboratory. After the brief on-site training period which we provide for your personnel, they can achieve a speed of operation which permits several dates to be determined per week. Good shielding is provided to minimize the background problem. The all-transistorized electronic equipment can accommodate a variety of detector sizes.

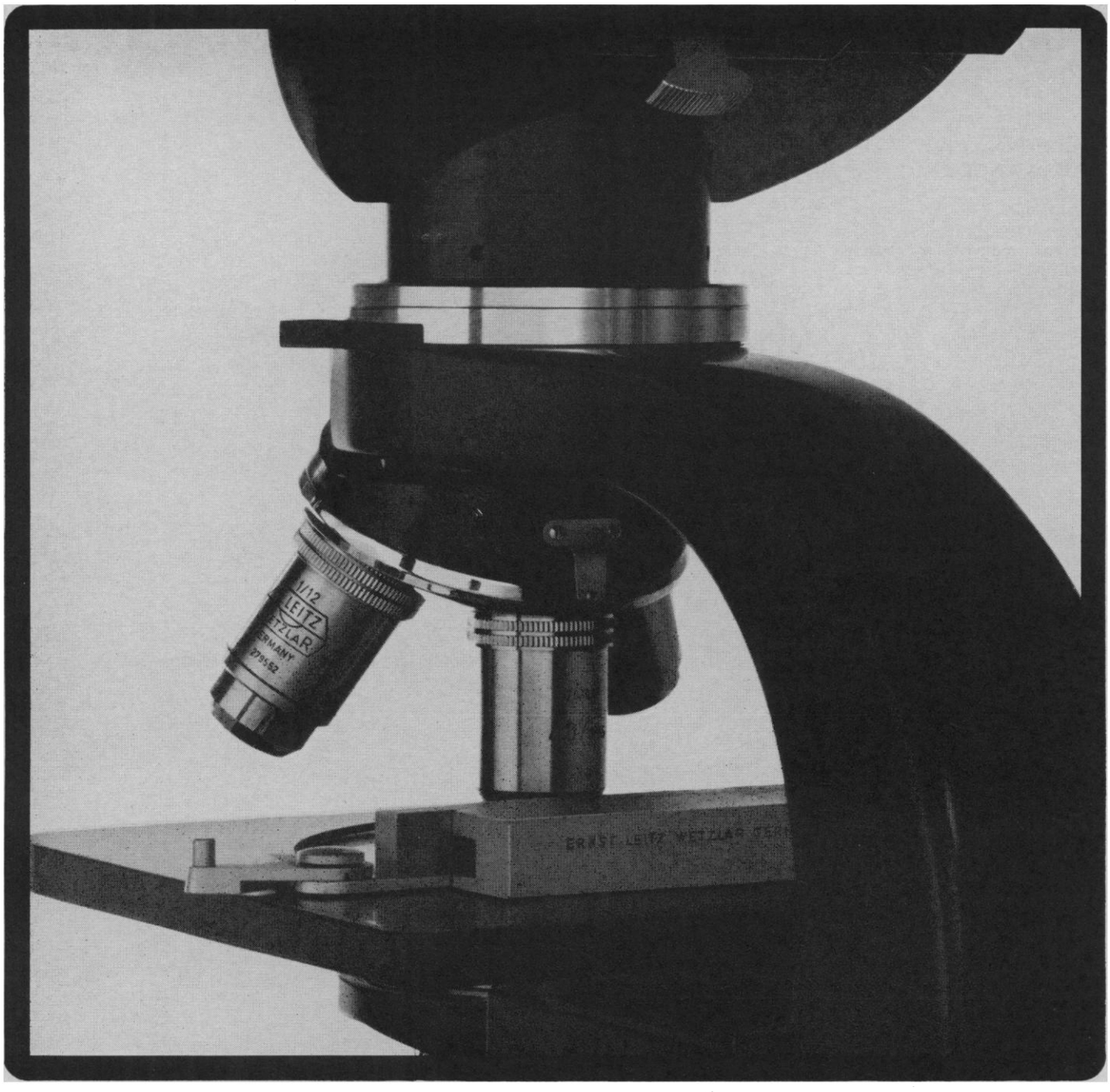
For a complete monograph describing the Model 560 series Carbon Dating Laboratory, its theory, operation, and applications, write to the Atomic Instrument Division of Baird-Atomic, Inc. (European interests: write attention the Export Department.) Service is available through all Baird-Atomic sales offices, in the U.S. and abroad.

Scientists: Investigate challenging opportunities with Baird-Atomic. An Equal Opportunity Employer.

RADIOCHEMISTRY, INC. BA BAIRD-ATOMIC, INC.

1111 West St. Catherine, Louisville, Kentucky 40210

33 University Road, Cambridge, Massachusetts 02138



Why use the LEITZ SM in routine labwork?

Unqualified optical superiority is one good reason. An extra-wide magnification range (35 to 1250X) is another!

Distortionless images at high magnifications can be achieved only with optics of the highest caliber. And, Leitz lenses are the outcome of 115 years of experience in the art of making exceptional optical instruments. Their high resolution makes the difference in critical examinations where anything less than perfection is not acceptable.

The unconventional, modern design of the SM microscope is another reason.

Rigid arm construction, originated by Leitz, makes the SM more stable and durable than other outmoded designs. This sturdy new structural design helps account for the SM's enviable record of dependability. Low position controls contribute to fatigue-free operation, and the *new maintenance-free coaxial focusing system* moves only the weight of the stage for precision adjustment.

The SM answers your laboratory's need for an exceptional microscope whose quality and reliability are beyond question. Its excellent basic design and numerous accessories make it the ideal instrument for use in all phases of routine microscopy in bacteriology, hematology, pathology, and as a teaching or demonstration microscope.

Write today for detailed information or demonstration of the SM Routine Laboratory Microscope and other Leitz scientific instruments and services. 52664

Leitz

E. LEITZ, INC., 468 PARK AVENUE SOUTH, NEW YORK 16, N. Y.
Distributors of the world-famous products of Ernst Leitz G. m. b. H., Wetzlar, Germany—Ernst Leitz Canada Ltd.
LEICA AND LEICINA CAMERAS · LENSES · PROJECTORS · MICROSCOPES

23 October 1964, Volume 145, Number 3643

SCIENCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Advice for Congress

The House Committee on Science and Astronautics has asked the National Academy of Sciences to answer two difficult questions:

"What level of Federal support is needed to maintain for the United States a position of leadership through basic research in the advancement of science and technology and their economic, cultural, and military applications?

"What judgment can be reached on the balance of support now being given by the Federal Government to the various fields of scientific endeavor, and on adjustments that should be considered, either within existing levels of over-all support or under conditions of increased or decreased over-all support?"

These questions constitute the first use of a new arrangement for the National Academy of Sciences to provide Congress with information and advice upon request. To answer the two questions, the Academy has appointed a committee of 15 distinguished members.

The committee's replies will be used by Congress in conjunction with the advice it receives from other sources. Congress will continue to receive the budget requests of the executive agencies. It will continue to hold legislative hearings and to seek the views of selected advisers. It will get plenty of advice on political, jurisdictional, and similar aspects from the executive agencies and its own members. Special scientific and technical programs will have their ardent supporters. And critics of the recommendations from any of these sources will get their day in court. Scientists should therefore have no feeling of surprise or offense if recommendations of the Academy committee are not all adopted.

Nevertheless, the establishment of the new arrangement constitutes a highly significant development in government-science relationships and presents the Academy with an opportunity to render Congress a valuable and distinctive service that it does not receive from any other source.

If the committee members were to submit individual answers, little would be gained over having 15 witnesses testify individually in legislative hearings. If the committee were to report only what it could agree upon quickly, it would not add substantially to what Congress might learn from other sources.

