NEW from CANALCO

DISC ELECTROPHORESIS

* trademark
See it anywhere between 3.5× and 120×

With Bausch & Lomb StereoZoom® Microscopes, just turning a knob gives you an infinite number of repeatable magnifications within the range selected. Powers available from 3.5× to 120×.

And, a new “Power Pod” optical design completely encloses the optical system in a single unit—keeps out dust and dirt, eliminates annoying image jump and blackout.

Why not see today’s most versatile microscope soon in a free laboratory demonstration.
Department of Ophthalmology, Toku-
shima University School of Medicine,
Tokushima, Japan; and F. Maxwell-Ly-
ons, Division of Communicable Dis-
eases, World Health Organization, Ge-

Laurence L. Quill, head of the depart-
ment of chemistry at Michigan State
University since 1945, has resigned
from that position to devote more time
to writing and research and to his duties
as head of the university's mathematical
and physical sciences division. Max T.
Rogers, professor of chemistry, is
acting head of the chemistry depart-
ment.

R. Gaurth Hansen, head of Michigan
State University's former department
of agricultural chemistry, has been
named head of the university's new de-
partment of biochemistry, comprised of
the department of agricultural chemis-
try and the biochemistry section of the
chemistry department.

Edward J. Forrest, associate dean of
the University of Illinois College of
Dentistry, has been appointed dean of
the University of Pittsburgh School of
Dentistry, effective 1 September.

Randall T. Chew III has succeeded
Thomas Clements as curator of miner-
alogy at the Los Angeles County Mu-

Homer F. Marsh, dean of the Univer-
sity of Miami School of Medicine
at Coral Gables since 1954, will suc-
cceed O. W. Hyman as vice-president
of the University of Tennessee (Memphis)
in charge of the medical units. Hyman
will retire on 1 July; Marsh will assume
his new position at a date to be set
later.

Two new department chairmen at Rensselaer Polytechnic Institute have
been appointed, effective 1 July.

E. C. W. A. Geuze, professor of soil
mechanics and foundation engineering,
will become chairman of the depart-
ment of civil engineering. He succeeds
Lewis B. Combs, who retired last year
as professor emeritus.

Hillard B. Huntington, associate head
of the department of physics since 1953,
will become chairman of that depart-
ment. He has been on a year's leave,
as visiting professor of metallurgy and
solid-state physics at Yale University.
He succeeds G. Howard Carrigan, who
will retire 30 June.

Leo G. Horan, formerly chief of the
cardiology section of the Veterans Ad-
ministration Hospital in New Orleans
and assistant professor of clinical medi-
cine at Tulane University, has joined
the staff of the University of Tennessee
College of Medicine as an associate
professor in medicine.

On 1 April, Matthias Stelly, former
professor of soils at Louisiana State
University, became executive secretary
of the American Society of Agronomy,
which has headquarters in Madison,
Wis. He succeeds L. G. Monthey, who
has held the post since 1948 and who
is now extension resource development
specialist with the University of Wis-
consin.

In a recent ceremony at the Uni-
versity of California's Lawrence Radia-
tion Laboratory, Livermore, Navy Dis-
tinguished Public Service Awards were
presented to Harold Brown, director of
the laboratory, and Edward Teller,
professor of physics. In addition, the
Livermore Laboratory earned a Navy
Certificate of Merit. The awards were
made for outstanding contributions by
the laboratory and by Brown and
Teller to the success of the Polaris
missile program.

George Pheler, professor of solid-
state physics at the University of Cal-
ifornia, La Jolla, has been awarded the
1960 American Physical Society Prize
of $2500 for developing a method of
examining the structure and behavior
of atoms in semiconductor materials.
The award is sponsored by Hughes Air-
craft Company of Culver City, Calif.

Robert Shankland, Ambrose Swasey
professor of physics at Case Institute
of Technology, received the second
Case Achievement Award at a recent
convocation at the institute. He was
cited for services to Case during the
years since 1929, when he received his
bachelor of science degree from the
institute.

Hans E. Thalmann, of the depart-
ment of geology at Stanford Univer-
sity, has returned from an 18-month
teaching assignment for the Interna-
tional Cooperation Administration at
the Escuela de Geologia of the Univer-
sity of Chile, Santiago.

Roy L. Whistler, Purdue University
biochemist, has been appointed chair-
man of the university's newly created
Institute for Agricultural Utilization
Research. The institute will promote,
develop, coordinate, and conduct basic
scientific research leading to expanded
industrial uses for agricultural products.