There is opportunity to do a far more penetrating job, one that will require much solid work by committee and staff, but one that will much more distinctively fulfill the challenging role of scientific adviser to Congress. A thoroughly helpful answer to the first question—on the level of support necessary to maintain leadership—will require analysis of trends in Germany, Japan, the U.S.S.R., and elsewhere, as well as in the U.S. A comparable answer to the second question—on balance of support among various fields—calls for an examination of each field in terms of the existing state of knowledge, the kinds of problems that are ripe for further study, the personnel and other resources available, and the possible or probable ramifications of further progress in understanding.

Answers at this level would provide Congress—and scientists also—with information that can be obtained from no other source and with guidance that would most assuredly have a constructive influence on future legislation.—DAEL WOLFLE

Western Ontario) disagreed. He referred to (i) the model of Ryter and Jacob by which the mesosome separates replicating DNA into two masses and to (ii) his own serial sections that show these organelles separating the chromatin by their attachments to the transverse septa at each end of the cell. He presented additional information on mesosome structure, position, and integrity derived from sections of *Bacillus* in penicillin, during spore formation, during the natural synchrony of spore germination, and in chilled and warmed cells. The suggestion was made that continuously replicating DNA may be continuously separated through its mesosomal attachment to the continuously expanding membrane-wall exoskeleton.

W. van Iterson (University of Amsterdam) reviewed the general structure of cytoplasm and compared the structure of bacteria with that of higher cells. Bacterial mesosomes (or membranous organelles) have been generally presumed absent in gram-negative bacteria and prominent in gram-positive organisms. Reduction of tellurite takes place in these "chondrioids" or "mitochondrial equivalents," and the bound reduced product can be detected in the electron microscope. It was also seen (in *Bacillus subtilis*) as thin rods at the cell periphery—although in *Proteus* it was found only as conglomerates of small elements contiguous with the plasma membrane. She suggested that the peripheral structures in both bacteria may function as basal granules or the cytoplasmic bases of flagella. She presented other micrographs suggesting that ribonucleoprotein does not usually occur in bacteria as separate rounded particles, but may be in linear arrays with numerous anastomoses. Ribonucleoprotein may be contiguous with the plasma membrane and possibly with the mesosome when present. In some organisms, helical fibrils from the nucleoplasm enter the cytoplasm and appear to participate in forming its net-like structure.

In his discussion, G. B. Chapman (Georgetown University) emphasized the bacterial cytoplasmic membrane and particularly its functions as the membrane septum and the mesosome. He noted the apparent absence of the latter in many bacteria (but not in *Escherichia coli*, as remarked by others) and their easy demonstrability in gram-positive bacteria. Discussions dealt with other derivatives of the plasma membrane (including chromatophores) and other constituents of the bacterial cytoplasm such as ribosomes and polysomes, fibrous structures, and various inclusions.

B. A. D. Stocker (Lister Institute, London) and H. Koffler (Purdue University) discussed bacterial flagella. These locomotor organelles can be seen by electron microscopy to be spiral filaments. Their subunits consist of proteins (flagellins). However, the organization of such proteins into "fibrils" or strands, the numbers of such fibrils about the hollow axis, and the coiling and pitch are variable or uncertain. Flagella arise from spheres or mushroom-shaped basal submembranous structures to which they are attached by hooks. Regions near the flagellar insertions reduce tellurite (discussed by van Iterson) and the hooks may contain RNA.

The flagellins, which have molecular weights from 20,000 to 40,000, lack cysteine, cystine and tryptophan; often contain an unspecified carbohydrate; and seem to lack most common mineral elements in any quantity. Those from thermophilic bacteria are more stable to heat and to a variety of denaturing agents than are those from

mesophiles. They contain less aspartic and glutamic acids. After acid disintegration of flagella, the flagellins can be reassembled under suitable conditions to reform spiral filaments which are indistinguishable from native flagella. Flagellar synthesis in vivo can be prevented in some strains by elevated incubation temperatures, and by inhibition of protein synthesis (for example, by chloramphenicol). The question of an intracellular pool of flagellin or of precursor is unsettled and may differ among genera of flagellated bacteria.

Additional surface components of some bacteria, the pili (or fimbriae), were discussed by C. C. Brinton, Jr. (University of Pittsburgh). He reviewed their chemical and morphologic nature, their inheritance, replication and development, and possible functions. Of particular interest was the discussion of the role of pili in phage resistance in some strains of *E. coli*, and the description of a new third type of pilus which is the apparent attachment site for Hf phage.

R. M. Cole (National Institutes of Health, Bethesda) reviewed the nature of bacterial cell wall replication as seen by the aid of specific immunofluorescence to wall antigens. The site and mode of initiation of wall replication differ in different bacteria (for example, a discrete single equatorial origin in *Streptococcus pyogenes* as opposed to multiple intercalated sites in *Salmonella typhosa*). Problems discussed in the light of this information concerned the nature of insertion of new wall and its relation to the mesosome; the simultaneity of time and site of synthesis of all the wall components as well as surface antigens; the differences between growth of peripheral wall and of septa, as seen in induced filament formation; and the need for other mechanisms to explain such phenomena as the overall thickening of walls of *Streptococcus fecalis*, which may occur under some conditions.

The latter was explained by G. D. Shockman (Temple University) as an example of an unbalanced growth situation. It did not essentially alter the concepts of normal replicatory mechanisms derived from immunofluorescent studies of cells growing in balanced steady states. Such wall thickening, first noted in the absence of essential precursors, (for example, valine or threonine) can also be produced by addition of selective inhibitors such as chloramphenicol. Also discussed was the possible manner of production of a site of weakness in the insoluble matrix of the replicating wall to allow insertion of new material; the role of autolytic enzymes in such a process and the sites and timing of their actions; and the need and existence of a primer or template for mucopeptide synthesis.

It can be said that the bacterial mesosome, in one relation or another, was the single topic of most concern to most participants and discussants. The importance of its occurrence (or ready demonstrability) in some organisms and not others is not known, nor is its actual relation to cell wall replication, to DNA replication, and to nucleoid separation. Its ability to reduce tellurite renews the question of "mitochondrial equivalence," but leaves unanswered the role of peripheral sites of tellurite reduction which appear related to flagellar origins. The reasons for complex and orderly substructure in walls of gram-negative bacteria, as opposed to those of most gram-positive organisms, are as obscure as the reasons for the seeming differences in their modes of wall replication and of cell separation after division. The na-

ture of the arrangement of bacterial DNA is not entirely clear, nor is it certain that it is actually linked to mesosome or to linear arrangements of ribonucleoprotein within the cytoplasm. Finally, further information is needed on correlation of anatomic and enzymatic data in cell wall replication, with particular emphasis on "normal" growth in balanced situations as compared with the mechanisms in unbalanced and "abnormal" states.

The participation of our European colleagues was generously supported by the National Science Foundation. Most of the presentations and pertinent discussion will be published in a forthcoming issue of *Bacteriological Reviews*.

ROGER M. COLE
National Institute of Allergy and Infectious Diseases, Bethesda, Maryland

Subunit Structure of Proteins

Biochemical and genetic aspects of the subunit structure of proteins was the topic of the annual symposium in biology held at Brookhaven National Laboratory, Upton, New York, 1–3 June 1964. Investigators from the fields of genetics and biochemistry convened to review progress in their particular areas and to integrate their findings into an understanding of proteins composed of two or more polypeptide chains and of the genes which govern such structures.

Of great importance, genetically, is the phenomenon of allelic complementation. Two differently mutated forms of a gene governing a single polypeptide chain cooperate to restore a function which is absent in cells containing only one of the defective genes. The biochemical explanation of such findings is that the function involved depends on an enzyme composed of identical polypeptides. A protein composed of two such polypeptides, altered in different places, may exhibit activity absent in a dimer composed only of identically altered chains. D. G. Catcheside's presentation of this phenomenon also pointed to the prevalence of proteins composed of identical subunits; he found that among 30 carefully analyzed genes in *Neurospora* more than one-half showed allelic complementation. It may well be that, aside from secretory proteins, the majority of proteins produced by the cell are composed of identical subunits.

One of the most intensively studied gene systems has been the histidine biosynthetic region of *Salmonella*. J. Loper, in discussing this system, pointed out that of eight enzymes governed by the region, four appear to be composed of subunits. Only two of the corresponding loci, however, exhibit allelic complementation. This indicates that dimeric composition, although essential for such complementation, does not by itself assure that the appropriate interactions will occur.

An interesting comparison of the histidine loci of *Neurospora* with those of *Salmonella* was made by Catcheside. Two corresponding loci in *Neurospora* and in *Salmonella* showed complementation in both cases. In addition, the loci corresponding to the two other *Salmonella* loci, which produce oligomeric products, did, in *Neurospora*, show the phenomenon. The other four histidine loci failed to show allelic complementation in either organism. However, in an analysis of a histidine locus in *Neurospora*, A. Ahmed pointed out possible pitfalls in this area; "polarity" mutants, which interfere with the for-

mation of products from several adjacent cistrons, might be erroneously used as evidence for a single cistron exhibiting allelic complementation.

Complementation between differently defective polypeptide subunits has been demonstrated in vitro. In a further analysis of the mechanism involved in the case of *E. coli* alkaline phosphatase, M. Schlesinger elaborated the conditions necessary for dimerization of which the most striking is a requirement for zinc ion. The conditions for dissociation and reassociation of another enzyme, pig heart fumarase, were reported by R. L. Hill and L. Kanarek. They presented strong evidence for the existence of four identical subunits in the enzyme molecule.

H. A. Itano reviewed his work on the genetics and biochemistry of hemoglobin, a protein which contains two pairs of identical chains and can be symbolized as $\alpha\beta\beta\alpha$. One mystery with regard to hemoglobin appears to have been resolved at the conference. Although in most cases nearly identical polypeptide subunits appear to associate randomly in the cytoplasm, it has not been possible to isolate molecules with mixed β-chains in hemoglobin. This failure has now been attributed to the rapid equilibria which exist between associated and dissociated forms, and lead to the disappearance by continual separation of any mixed β-structures in the course of separative procedures such as electrophoresis.

An interesting approach to the identification of the bonds holding subunits together was discussed by C. Tanford. Such identification involves comparison of free energy differences between associated and dissociated protein subunits in various solvents. The free energy of solution of protein side chains is in the same solvents in order to identify the side chains newly released on dissociation and hence presumably bound together in the associated form.

With regard to the kinetics of association, K. E. Van Holde presented an intriguing picture of the situation in squid hemocyanin, which, in the electron microscope, appears as a radially symmetrical disk composed of five dimeric components. Together with L. B. Cohen he was able to demonstrate, in the ultracentrifuge, breakdown of the decamer to dimers and monomers in response to changes in the *p*H. Analysis of the rate of reformation of the complete protein indicated that intermediate linear poly-

mers of dimers were unstable until insertion of the fifth member which effectively locked the structure in the stable cyclic decamer form.

Subunit structure is the basis of one class of isozymes (enzymes of similar function but different composition). C. R. Shaw demonstrated how genetic analysis could be used to predict and verify the subunit composition of isozymes. A single mutation, for example, increases the number of isozymes of lactic dehydrogenase to 15. Lactic dehydrogenase normally exists in five forms composed of all possible tetrameric combinations of two different subunits. N. O. Kaplan proposed that the subunit composition of lactic dehydrogenase was related to cellular requirements for aerobic or anerobic metabolism. He has found that the forms of the isozymes composed of identical chains are differently adapted to these two functions.

From the reports of C. Frieden, J. C. Gerhart, and J.-P. Changeux, the subunit structure of enzymes appears to be intimately related to the control of their activity in cellular metabolism. Gerhart has succeeded in dissociating into subunits an enzyme, aspartate transcarbamylase, which is subject to feed-back inhibition. He is now analyzing the properties of the subunits with regard to binding of substrate and inhibitor. Such allosteric effects in general, in which a metabolite is specifically bound and enhances or impedes the activity of an enzyme, appear to involve, in all cases, a protein composed of subunits. Changeux put forward a theory for this phenomenon based on a shifting of the equilibrium between loose and compact states of the protein by the metabolite exerting the allosteric effect. One of the states could bind substrate less readily so that, depending on the shift in equilibrium, activation or inhibition would result.

One class of proteins of which the function of their subunit structure is readily apparent is antibodies. A dimeric structure composed of identical subunits would provide the specific bivalency needed for precipitate formation. In a review of antibody structure, A. Nisonoff presented evidence for an ABBA configuration reminiscent of that found for hemoglobin. From his own work it is clear that a single binding site is present on each AB subunit of a specific antibody. He was able to form only univalent antibody by reassociating such fragments with AB fragments of normal gamma globulin.

A panel discussion, chaired by R. D. Hotchkiss, provided an opportunity for speculation about the significance of subunit structure. Clearly, the occurrence of allelic complementation in diploid organisms would allow an increased variability and plasticity of the genetic makeup. Similarly, the quaternary structure of proteins offers a new dimension for the control of cellular processes.

The proceedings of the conference will be published as volume 17 of the *Brookhaven Symposia in Biology*.

S. LACKS

Brookhaven National Laboratory, Upton, New York

Forthcoming Events

October

29–31. Society for the **Scientific Study of Religion**, Washington, D.C. (S. Z. Klausner, SSSR. 1424 16th St., NW, Washington, D.C.)

30–31. **Nuclear Medicine** Clinical Applications, symp., Shaker Heights, Ohio. (Cleveland Nuclear Medicine Symp., P.O. Box 7084, Cleveland, Ohio 44128)

30–1. **Meteoritical Soc.**, 27th meeting,

Arizona State Univ., Tempe. (C. B. Moore, Dept. of Geochemistry, Arizona State Univ., Tempe)

November

1–7. **Plant Scientists** of Latin America, 6th meeting, Lima, Peru. (M. Paulette, Universidad Agraria, Apartado 456, Lima)

2–4. Society of **Engineering Science**, 2nd technical meeting, Michigan State Univ., East Lansing. (A. C. Eringen, School of Aeronautical and Engineering Sciences, Purdue Univ., West Lafayette, Ind. 47907)

2–6. United Nations, **Drug Supervisory** Body, 62nd session, Geneva, Switzerland. (UN, Palais des Nations, Geneva)

2–9. Natural Gas in Production of **Petrochemicals**, seminar, Teheran. (U.N. Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Av., Bangkok, Thailand)

3–5. **Liquification** in Mine Chambers, conf., Ostrava, Czechoslovakia. (Mrs. E. Vergeinerova, Czechoslovak Scientific and Technical Soc., Siroka 5, Prague 1)

4–6. **Diffraction**, 22nd Pittsburgh conf., Pittsburgh, Pa. (W. M. Biagas, Pittsburgh Diffraction Conf., Crucible Steel Co., P.O. Box 7257, Pittsburgh 15213)

4–6. **Design of Experiments**, 10th conf., (by invitation only), Washington, D.C. (F. G. Dressel, Army Research Office-Durham, Box CM, Duke Station, Durham, N.C.)

4–6. Northeast **Electronics Research and Engineering** meeting (NEREM), Boston, Mass. (J. E. Storer, Inst. of Electrical and Electronics Engineers, 313 Washington St., Newton 58, Mass.)

4–6. **Manned Space Flight**, 3rd, American Inst. of Aeronautics and Astronautics, NASA Manned Spacecraft Center, Houston, Tex. (AIAA, 141 E. 44 St., New York 17)

4–7. American Physical Soc., **Plasma Physics** Div., New York, N.Y. (S. J. Buchsbaum, Bell Telephone Laboratories, Murray Hill, N.J.)

4–7. American Soc. of **Tropical Medicine and Hygiene**, New York, N.Y. (G. M. Jeffrey, Box 295, Kensington, Md.)