Robert S. Platt, professor emeritus
and former chairman of the depart-
ment of geography, University of Chicago,
has joined the staff of the department
of geography at Ohio State University
as Mershon Distinguished Professor for
the spring quarter. He will teach a
course on the history of geography and
a seminar on tropical development.

M. T. L. Cronin, former head of the
department of pathology and toxicology
at the Schering Corporation, Bloom-
field, N.J., has joined Woodward Re-
search Corporation, Herndon, Va., as
pathologist.

Julian Donoso-Torres has also joined
the Woodward staff. He was formerly
soil chemist with the United Fruit
Company's Division of Tropical Re-
search in La Lima, Honduras.

Recent Deaths

Matthew A. Hunter, Troy, N.Y.; 72;
metallurgist and dean emeritus of Rens-
selaer Polytechnic Institute, where he
served for 41 years; retired in 1949;
founded and headed the department of
metallurgy engineering; 24 Mar.

Khachatur Kshetoyants, Moscow,
U.S.S.R.; 60; internationally known
physiologist at Moscow State Univer-
sity, where he was engaged in research
for more than 30 years; author of
Comparative Physiology of the Nervous
System, a monograph that has been
recommended for the 1961 Lenin
Prize; 3 Apr.

Donald S. Rawson, Saskatoon, Sas-
atchewan; 56; professor and head of
the biology department at the Univer-
sity of Saskatchewan; internationally
known limnologist; 16 Feb.

Masao Tsuzuki, Tokyo, Japan; 68;
an authority on radiation diseases and
head of the Tokyo Red Cross Hospital;
was Japan's representative on the United
Nations scientific committee on the ef-
fects of atomic radiation in 1957 and
1958; was active in the World Health
Organization and in the movement to
ban nuclear tests; specialized in treat-
ing survivors of the Hiroshima and
Nagasaki atom-bomb blasts; 5 Apr.
Viscoelastic Properties of Polymers.

This volume is the latest of three or four important works, devoted in whole or in large part to the viscoelastic properties of polymers, to be published in the United States during the past 12 months. In writing this book, Ferry set for himself four goals: assembling in one place of the informational tools needed by workers in the field to make measurements and interpret data; the straightforward exposition of the concepts of viscoelasticity from the ground up, for the benefit of beginners in the field; the delineation of areas requiring further theoretical and experimental work; and finally, the illustration of applications of viscoelastic functions and the reduced-variable technique to technological situations. This program is not necessarily as diversified as and, perhaps, overambitious as it might seem, for these goals are not unrelated. For example, one could not get very far toward the second objective without accomplishing the first.

It will not surprise his colleagues to find that John Ferry develops his subject with a logical rigor that approaches the proverbial Lagrangian elegance about as closely as could any treatment of viscoelasticity, for the subject is still in its adolescence. Although it is logically coherent, this work is not a compilation of all work that has been done on the viscoelastic properties of polymers, nor is it a stringing together of chapters on nonsequential, specialized subjects. Perhaps because he wished to adhere closely to this tone of coherence, the author has been selective. This has resulted in what some might consider important omissions. For example, there is only an allusion to the Eyring-Tobolsky reaction-rate theory of viscoelastic deformation, and there is no reference whatever to the James-Guth theory of rubber-like elasticity.

W. James Lyons
Textile Research Institute,
Princeton, N.J.


The past two decades have seen the birth and rapid parallel development of both high-speed digital computers and nuclear reactors. During the past decade it has become standard procedure to use digital computers for the solution of problems arising in nearly every phase of nuclear reactor design and application. A significant proportion of the available time on our largest and fastest digital computers is devoted specifically to calculations in these areas. Ward Sangren has long been associated with the application of digital computers to nuclear reactor calculations and thus is eminently qualified to write in this field. He states that a primary objective of his book is “to present the nuclear engineer or scientist with an introduction to high speed nuclear reactor calculations.” The topics covered range over a broad field. Chapter headings include “Digital computers,” “Programming,” “Numerical analysis,” “A code for fission product poisoning,” “Diffusion and age diffusion calculations,” “Transport equation—Monte Carlo,” and “Additional reactor calculations.” Each chapter is self-contained and can be read independently of the others.

The introduction reviews briefly the history of nuclear reactor and digital computer developments. Then surveys are given of the problems involved in building nuclear reactors and in solving problems on digital computers. Two chapters are devoted to a general description of digital computers and the preparation of computer programs. There is a chapter on the language and methods of numerical analysis. As a transition to the last chapters, concerned with nuclear reactor calculations, there is a chapter which describes the various steps involved in setting up and solving a particular problem on a digital computer.