4–7. French Soc. of **Orthopedics and Traumatology**, 39th congr., Paris. (Secretariat, Pavillon Ollier, Hôpital Cochin, 27, rue du Faubourg Saint-Jacques, Paris 14e)

5–6. U.S. Army Materiel Command, Inst. of **Environmental Sciences**, joint meeting, Aberdeen Proving Ground, Md. (A. Armstrong, 104 Bliss Lane, Glen Burnie, Md.)

5–7. **Nutrition Hygiene** Conf., Brno, Czechoslovakia. (K. Halacka, Hygiene Section, Czechoslovak Medical Soc., Sokolska 31, Prague 2)

6–7. **Biochemistry**, 7th annual West Central States conf., State Univ. of Iowa, Iowa City. (G. F. Lata, Dept. of Biochemistry, State Univ. of Iowa, Iowa City)

6–7. Experimental Methodology and Applied Immunology in **Allergy Research**, symp., Erfurt, East Germany. (H. D. Faulhaber, Gesellschaft für Experimentelle Medizin der D.D.R., Littenstr. 78, Berlin C.2, East Germany)

6–7. Central Soc. for **Clinical Research**, Chicago, Ill. (J. F. Hammarsten, Ancker Hospital, St. Paul 1, Minn.)

7. International Acad. of **Oral Pathology**, 2nd conf., San Francisco, Calif. (J. L. Bernier, Dental School, Georgetown Univ., Washington, D.C. 20007)

7–14. International **Dental** Federation, 52nd meeting, San Francisco, Calif. (G. H. Leatherman, 35 Devonshire Pl., London, W.1)

8–14. **Switching Circuit Theory and Logical Design**, 5th annual symp., Princeton Univ., Princeton, N.J. (T. H. Crowley, Bell Telephone Laboratories, Murray Hill, N.J.)

9–11. Flexural Mechanics of **Reinforced Concrete**, intern. symp., Miami, Fla. (H. A. Sawyer, Dept. of Civil Engineering, Univ. of Florida, Gainesville)

9–12. American **Dental** Assoc., San Francisco, Calif. (H. Hillenbrand, 222 E. Superior St., Chicago, Ill.)

9–13. Institute of **Neurosurgery**, 25th anniversary, Santiago, Chile. (C. Villavicencio, Casilla 70-D, Santiago)

9–13. **Mathematical Education**, seminar Dalat, South Vietnam. (Assoc. of Southeast Asian Insts. of Higher Learning, Ratasastra Bldg., Chulalongkorn Univ., Race Course Rd., Bangkok, Thailand)

10. American College of **Dentists**, San Francisco, Calif. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo.)

10–11. **Quality Control**, seminar, Cleveland, Ohio. (R. C. Schultz, American Soc. of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38, Mich.)

11–12. Use of **Plastics in Machine Construction**, conf., Hungary. (Hungarian Soc.

of Mechanical Engineers, Szabadsag ter 17, Budapest 5)

11–13. Eastern **Analytical** symp., New York, N.Y. (M. Margoshes, Room 3, Chemistry Bldg., Natl. Bureau of Standards, Washington, D.C. 20234)

11–13. American Soc. for **Cell Biology**, Cleveland, Ohio. (D. E. Green, Inst. for Enzyme Research, 1710 University Ave., Madison 6, Wis.)

11–13. American **Concrete** Inst., fall meeting, Miami, Fla. (W. T. Eefting, 3332 Pan American Dr., Miami)

11–14. American Acad. of **Neurological Surgery**, Miami, Fla. (E. W. Davis, 806 S.W. Broadway, Portland, Ore.)

11–14. **Models for the Perception of Speech and Visual Forms**, symp., Boston, Mass. (Symp. Committee, Data Sciences Laboratory, Air Force Cambridge Research Laboratory, Bedford, Mass. 01731)

12–13. American Soc. of **Cytology**, 12th annual, Pittsburgh, Pa. (W. R. Lang, 1012 Walnut St., Philadelphia, Pa. 19107)

12–13. **Nerve as a Tissue**, conf., Lankenau Hospital, Philadelphia, Pa. (K. Rodahl, Lankenau Hospital, Philadelphia 51)

12–13. Netherlands **Nuclear** Forum, intern. congr., Amsterdam. (Nederlands Atoomforum, Scheveningseweg 112, The Hague, Netherlands)

12–14. **Paleomagnetism**, 2nd U.S.–Japan seminar, U.S.–Japan Cooperative Science Program, Univ. of California, Berkeley. (J. Verhoogen, Dept. of Geology and Geophysics, Univ. of California, Berkeley 4)

13–15. Association of **Clinical Scientists**, 26th meeting, Washington, D.C. (F. W. Sunderman, Jr., Univ. of Florida, College of Medicine, Gainesville 32603)

14–19. American Acad. of **Ophthalmology and Otolaryngology**, Chicago, Ill. (W. L. Benedict, 15 Second St., SW, Rochester, Minn. 55901)

14–21. Pan American **Medical Women's** Alliance, 9th congr., Los Angeles, Calif. (E. M. Hohl, 1234 N. Vermont Ave., Hollywood, Calif.)

15–17. Water in the **Arid Zones** of the Old World, symp., Halle an der Saale, East Germany. (Deutsche Akademie der Naturforscher Leopoldina, August-Bebel Str. 50 a, Halle an der Saale)

15–19. American Soc. of **Agronomy**, Crop Science Soc. of America, Soil Science Soc. of America, annual, Kansas City, Mo. (L. A. Richards, American Soc. of Agronomy, 677 S. Segoe Rd., Madison 11, Wis.)

15–19. Society of **Exploration Geophysicists**, Los Angeles, Calif. (C. G. Ferris, E. V. McCollum & Co., 515 Thompson Bldg., Tulsa, Okla.)

16–17. **Basic Sciences**, 3rd annual conf., New York, N.Y. (A. Gelbart, Yeshiva Univ., Amsterdam Ave. and 186th St., New York)

16–19. Gulf and Caribbean **Fisheries** Inst., conf., Ocho Rios, Jamaica. (Executive Secretary, Gulf and Caribbean Fisheries Inst., 1 Rickenbacker Causeway, Miami, Fla. 33149)

16–19. **Magnetism and Magnetic Materials**, Minneapolis, Minn. (J. B. Goodenough, Lincoln Laboratory C182, Lexington, Mass. 02173)

16–20. Interagency **Chemical Rocket Propulsion** Group, Mechanical Behavior Working Group, 3rd annual, Redstone Arsenal, Ala. (T. H. Duerr, AMSMI-RKP, Redstone Arsenal, Ala. 35809)

16–20. **Soil Science** Soc. of America, annual, Kansas City, Mo. (W. E. Jeske, 7515 N.E. Ankeny Rd., Ankeny, Iowa)

17–18. **Allied Air Force Medical** Conf., 10th annual, Fontainbleau, France. (Officier Administratif, Division Médicale d'Aircent, Camp Guynemer, Fontainbleau)

18–20. Northeastern States **Navy Research and Development** Clinic, Philadelphia, Pa. (N. R. Droulard, Franklin Inst. Laboratories, 20th and Parkway, Philadelphia, Pa. 19103)

18–21. **Neurological Surgeons**, Bal Harbour, Fla. (J. R. Russell, 1815 N. Capitol Ave., Indianapolis, Ind. 46202)

19–21. **Geological** Soc. of America, Miami Beach, Fla. (J. W. Peoples, 10 Wesleyan Place, Middletown, Conn.)