Because the range of subjects covered is so broad and the fields involved are developing so rapidly, Sangren has been able to give only a brief introduction to any specific topic.

Elizabeth Cuthill
Applied Mathematics Laboratory,
David Taylor Model Basin

New Books

Biological and Medical Sciences


Economics and the Social Sciences


Cahiers de Synthèse Organique. Méthodes et tableaux d'application. Léon Velluz, Ed. Jean Mathieu, André Allais, and Jacques Valls, vol. 6, 418 pp., paper, NF. 110; cloth, NF. 120. vol. 7, 309 pp., paper, NF. 100; cloth, NF. 110. vol. 8, 233 pp., paper, NF. 75; cloth, NF. 85.


Gmelins Handbuch der Anorganischen Chemie. pt. B, section 2, System No. 9, Sulphur. 758 pp., Illus., paper, $111; System No. 20, Lithium (supplement volume), 525 pp., Illus., paper, $77.50; cloth, $78.50. Section 1, System No. 34, Mercury, 466 pp., paper, $67.50. Verlag Chemie, Weinheim, Germany, 1960.


YOUR 35 mm PROJECTOR NOW WILL Z-O-O-M MICROSCOPE SLIDES!

- New 15. Elget Zoom Microtach Attachment converts your projector for continuously variable magnification of slides
- Focus at any magnification—zoom image stays sharp
- Zoom magnification dramatizes the projected image for lectures, demonstrations
- True, variable iris controls field size for concentration of interest on select areas
- Positive lock spring device secures slide
- Adapters fit unit to most popular 35mm slide projectors; unit removes instantly for normal projector use
- Complete Elget Zoom Microtach Attachment—with appropriate adapter for your projector—$64.50

When ordering, please specify make and model of projector you will be adapting. For further details or for orders, write to: DEPT. S-4

SCIENTIFIC INSTRUMENT DIVISION

1256

Elget Optical Co.
838 Smith Street, Rochester, N. Y.
EL-880


Medical Physics, Otto Glasser, Ed. (Year Book), 8 July 1960, 81

Principles of Human Genetics, C. Stern (Freeman), 27 Jan. 1961, 270


Science in Progress, H. Taylor, Ed. (Yale Univ. Press), 22 July 1960, 219

Strahlenbiologie, H. Fritz-Niggl (Thieme), 20 May 1960, 1521


Botanical Sciences

Algenkunde, B. Fott (Fischer), 9 Dec. 1960, 1759

Anatomy of Seed Plants, K. Esau (Wiley), 10 June 1960, 1721

Biology of Mycorrhiza, J. L. Harley (Hill; Interscience), 22 Apr. 1960, 1219

A California Flora, P. A. Munz and D. D. Keck (Univ. of California Press), 1 Apr. 1960, 982

The Coconut Palm, K. P. V. Menon and K. M. Pandalai (Indian Central Coconut Committee, Ernakulam, South India), 8 Apr. 1960, 1036


Die Evolution der Angiospermen, A. L. Takhtajan (Fischer), 23 Sept. 1960, 801


I.C.A.R. Monographs on Algae, T. V. Desikachary (Indian Council of Agricultural Research), 27 May 1960, 1604

Illustrated Flora of the Pacific States, L. Albamns and R. S. Ferris (Stanford Univ. Press), 3 June 1960, 1665


Salt Marshes and Salt Deserts of the World, V. J. Chapman (Hill; Interscience), 2 Sept. 1960, 614

Sinopsis de la flora chilena, claves para la identificacion de familias y generos, C. M. Pizarro (Ediciones de la Universidad de Chile), 10 June 1960, 1729

Chemistry


Anorganische Chemie, I. Náray-Szabó (Harrerian Academy of Sciences, Budapest), 22 Apr. 1960, 1214

Chemical Analysis of Air Pollutants, M. B. Jacobs (Interscience), 8 July 1960, 80

Chemical and Natural Controls of Pests, E. R. de Ong (Reinhold; Chapman and Hall), 16 Dec. 1960, 1831

Chimica Generale e Inorganica, G. Bruni; S. R. Levi and M. A. Rollier, Eds. (Libreria Editrice Politecnica, Milan), 17 June 1960, 1803

Nouveau Traité de Chimie Minérale, vol. 16, group 7, and vol. 18, group 8, P. Pascal, Ed. (Masson), 8 Apr. 1960, 1038


Quantum Chemistry, R. Daudel, R. Lefebvre, and C. Moser (Interscience), 12 Aug. 1960, 412


Some Problems of Chemical Kinetics and Reactivity, N. N. Semenov, translated by J. E. S. Bradley (Pergamon), 15 Apr. 1960, 1092

Treatise on Analytical Chemistry, I. M. Kolthoff and Philip J. Elving, Eds. (Interscience), 22 Apr. 1960, 1213


Earth Sciences

Aerial Photographic Interpretation, D. R. Lueder (McGraw-Hill), 22 Apr. 1960, 1217

Agriculture and Ecology in Africa, J. Phillips (Prager), 5 Aug. 1960, 344

Atlantic Hurricanes, G. E. Dunn and B. I. Miller (Louisiana State Univ. Press), 1 Nov. 1960, 1392


Beaches and Coasts, C. A. M. King (Arnold, London; St. Martin’s Press, New York), 10 June 1960, 1728


Elements of Cartography, A. H. Robin- son (Wiley), 22 Apr. 1960, 1215

SCIENCE, VOL. 133
## AAAS SYMPOSIUM VOLUMES

published during 1959 and 1960

<table>
<thead>
<tr>
<th>No.</th>
<th>Retail Members*</th>
<th>Retail Members*</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>436 pp., 65 illus., index</td>
<td>$ 8.50 $ 7.50</td>
</tr>
<tr>
<td>64</td>
<td>526 pp., 283 illus., 1 color page, index</td>
<td>9.75 8.50</td>
</tr>
</tbody>
</table>

### No. 57
Systems of Units—National and International Aspects
Dec. C. F. Kayan, Ed. 308 pp., index
Retail Members:* 6.75 5.75

### No. 56
Symposium on Basic Research
Retail Members:* 3.00 2.50

### No. 55
Photoperiodism and Related Phenomena in Plants and Animals
Retail Members:* 14.75 12.50

### No. 54
The Human Integument—Normal and Abnormal
July Stephen Rothman, 1959 Ed., 270 pp., 59 illus., index
Retail Members:* 6.75 5.75

### No. 53
Grasslands
June Howard B. Sprague, 1959 Ed., 424 pp., 37 illus., index
Retail Members:* 9.00 8.00

### No. 52
Evolution of Nervous Control from Primitive Organisms to Man
June A. D. Bass., 1959 Ed., 240 pp., 61 illus., index
Retail Members:* 5.75 5.00

### No. 51
Zoogeography
Jan. C. L. Hubbs, Ed., 1959 pp., 115 illus., author index, index of scientific names
Retail Members:* 12.00 10.50

* Members' prices are for orders submitted together with payment by AAAS members.

---

To: AAAS,

1515 Massachusetts Ave. NW, Washington 5, D.C.

Please send me the volumes circled:

65 64 63 62 61 60 59 58 57 56 55 54 53 52 51

☐ Payment of $ ........... is enclosed.  ☐ Please invoice at retail prices.

NAME .................................................................................................................

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

CITY .................................................................................................................. ZONE ... STATE ..........................................................
Frontiers of the Sea, R. C. Cowen (Doubleday), 5 Aug. 1960, 346

General Climatology, H. J. Critchfield (Prentice-Hall), 24 June 1960, 1882

General Crystallography, W. F. de Jong (Freeman), 22 Apr. 1960, 1215

Geografia Fizyczna Polski (Physical Geography of Poland), S. Lenczewicz (Foreign Literature Press, Moscow), 22 Apr. 1960, 1213

Geologic Evolution of Europe, R. Brinkman (Enke, Stuttgart; Hafner), 17 Feb. 1961, 456


Introduction to Theoretical Meteorology, S. L. Hess (Holt), 27 May 1960, 1604

Invertebrate Paleontology, W. H. Easton (Harper), 9 Sept. 1960, 666


The Mysterious Earth, L. del Rey (Chilton, Philadelphia), 27 May 1960, 1604

Our Developing World, L. D. Stamp (Faber and Faber, London), 14 Oct. 1960, 1008


Paléontologie Stratigraphique, H. Termier and G. Termier (Masson), 23 Dec. 1960, 1884


Sea off Southern California, K. O. Emery (Wiley), 22 Apr. 1960, 1212

Search for the Past, J. R. Beerbower (Prentice-Hall), 9 Sept. 1960, 666


This Is the American Earth, A. Adams and N. Newhall (Sierra Club), 9 Dec. 1960, 1759