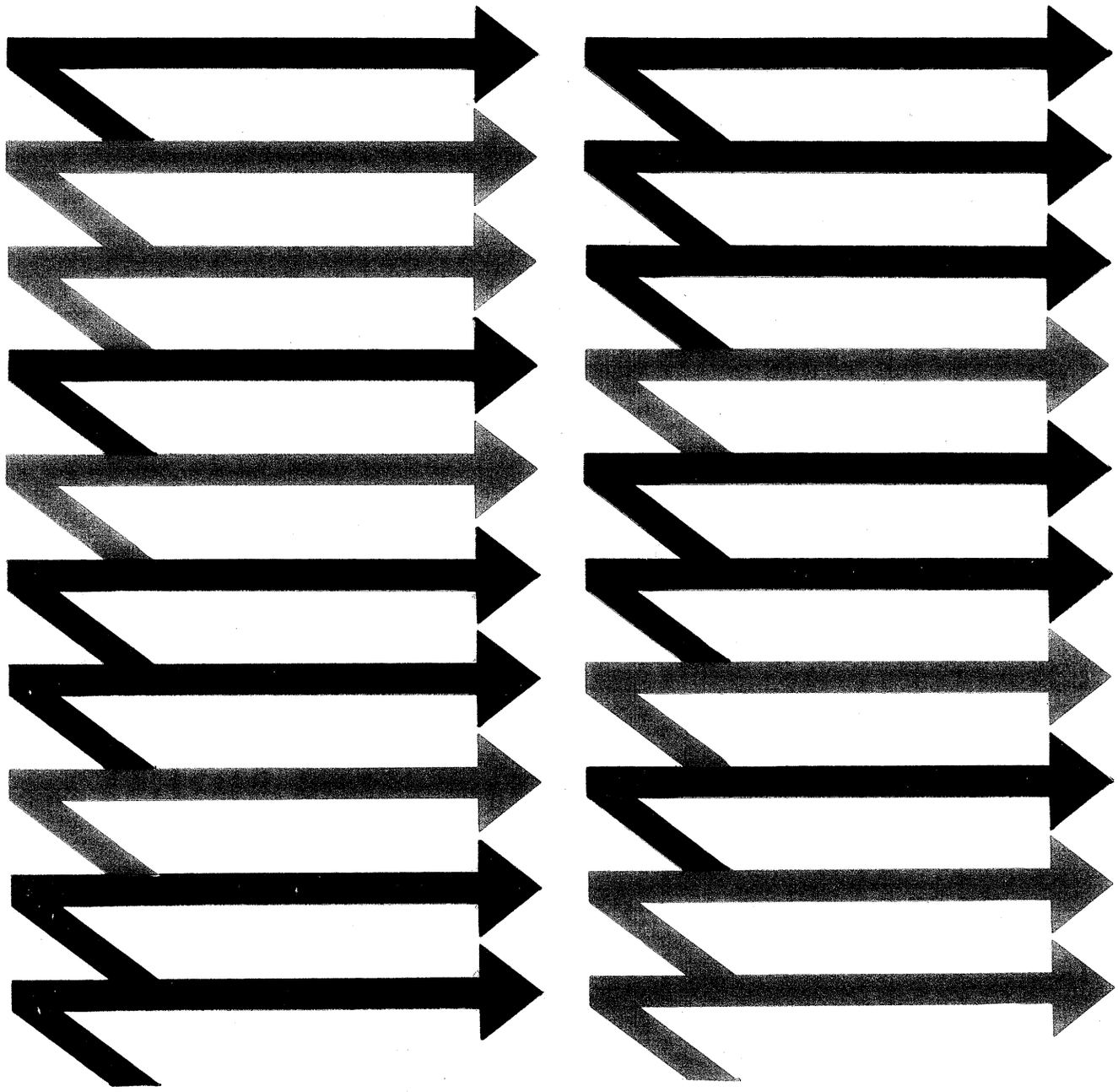
19–21. **Paleontological** Soc., Miami Beach, Fla. (R. L. Langenheim, Jr., Dept. of Geology, Univ. of Illinois, Urbana)

19–21. National Council of **Teachers of Mathematics**, Atlanta, Ga. (J. D. Gates, 1201 16th St., NW, Washington, D.C.)

19–22. American **Anthropological** Assoc., 63rd annual, Detroit, Mich. (E. R. Service, Dept. of Anthropology, Univ. of Michigan, Ann Arbor)

21–22. American **Geological** Inst., Miami Beach, Fla. (L. Hoover, 1444 N St., NW, Washington, D.C. 20005)

21–24. American **Speech and Hearing** Assoc., San Francisco, Calif. (K. O. Johnson, 1001 Connecticut Ave., NW, Washington, D.C.)



for DNA and RNA Research

new C^{14} and H^3 labeled 5′-nucleotides – exclusive from Schwarz

Available for the first time, all the four ribonucleoside mono- di- and triphosphates C^{14}-labeled, both randomly and specifically—all the deoxyribonucleoside monophosphates plus dADP and dATP specifically C^{14}-labeled. Specific activities range from 5 to 15 mc/mmole, and, for the randomly labeled monophosphates, 25 to 50 mc/mmole. N. B. To complement the C^{14} compounds, high specific activity nucleotides of adenosine and cytidine are tagged with H^3, e.g., for double-label studies.

SCHWARZ BIORESEARCH, INC. • Orangeburg, New York

BIOCHEMICALS • RADIOCHEMICALS • PHARMACEUTICALS for research, for medicine, for industry

New Products

Bibliography to applications of atomic absorption spectrophotometry is a comprehensive listing of published literature pertaining to the use of this technique in the determination of trace metals. The first 2 pages of this 8-page booklet contain an index classifying this literature by application and by element. Application classifications are agricultural, biological, industrial, metallurgical, mining, and petroleum. Under these headings are more specific applications with a listing of the elements which have been investigated. In parentheses after each element is a number or several numbers corresponding to individual references in the bibliography. For a copy of the "Bibliography to Applications of Atomic Absorption Spectrophotometry," ask for Perkin-Elmer Newsletter No. 16. Also available is a listing of literature in this field published as newsletters by Perkin-Elmer employees. Ask for "Summary of Atomic Absorption Newsletters and Applications Reprints."—D.J.P. (Instrument Marketing Div., Perkin-Elmer Corp., Main Ave., Norwalk, Conn.)

Circle 1 on Readers' Service card

Combination **hot plate and magnetic stirrer** with a 16- by 11-inch working surface can provide heating or stirring or both for up to six flasks or beakers. The cast aluminum hot plate surface has six centering marks which indicate the proper positions for flasks containing stirring magnets. Heat for this device is provided by Calrod heaters mounted directly beneath the hot plate surface, and temperatures of up to 360°C on this surface are controlled through an adjustable bimetallic thermostat. The control for this thermostat is on the front panel along with a separate control for stirring. Both dials have "off" positions so that either function can be utilized separately. A pilot lamp indicates when the heater is on, and an independent power line switch allows dial positions to remain set when the unit is off. Six Teflon-covered stirring bars are included with the hot plate–magnetic stirrer.—D.J.P. (Central Scientific Co., 1700 Irving Park Rd., Chicago, Ill. 60613)

Circle 2 on Readers' Service card

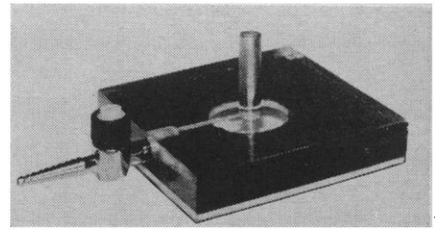
Student recorder is designed electrically to provide faithful recordings of most signals encountered in the training programs of medical laboratories and mechanically to withstand the rigors of student use. The Offner Type RB Dynograph features a frequency response which is flat to 100 cy/sec and down no more than 35 percent at 150 cy/sec; a rise time of 2.5 msec for 10 percent to 90 percent of a 2-cm travel; a sensitivity range of 1 μv/mm to 0.5 volt/cm; and an input impedance of 2 megohms. With all solid-state circuitry the recorder may be obtained with 2, 4, or 6 channels, with a multipurpose input coupler supplied with each channel. When used in the "straight through" mode, this coupler provides differential, floating inputs to each channel with a balanced, common-mode rejection of 50,000: 1 at 60 cy/sec and an equivalent input noise of less than 1 μv r.m.s. at maximum sensitivity with input shorted. Amplitude per channel of up to 6 cm is possible with linearity to within 1 percent for central 5 cm. Zero suppression between 6 and 10 cm is independent of sensitivity setting. Curvilinear recording is ink on 4½-inch-, 8½-inch-, and 12½-inch-wide folded paper for 2, 4, and 6 channels. Speeds of 1, 2.5, 5, 10, 25, 50, 100, and 250 mm/sec are selected by a lever and are electrically shifted from mm/sec to mm/min. An event marker is supplied. Based on training laboratory considerations, the recorder is a desk type rather than rack mounted, measuring 22 by 35 by 33 inches, and is mounted on lockable castors. Of interest is the master/slave capability which allows several Type RB recorders to be interconnected so that the trace of the instructor's "master" recorder can be followed on several "slave" units. The coupler supplied (Type 9853) can be used with most physiological transducers, but other couplers are available for those measurements requiring them. —D.J.P. (Beckman Instruments, Inc., Spinco Div., 1117 California Ave., Palo Alto, Calif.)