General


Arizona Place Names, W. C. Barnes (Univ. of Arizona Press), 6 May 1960, 1368

The Child Buyer, J. Hersey (Knopf). 24 Feb. 1961, 573

Harvests and Harvesting through the Ages, N. E. Lee (Cambridge Univ. Press). 23 Dec. 1960, 1884

Indian Scientific and Technical Publications, compiled by the National Library, Calcutta (Council of Scientific and Industrial Research, New Delhi), 26 Aug. 1960, 542

Japan's American Interlude, K. Kawai (Univ. of Chicago Press), 22 Apr. 1960, 1211


Scientific Research in British Universities, Dept. of Scientific and Industrial Research (Her Majesty's Stationery Office), 1 Apr. 1960, 980


Science, Vol. 133
Two New Directories Now Available

INDUSTRIAL RESEARCH LABORATORIES
of the United States, 11th Edition

A guide to the activities, personnel, and services of 5,420 laboratories. Each entry includes names of key research officers, the number and kinds of scientific personnel, locations of laboratories, and highly specific descriptions of research activities. In addition to the subject and geographic indexes found in earlier editions, the 11th edition provides a personal-name index of nearly 20,000 individuals in research.

NAS-NRC Publication No. 844, 700 pp., $12.00 postpaid.

SCIENTIFIC and TECHNICAL SOCIETIES
of the United States and Canada, 7th Edition

1597 United States societies and 239 Canadian societies are listed, with information on their officers, histories, purposes, membership requirements, size, meetings, special professional activities, serial publications, and libraries. Index includes subject fields, titles of publications, names of medals and awards, and recent changes in names of societies.

NAS-NRC Publication No. 900, 512 pp., $9.00 postpaid.

Order from
Printing & Publishing Office
National Academy of Sciences
National Research Council
2101 Constitution Avenue, N.W.
Washington 25, D. C.
A basic book on modern biochemistry

The Atoms Within Us
by Ernest Borek

A lucid guide to the procedures and accomplishments of biochemistry. Dr. Borek explores the principles of life itself as embodied in the living cell. His explanation of advances in defending and extending life, and of attempts to recreate it artificially, clarify the work that gave us the wonder drugs, man-made vitamins and hormones, and that now continues the war on cancer. A book that illuminates the ideas and insights of the biochemist at work. 238 pages. $5.00

Psychophysiological Aspects of Space Flight
Edited by Bernard E. Flaherty, Lt. Col. USAF (MC)

Leading space research experts discuss the psychophysiological problems in space flight and review their recent efforts in solving these problems. Topics include: the program and objectives of Project Mercury; special techniques of controlling sensory-physiological reactions to space flight; and narrations of personal experiences in simulated space flights and high-altitude escape situations. 368 pages. $10.00

Air Pollution
World Health Organisation, Monograph Series, No. 46

Fourteen international specialists contributed these studies of trends in air pollution research. Deals with every aspect: history, causes, results, control, prevention, and legislation; includes a report on radio-active pollution of atmosphere. Index, color illustrations. 431 pages. $10.00

Order from your bookstore, or from COLUMBIA UNIVERSITY PRESS
2960 Broadway, New York 27, N. Y.

History and Philosophy of Sciences
Louis Agassiz, E. Lurie (Univ. of Chicago Press), 2 Dec. 1960, 1655
America in the Antarctic to 1840, P. I. Mitterling (Univ. of Illinois Press), 8 Apr. 1960, 1037
The American Civil Engineer, D. H. Calhoun (Technology Press and Harvard Univ. Press), 21 Oct. 1960, 1145
Antarctica, E. Schulthess (Simon and Schuster), 24 Feb. 1961, 574
Basic Values of Western Civilization, S. B. Clough (Columbia Univ. Press), 23 Dec. 1960, 1883
A Bibliographical Checklist and Index to the Published Writings of Albert Einstein, compiled by N. Boni, M. Russ, and D. H. Laurence (Pageant Books), 4 Nov. 1960, 1307
A Bibliography of Dr. Robert Hooke, G. Keynes (Oxford Univ. Press), 24 Feb. 1961, 574
A Conscience in Conflict, J. W. Gruber (Columbia Univ. Press), 30 Sept. 1960, 890
The Edge of Objectivity, C. C. Gillispie (Princeton Univ. Press), 22 Apr. 1960, 1203
Paul Ehrenfest, Collected Scientific Papers, Martin J. Klein, Ed. (North-Holland; Interscience), 22 Apr. 1960, 1204
Errors and Deception in Science, J. Rostand (Basic Books), 20 Jan. 1961, 187
Galathea Report (Danish Science Press, Copenhagen), 20 May 1960, 1521
God Speed the Plow, C. C. Spence (Univ. of Illinois Press), 23 Dec. 1960, 1884
Heavenly Clockwork, J. Needham, W. Ling, and D. J. de Solla Price (Cambridge Univ. Press), 17 June 1960, 1802
A History of Greek Fire and Gunpowder, J. R. Partington (Heffer), 10 June 1960, 1726
A History of Metallography, C. S. Smith (Univ. of Chicago Press), 2 Dec. 1960, 1656
A History of Metals, L. Aitchison (Interscience), 30 Sept. 1960, 887
Kepler, M. Caspar (Abelard-Schuman), 22 Apr. 1960, 1203
The Leopard's Spots: Scientific Attitude toward Race in America, 1815–59, W. Stanton (Univ. of Chicago Press), 1 Apr. 1960, 981
Measuring the Invisible World, A.