Circle 3 on Readers' Service card

Microtome-cryostat handbook discusses techniques and methods for the preparation, freezing, sectioning, mounting, and staining of tissue sections. The work is published by the International Equipment Company and its instruments form the basis for discussion. However, the information is presented for its general usefulness in all cryostat work. Black-and-white photographs are used often to illustrate specific points, and color photomicrographs of frozen and paraffin sectioning facilitate comparison of the two methods. Temperature control information includes a detailed chart of recommended temperatures for sectioning various types of tissue. Equipment operating efficiency is stressed with special reference to microtome knives, accessories, and routine maintenance. A bibliography and literature references are found on the last pages of the 28-page booklet. This handbook is available at no charge.—D.J.P. (International Equipment Co., 300 Second Ave., Needham Heights, Mass. 02194)

Circle 4 on Readers' Service card

Freeze-drying vacuum adaptor plate is available either 7 or 5 inches square with a large bore evacuation port sealed in the center and a small bore



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

Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager (D.J.P.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither *Science* nor the writers assume responsibility for the accuracy of the information. A Readers' Service card for use in mailing inquiries concerning the items listed is included on pages 469 and 567. Circle the department number of the items in which you are interested on this card.

venting valve to one side. The plate is made of clear acrylic plastic 1 inch thick to resist deformation and has a ¼-inch-thick neoprene surface securely bonded to the plastic except for a clear window around the vacuum port. The soft, thick neoprene permits good seals to be made to any thick-rim vessel that fits the plate and can hold the vacuum. The device is said to obviate the need for special lyophilizing glassware and is adaptable for degassing suction filtering.—R.L.B. (Refrigeration for Science, Inc., 3441 Fifth St., Oceanside, L.I., N.Y.)

Circle 5 on Readers' Service card

Infusion rate control device can be set to deliver from 5 to 150 drops per minute from standard intravenous (I.V.) equipment. The instrument, which contains no pump, simply regulates the gravity flow of infusion fluid from the I.V. bottle to the patient. It consists of a photoelectric drop detector which fits on the drop chamber of the I.V. set and an electronic control unit which mounts on the I.V. stand. This control unit has a clamping gate into which the tubing between the I.V. bottle and patient is placed. This gate opens when a drop is called for by the rate set, and closes after the drop detector has signaled that a drop has formed and fallen in the drop chamber. A slide calculator mounted on this unit facilitates the calculation of rate in drops per minute, from milliliters of fluid to be administered and time. This rate is then set on a knob on the front panel. Conditions which would prevent proper delivery cause the unit to alarm and close the control gate. Such conditions are infiltration, clogged needle. empty bottle, kinked tubing, or power failure. An optional elapsed-time control permits administration of a portion of the I.V. bottle with automatic shutdown and alarm at the end of the preset period.—D.J.P. (Corbin-Farnsworth Inc., 440 Page Mill Rd., Palo Alto, Calif.)

Circle 6 on Readers' Service card

Phonocatheter for the intracardiac detection of heart sounds consists of a subminiature microphone in the end of a woven dacron catheter. This sensor, located 3 mm from the distal tip of the catheter, is a two-section ceramic piezoelectric element encased in stainless steel and connected to a shielded cable incorporated into the catheter wall. It exhibits a frequency response of 1.5 to 10,000 cy/sec (± 8 db), a sensitivity of −135 db referred to 1

volt/dyne cm² at 1000 cy/sec, and a capacitance of 500 pf (500 $\mu\mu$f). It measures 0.050 inch in diameter by 0.75 inch long and weighs 0.10 g. To couple this high-impedance source to standard low-impedance recording equipment, an accessory low-noise, high-impedance (750 megohms) amplifier is available. Use of such an amplifier assures that the full frequency range of the sensor will be presented to the recorder. Though a probe is available with the phonosensor only, by far a more useful device is the phonocatheter, which also has a lumen with a separate female luer fitting. This permits the simultaneous recording of pressure data or the collecting of blood samples. Both devices can be cold sterilized, gas sterilized, or autoclaved.—D.J.P. (United States Catheter and Instrument Corp., Glens Falls, N.Y.)

Circle 7 on Readers' Service card

Gradients of pH or solution concentration in the eluting buffer of ion exchange chromatography can be established by a new device called the Varigrad. The gradient-producing device is fabricated of precision-machined, chemically inert, clear plastic. There are nine water-tight chambers in the device, all connected through stainless-steel toggle valves with Teflon diaphragms, so that contaminating materials are never in contact with the buffer solution. The shape of the gradient can be altered by modifying the proportions of solutions used in the chambers or by varying the number of chambers used in sequential combination by closing the appropriate connecting channels. In use, all of the chambers are in hydrostatic equilibrium which is constantly being reestablished in response to the removal of liquid from a chamber at one end of the series. Maximum working capacity of the device is approximately 1.2 lit. A centrally mounted paddle arrangement for simultaneous stirring of all nine chambers is actuated by a high-torque, synchronous motor which is mounted on a removable plate at one end of the unit. A plastic cover plate incorporates a level indicator that allows quick and positive leveling by adjustment of the three knurled stainless-steel legs. A unique transmission between the drive motor and the paddle-stirrer allows easy stroke adjustment of the paddle-stirrer.—D.J.P. (Phoenix Precision Instruments Co., Inc., 3803–05 N. Fifth St., Philadelphia, Pa.)

Circle 8 on Readers' Service card

NEW BOOKS

(*Continued from page 513*)

Clarke. Davis, Philadelphia, ed. 2, 1964. 397 pp. Illus. $9.

Herzinsuffizienz: Hämodynamik und Stoffwechsel. An international symposium (Wurzburg), July 1963. E. Wollheim and K. W. Schneider, Eds. Thieme, Stuttgart, Germany, 1964. 374 pp. Illus. Paper, DM. 68.

Humangenetik. Ein kurzes Handbuch in fünf Bänden. vol. 3, pt. 1, *Stoffwechsel, Innere Sekretion, Urogenitalsystem, Myopathien, Allergie, Rheumatischer Formenkreis, Infektionskrankheiten, Maligne Tumoren.* P. E. Becker, Ed. Thieme, Stuttgart, 1964. 737 pp. Illus. DM. 215.

Ichneumon-Flies of America North of Mexico. pt. 4, *Subfamily Gelinae, Tribe Hemigasterini,* Henry Townes and Virendra K. Gupta, 309 pp., Illus., $9.50 (1962); pt. 5, *Subfamily Diplazontinae,* Clement E. Dasch, 308 pp., Illus., $9.50 (1964). American Entomological Inst., Ann Arbor, Mich.

Insects of Campbell Island (*Pacific Insects Monogr.*, No. 7). J. Linsley Gressitt *et al.* Bishop Museum Press, Honolulu, 1964. 663 pp. Illus. Paper, $9; cloth, $10.

An Introduction to Physical Biochemistry. Henry B. Bull. Davis, Philadelphia, 1964. 445 pp. Illus. $8.50.

The Matter of Mendelian Heredity. K. R. Lewis and B. John. Little, Brown, Boston, 1964. 269 pp. Illus. $10.