ISOTOPES for Your Development Work

Oak Ridge National Laboratory offers more than 300 radioactive and stable isotope products.

RADIOISOTOPES
Processed Solutions — 90 processed radioisotopes may be obtained, including many carrier-free and high specific activity products.

Now Available — Iridium-192 gamma sources with specific activity up to 100 curies per gram, and cobalt-60 radiography sources 1/8 and 1/16-inch in diameter with specific activity greater than 100 curies per gram. At a reduced price, carbon-14 barium carbonate is available at $9.50 per millicurie.

STABLE ISOTOPES
More than 200 stable isotopes available from 50 elements. . . Chemical processing and target fabrication services also offered. . . Ultra-high isotopic purity in a number of isotopes.

For information or literature, write to: Isotopes Division, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee.
Improved de Fonbrune Micro-Forge With Binocular Body

Specifically developed for use in the fabrication of simple and intricate micro-tools of glass or metal under controlled conditions. Use of the de Fonbrune micro-forge is recommended with any type micromanipulator. The forge is now built with binocular stereoscopic microscope. With this modification, the image is observed erect — not inverted — in three dimensions, an important factor in rapid, accurate work.

Affords new simplicity and flexibility for micro-studies in biological or chemical technics.

The de Fonbrune micromanipulator has proved to be of great value in micro-studies in many fields. In biology the instrument is used in cell dissection and isolation ... micro-injection and operation on protozoa ... pH studies on living cells ... isolation and transfer of single bacteria, etc. It has proved equally serviceable in study of fibers and yeast cells, in investigating oils, rust deposits, colloidal, and other materials.

Manufactured under exclusive license on the French patents, the instrument consists of a manipulator and receiver. Use with any microscope ... arranged for right or left hand operation. The micro-tool is mounted on the receiver; impulses from the manipulator are transmitted to the tool through sensitive pneumatic membranes. Within a range of 3 mm, the micro-instrument may be moved in any plane or angle by a single control. Ratio of displacement of control lever and micro-tool may be adjusted from 1:50 to 1:2500.

Write for prices and descriptive bulletin T114.
Bharucha-Reid (McGraw-Hill), 28 Oct. 1960, 1244


Information Processing (Oldenbourg, Munich; Butterworths), 19 Aug. 1960, 464

An Introduction to Electronic Data Processing, R. Nett and S. A. Helzler (Free Press), 8 July 1960, 82

An Introduction to Linear Programming and the Theory of Games, A. M. A. Elshaarawy (Methuen; Wiley), 4 Nov. 1960, 1306

Introduction to Statistical Communication Theory, D. Middleton (McGraw-Hill), 1 July 1960, 31


Mathematical Methods and Theory in Games, Programming, and Economics, S. Karlin (Addison-Wesley), 29 Apr. 1960, 1308

A Primer of Programming for Digital Computers, M. H. Wrubel (McGraw-Hill), 8 July 1960, 82


Statistical Theory of Communication, Y. W. Lee (Wiley), 25 Nov. 1960, 1546

Théorie Relativiste des Fluides à Spin, F. Halbwachs (Gauthier-Villars), 27 Jan. 1961, 273

The Theory of Matrices, F. R. Gantmacher (Chelsea), 22 Apr. 1960, 1216


Medicine

Aktuelle Probleme der, Ernährung, J. C. Somogyi, Ed. (Karger), 4 Nov. 1960, 1306

Clinical Chemical Pathology, C. H. Gray (Arnold; Williams and Wilkins), 12 Aug. 1960, 412

Diagnosis of Veterinary Parasitisms, J. H. Whitlock (Lea and Febiger), 22 Apr. 1960, 1220