Le Métabolisme de la Phosphorylcréatine et de l'Adénosine Triphosphate durant la Contraction Musculaire. Georges Maréchal. Editions Arscia, Bruxelles; Librairie Maloine, Paris, 1964. 184 pp. Illus. Paper.

Monographic Studies in Cassia (Leguminosae-Caesalpinioideae). pt. 1, *Section Serocalyx (Mem. N.Y. Bot. Garden* **12**, No. 1). Howard S. Irwin, Jr., New York Botanical Garden, New York, 1964. 114 pp. Illus. $6.

New Biochemical Separations. A. T. James and L. J. Morris, Eds. Van Nostrand, Princeton, N.J., 1964. 434 pp. Illus. $12.50.

Photo-Neuro-Endocrine Effects in Circadian Systems, with Particular Reference to the Eye (*Ann. N.Y. Acad. Sciences* **117,** art. 1). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1964. 645 pp. Illus. Paper. $9.

Plants in Perspective. A laboratory manual of modern biology. Eldon H. Newcomb, Gerald C. Gerloff, and William F. Whittingham. Freeman, San Francisco, 1964. 226 pp. Illus. Paper, $3.75.

Principles and Applications in Aquatic Microbiology. Proceedings, Rudolfs Research Conference (New Brunswick, N.J.). H. Heukelekian and Norman C. Dondero, Eds. Wiley, New York, 1964. 466 pp. Illus. $10. Twenty-one papers presented at the conference and one paper, "Trends and needs of research in aquatic microbiology," which was presented at the conference, Global Aspects of Applied Microbiology (Stockholm, 1963).

Reproductive Physiology. Comparative reproductive physiology of domestic animals, laboratory animals, and man. A. V. Nalbandov. Freeman, San Francisco, ed. 2, 1964. 330 pp. Illus. $7.50.

Retention of Functional Differentiation in Cultured Cells (*Wistar Inst. Symp. Monogr.*, No. 1). A symposium (Philadelphia, Pa.), March 1964. Vittorio Defendi, Ed. Wistar Inst. Press, Philadelphia, 1964. 130 pp. Illus. Paper, $5. Twelve papers presented at a symposium in honor of Margaret and Warren H. Lewis.

Steroid Drugs. vol. 2, *Index of Biologically Active Steroids*. Norman Applezweig. Holden-Day, San Francisco, Calif., 1964. 459 pp. Illus. $10.50.

Studies of Macromolecular Biosynthesis. Richard B. Roberts, Ed. Carnegie Institution of Washington, Washington, D.C., 1964. 716 pp. Illus. $7.

A Textbook of General Physiology. Hugh Davson. Little, Brown, Boston, ed. 3, 1964. 1182 pp. Illus. $19.75.

The Thymus (*Wistar Inst. Symp. Monogr.*, No. 2). A symposium (Philadelphia, Pa.), April 1964. Vittorio Defendi and Donald Metcalf, Eds. Wistar Inst. Press, Philadelphia, 1964. 153 pp. Illus. Paper, $5. Eleven papers.

Economics and the Social Sciences

Advances in Experimental Social Psychology. vol. 1. Leonard Berkowitz, Ed. Academic Press, New York, 1964. 333 pp. Illus. $9. Eight papers: "Cultural influences upon cognitive processes" by Harry C. Triandis; "The interaction of cognitive and physiological determinants of emotional state" by Stanley Schachter; "Experimental studies of coalition formation" by William A. Gamson; "Communication networks" by Marvin E. Shaw; "A contingency model of leadership effectiveness" by Fred E. Fiedler; "Inducing resistance to persuasion: some contemporary approaches" by William J. McGuire; "Social motivation, dependency, and susceptibility to social influence" by Richard H. Walters and Ross D. Parke; and "Sociability and social organization in monkeys and apes" by William A. Mason.

Africa: A Study in Tropical Development. L. Dudley Stamp. Wiley, New York, ed. 2, 1964. 544 pp. Illus. $10.95.

Africa and the Islands. R. J. Harrison Church, John I. Clarke, P. J. H. Clarke, and H. J. R. Henderson. Wiley, New York, 1964. 510 pp. Illus. $9.75.

Ancient Races of Baluchistan, Panjab, and Sind. S. S. Sarkar. Bookland, Calcutta, India, 1964. 119 pp. Illus. Rs. 10.

Anthropology. Eric R. Wolf. Prentice-Hall, Englewood Cliffs, N.J., 1964. 127 pp. $4.95.

The Archeology of Cape Denbigh. J. L. Giddings. Brown Univ. Press, Providence, R.I., 1964. 347 pp. Illus. Plates. $12.50.

The Australian Aborigines. A. P. Elkin. Doubleday, Garden City, N.Y., 1964. 395 pp. Illus. Paper, $1.95.

The Birth of Western Civilization: Greece and Rome. Michael Grant, Ed. McGraw-Hill, New York, 1964. 360 pp. Illus. $28.50.

Categories of Human Learning. Arthur W. Melton, Ed. Academic Press, New York, 1964. 372 pp. Illus. $8.50.

Choice, Strategy, and Utility. Sidney Siegel. McGraw-Hill, New York, 1964. 192 pp. Illus. $5.95.

Conduct of the New Diplomacy. James L. McCamy. Harper and Row, New York, 1964. 315 pp. $6.50.

Continuity and Change in Latin America. John J. Johnson, Ed. Stanford Univ. Press, Stanford, Calif., 1964. 296 pp. $6.75.

The Control of Human Fertility in Jamaica. J. Mayone Stycos and Kurt W. Back. Cornell Univ. Press, Ithaca, N.Y., 1964. 391 pp. $7.50.

Cross-Cultural Understanding: Epistemology in Anthropology. F. S. C. Northrop and Helen H. Livingston, Eds. Harper and Row, New York, 1964. 412 pp. $7.50.

Culture Change in Tribal Bihar: Munda and Oraon. Sachchidananda. Bookland, Calcutta, India, 1964. 161 pp. Illus. Rs. 12. A study sponsored by the Research Programmes Committee, Planning Commission, Government of India.

Tests and Measurements. Leona E. Tyler. Prentice-Hall, Englewood Cliffs, N.J., 1963. 128 pp. Illus. Paper, $1.50; cloth, $3.95.

Understanding Minority Groups. Joseph B. Gittler, Ed. Wiley, New York, 1964 (© 1956). 148 pp. Paper, $1.45. Essays by Wayne A. R. Leys, John LaFarge, John Collier and Theodore H. Hass, Oscar Handlin, Ira de A. Reid, Dorothy Swaine Thomas, Clarence Senior, and Joseph B. Gittler.

U.S.A. and Its Economic Future. Arnold B. Barach. Twentieth Century Fund, New York, 1964. 156 pp. Illus. Paper, $1.95.

(Continued from page 509)

neering, a major factor in progress and prosperity." It did go on to add a bit of caution by quoting President Eisenhower's Farewell Address warning that " 'the prospect of domination of the nation's scholars by Federal employment, project allocations and the power of money is ever present, and is gravely to be regarded.' " And it also quoted Eisenhower's assertion that " 'in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite.' "

It is not in style for Democrats to quote Republican Presidents approvingly, but it is not unlikely that Scientists and Engineers for Johnson–Humphrey are in agreement with the substance of Eisenhower's views.

In releasing its statement of principles, Scientists and Engineers for Goldwater also expanded the list of members which was carried in this space on 9 October. The additional members are:

Roger Adams, professor emeritus and former head of the chemistry department, University of Illinois;

R. L. Anthony, professor of physics, Notre Dame University;

John C. Bailar, head of the department of inorganic chemistry, University of Illinois.

Carl Barnes, former vice president for research, 3-M Company;

Robert R. Bennett, program director, Space Technology Laboratory;

F. N. M. Brown, professor of aeronautical engineering, Notre Dame University;

William Burrows, professor of microbiology, University of Chicago;

Carl J. Christensen, professor of chemistry, University of Utah;

George L. Clark, professor emeritus, department of chemistry, University of Illinois;

Gilmore D. Clarke, consulting engineer, Gilmore D. Clarke–Michael Rapuano;

Walter A. Compton, vice president, Miles Laboratories;

A. Scott Crossfield, aeronautical engineer, North American Aviation;

Ray P. Dinsmore, former vice president, Goodyear Tire Company;

Roy Dorcus, former dean, school of life sciences, University of California, Los Angeles;

Louis Dunn, consultant to Aerospace Industries;

Max Dunn, vice president, International Chemical & Nuclear;

Lawrence H. Flett, consultant, Western Reserve;

W. M. Flowers, president, Sinclair Research, Inc.;

H. Close Hesseltine, professor, obstetrics and gynecology, University of Chicago Medical School;

James C. Hodge, president and director, the Warner-Swasey Company;

E. C. Hughes, vice president for research, Standard Oil Company of Ohio;

Carl Keyser, professor of mechanical engineering, University of Massachusetts;

Sidney D. Kirkpatrick, consulting editor, McGraw-Hill Book Company;

Guenther W. Lehmann, design engineer, Lockheed, Missile and Space Division;

Dewey M. McCain, head, department of civil engineering, Mississippi State University;

Admiral Ben Moreell, former president, Jones-Laughlin Steel;

Daniel E. Noble, executive vice president, Motorola, Technical Products Division;

John K. Northrop, founder, Northrop Aviation;

Jan Oostermeyer, chemical consultant and president, Applied Solar Energy Association;

George L. Parkhurst, vice president, Standard Oil Company of California;

Abbott L. Penniman, Jr., consulting engineer;

Roland I. Pritikin, ophthalmologist;

Louis Ruthenburg, former chairman of the board, Servel, Inc.;

G. Frederick Smith, professor emeritus, department of chemistry, University of Illinois;

Cornelia T. Snell, research chemist and author;

Foster Dee Snell, chairman of the board, Foster Dee Snell, Inc.;

Lincoln Thompson, president, Raymond Engineering Laboratories, Inc.;

J. Carlton Ward, Jr., former president, Fairchild Aircraft;

General T. A. Weyher, dean, school of engineering, University of Miami, Coral Gables, Florida;

J. C. Witt, former director of research, Portland Cement Company;

Lt. Gen. Laurence C. Craigie, vice president, American Machine & Foundry;

John H. Nair, consultant, Chemetron Corporation.—D.S.G.

Nobel Laureates Issue Statement Supporting Johnson and Humphrey

Thirty-two recipients of the Nobel prize announced their support for President Johnson last week. At a press conference held in New York, the group, composed largely of scientists, issued a statement saying that "the great issue of the impending election is the issue of war and peace."

"If he is to help secure the future of freedom and of humanity," the statement reads in part, "the next President of the United States must be responsible. He must understand that the processes of peace are complex and gradual. He must not delude others—or himself—into thinking that the massive problems of the world will yield to once-and-for-all solutions, whether through slogans, ultimatums or the force of arms."

The statement also cites "patience" and understanding of "the nature of a nuclear age" as qualities essential to presidential leadership, and concludes that "President Johnson meets these qualifications and that his opponent does not." It also offers a warm endorsement of Senator Humphrey as "a proven champion of reason and vision in world affairs."

The statement was signed by the following Nobel laureates: Carl D. Anderson, John Bardeen, Felix Bloch, Konrad Bloch, Melvin Calvin, Owen Chamberlain, Carl F. Cori, Andre F. Cournand, Peter J. W. Debye, Joseph Erlanger, Donald A. Glaser, Robert Hofstadter, Edward C. Kendall, Arthur Kornberg, Polykarp Kusch, Fritz A. Lipmann, Maria Goeppert Mayer, Hermann J. Muller, Severo Ochoa, Edward M. Purcell, Isidor I. Rabi, Dickinson W. Richards, Jr., Frederick Robbins, Emilio Segré, John Steinbeck, Otto Stern, Albert von Szent-Gyorgyi, Edward L. Tatum, Harold Urey, James D. Watson, Chen Ning Yang, and Tsung Dao Lee.—E.L.

Announcements

Those pursuing or contemplating research in the **evaluation of translations** are invited to make use of materials held by the Automatic Language Processing Advisory Committee, National Academy of Sciences.

These materials, which will be made available without charge, consist of excerpts from *Mashina i Mysl' (Machine and Thought)*, Z. Rovenskii, A.

Uemov, and E. Uemova (Moscow, 1960), in the original Russian and nine human and machine translations into English.

Requests should be sent to A. Hood Roberts, Executive Secretary, Automatic Language Processing Advisory Committee, National Academy of Sciences, 2101 Constitution Ave., NW, Washington, D.C. 20418.

The **American Association of Petroleum Geologists** has announced the introduction of a certification-procedure program. Its purpose is to provide a review of the qualifications of the geologist, coupled with an evaluation by his colleagues. Further information about the program is available from Grover E. Murray, Louisiana State University, Baton Rouge, Louisiana.

Courses

The Second U.S.—Japan Seminar on **Paleomagnetism,** under the auspices of the U.S.–Japan Cooperative Science Program, will be held 12–14 November at the University of California, Berkeley, to discuss results obtained by present participants in the program and plans for the future. (J. Verhoogen, Department of Geology and Geophysics, University of California, Berkeley 4.)

Meeting Notes

The 8th European Congress on **Molecular** Spectroscopy will be held 14–20 August in Copenhagen. It will be sponsored by the International Union of Pure and Applied Chemistry and the Royal Danish Academy of Sciences. Papers on raman, infrared, ultraviolet, or microwave spectra, or nuclear magnetic resonance spectra, electron spin resonance spectra, spectral theory, and novel analytical applications are invited. Persons wishing to submit papers must complete a provisional registration form supplied by the Congress. Deadline for receipt of this form in Copenhagen: *15 December.* (8th European Congress on Molecular Spectroscopy, Universitetsparken 5, København Ø, Denmark).

The 10th symposium on **microwave theory and techniques** will be held 5–7 May in Clearwater, Florida. The Institute of Electrical and Electronics Engineers will sponsor it. Topics to

be included are microwave acoustics, microwave components for phased arrays and space applications, active and passive microwave solid-state devices, and components and techniques for millimeter through optical wavelengths. Deadline for summaries and abstracts: *15 November*. (J. E. Pippin, Chairman, Technical Program Committee, Sperry Microwave Electronics Company, Box 1828, Clearwater).

Scientists in the News

Jeremiah P. Freeman, formerly with the Redstone Arsenal Laboratories, Rohm and Haas Company, has been named an associate professor of chemistry at the University of Notre Dame.

The new chairman of the department of pharmaceutical sciences at St. John's University, is **John J. Sciarra**, professor of pharmaceutical chemistry at the school.

Herbert G. Stoenner, assistant director of the Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, has been appointed director of the laboratory.

At the University of Illinois:

William E. Adams, head of the anatomy department, University of Otago, Dunedin, New Zealand, is a visiting professor for the coming academic year.

James C. Plagge, anatomy professor, has been appointed coordinator for the university's Chiengmai project, in Thailand, for the next 2 years.

I. Estermann, formerly chief scientist and scientific director of the Office of Naval Research, London, has been appointed to the Lidow chair in solid-state physics at Technion, Israel Institute of Technology in Haifa. He will be succeeded in the London position by **Peter King**, formerly associate director of the Naval Research Laboratory, Washington.

Erratum. In the index to volume 145 of *Science* (published 25 September) the surname of Waclaw Szybalski was misspelled "Szbalski." This error was repeated under the entries for "Iyer" and "Mitomycin."

Erratum: In the report "Visual evoked potentials as a function of flash luminance and duration" by Wicke, Donchin, and Lindsley (2 Oct., p. 83), the last sentence of the first paragraph of column 3 on p. 84 should have read: "These data indicate that the waveform and amplitude of the average evoked potentials depend on the total luminous energy of the flash and further suggest a relationship to apparent brightness, in accordance with Bloch's law."