Infectious Diseases of Animals, A. W. Stableforth and I. A. Galloway, Eds. (Academic Press; Butterworths), 1 July 1960, 30

Medical Helminthology, J. M. Watson (Bailliére, Tindall and Cox; Williams and Wilkins), 4 Nov. 1960, 1307

Medizinische Grundlagenforschung, K. F. Bauer, Ed. (Thieme), 29 July 1960, 290

Teaching Comprehensive Medical Care, K. R. Hammond and F. Kern, Jr. (Harvard Univ. Press), 1 Apr. 1960, 981

Textbook of Physiology, G. Y. Vladimirov, V. V. Delov, G. P. Konradi, and A. D. Slonim; K. M. Bykov, Ed. (Foreign Languages Publishing House, Moscow), 17 June 1960, 1799

Ticks, D. R. Arthur (Cambridge Univ. Press), 29 July 1960, 291

Physics

Accelerators, R. R. Wilson and R. Littauer (Doubleday), 7 Oct. 1960, 950


Artificial Earth Satellites, L. V. Kurnosova, Ed. (Plenum Press; Chapman and Hall), 13 May 1960, 1164


Elementary Modern Physics, R. T. Weidner and R. L. Sells (Allyn and Bacon), 12 Aug. 1960, 413

Elements of Ion Exchange, R. Kunin (Reinhold), 15 July 1960, 142

Fast Neutron Physics, J. B. Marion and J. L. Fowler, Eds. (Interscience), 2 Sept. 1960, 613

Glossary of Atomic Terms (U.K. Atomic Energy Authority), 25 Nov. 1960, 1547

High-Energy Electron Scattering Tables, R. Herman and R. Hofstadter (Stanford Univ. Press), 15 July 1960, 141

High Energy Nuclear Physics, W. O. Lock (Methuen; Wiley), 27 Jan. 1961, 272

Horns, Strings, and Harmony, A. H. Benade (Doubleday), 8 July 1960, 83

Introduction to Quantum Field Theory, R. Mandl (Interscience), 12 Aug. 1960, 414

Introduction to the Theory of Quantized Fields, N. N. Bogoliubov and D. V. Shirkov (Interscience), 8 July 1960, 84

Modern University Physics, J. A. Richards, F. W. Sears, M. R. Wehr, and M. W. Zemansky (Addison-Wesley), 10 Mar. 1961, 696

Non-relativistic Quantum Mechanics, R. M. Sillitto (Quadangle Books), 17 Feb. 1961, 456

Nuclear Photo-Disintegration, J. S. Levinger (Oxford Univ. Press), 7 Oct. 1960, 951

Open-Channel Hydraulics, V. T. Chow (McGraw-Hill), 22 Apr. 1960, 1215

Physics of the Atom, M. R. Wehr and J. A. Richards, Jr. (Addison-Wesley), 12 Aug. 1960, 413

Physics in Your High School, prepared by the American Institute of Physics (McGraw-Hill), 22 Apr. 1960, 1216


The Restless Atom, A. Romer (Doubleday), 8 July 1960, 83

Saturday Science, A. Bluemle, Ed. (Dutton), 7 Oct. 1960, 950


Special Relativity, W. Kindler (Oliver and Boyd; Interscience), 17 Mar. 1961, 750
Production experience guarantees RELIABILITY

Order with confidence, the quality and dependability your laboratory and research needs demand. Prompt service. All correspondence and inquiries answered immediately.

Write for this FREE CATALOG NOW! No salesman will call.

COLORADO SERUM CO. LABORATORIES

Laboratory and General Office PEAK OF QUALITY
4950 YORK STREET • DENVER 16, COLORADO • MAin 3-5373

Another NEW LECTURE ROOM PERIODIC TABLE
LARGER • EASY TO READ • COLORFUL INCLUDES ATOMIC DATA

Includes all elements and number of naturally occurring radioactive and stable isotopes. Shows atomic number in large type, also weight, density, boiling and melting points, electronic configuration, half-life, and important atomic constants for physics and chemistry. New large lecture room size, 62" x 52", in 4-colors on heavy plastic coated stock.

No. 12056 with wood strips and eyelets .......... each $7.50
No. 12057 mounted on spring roller with brackets.... $12.50

CENTRAL SCIENTIFIC
A Division of Cenco Instruments Corporation
1718-M Irving Park Road • Chicago 13, Ill.
Montreal, N. J. • Toronto • Sonora, Mass.
Los Angeles • Birmingham, Ala. • Ottawa
Cenco S.A., Scheda, The Netherlands

NEW PRICES—NEW PRODUCTS IN WINTHROP’S 1961 PRICE LIST OVER 100 BULK CHEMICALS INCLUDING

- PHARMACEUTICALS such as DIPYRONE, PHENYLEPHRINE
- PYRAZOLONES such as PYRAZOLONE, PHENYL METHYL PYRAZOLONE
- INTERMEDIATES such as DIPHENYLACETONITRILE, MALONONITRILE
- AMINO ACIDS and other BIOCHEMICALS

MANY PURCHASING AGENTS, PRODUCTION MANAGERS AND RESEARCH DIRECTORS HAVE BEEN AMAZED AT THE WEALTH OF CHEMICAL STOCKS AVAILABLE FROM WINTHROP

If you want something Special BE PREPARED
FILL OUT THE COUPON FOR PROMPT MAILING.

Winthrop Laboratories Dept. 54211
Special Chemicals Dept.
1450 Broadway, New York 18, N. Y.

Name

Firm

Street Address

City Zone State

21 APRIL 1961 1263
make calculations directly in solving electroplating problems

No longer need you rely on empirical methods made necessary by previous types of current density cells. With this new Linear Electroplating (Cell) Analyzer, total polarization can be calculated directly. Developed at the Polytechnic Institute of Brooklyn, the Analyzer cell was specifically designed to give linear distribution of current density along the electrode. Thus, calculations can be made from simple measurements. The unit has extensive laboratory and field applications...is extremely useful in the control, development and study of plating solutions.

Fabricated of Plexiglass (II-A) to fine tolerances. The two sides holding the electrodes are opaque, the other two are clear Plexiglass to permit unobstructed observation.

G-793D LINEAR ELECTROPLATING ANALYZER consisting of Plexiglass cell and cover only $29.50

For reference, see J. ELECTROCHEM. SOC. 103 p. 349 (1956). Reprints on request.

New MANOSTAT Linear Electroplating (CELL) Analyzer simplifies current density study in the lab and field

Tempunit fits any suitable container to make a complete ready-to-operate water bath in less than a minute!

Tempunit provides .05° C control differential from ambient to 95° C (205° F) in a 4-gallon uninsulated container. Suction from stirrer circulates over 1 liter of water per minute to external instruments.

Tempunit uses a rugged, heavy-duty neoprene rubber bellows for fail-safe pneumatic control of a 1000-watt immersion heater. All submersible parts except the bimetallic sensing element are nickel-plated for extra long life.

Net weight 6 1/4 lbs. Shipping weight 12 lbs. Overall height 12". Case dimensions 5" x 4 1/2" x 6 1/2". For operation on 115 Volt 60 Cycle A.C.

No. 5414-60 Tempunit each............$135.00

LaPINE SCIENTIFIC COMPANY
6001 South Knox Avenue • Chicago 29, Illinois
LABORATORY SUPPLIES AND REAGENTS

The Special Theory of Relativity, J. Aharoni (Oxford Univ. Press), 22 July 1960, 217
Theory of Elementary Particles, P. Roman (North-Holland; Interscience), 11 Nov. 1960, 1391
The 3-j and 6-j Symbols, M. Rotenberg, R. Bivins, N. Metropolis, and J. K. Wooten, Jr. (Technology Press), 15 July 1960, 143
Turbulence, J. O. Hinze (McGraw-Hill), 22 Apr. 1960, 1215

Political Science
Agricultural Policy, Politics, and the Public, C. M. Hardin, Ed. (American Academy of Political and Social Science), 7 Oct. 1960, 949
American Foreign Policy Since World War II, J. W. Spanier (Prager), 31 Mar. 1961, 1007
Beyond the Welfare State, G. Myrdal (Yale Univ. Press), 29 July 1960, 288
The Changing Middle East, E. Lengyl (Day), 2 Sept. 1960, 614
China Crosses the Yalu, A. S. Whiting (Macmillan), 10 Feb. 1961, 375
Communist China and Asia: Challenge to American Policy, A. D. Barnett (Harper), 22 Apr. 1960, 1205
Convention Decisions and Voting Records, R. C. Bain (Brookings Institution), 4 Nov. 1960, 1307
The Death of Africa, P. Ritner (Macmillan), 3 June 1960, 1662
From Empire to Nation, R. Emerson (Harvard Univ. Press), 3 June 1960, 1662
The Enlargement of the Presidency, R. G. Tugwell (Doubleday), 4 Nov. 1960, 1305
Facts about the Presidents, J. N. Kane (Wilson), 22 July 1960, 215
The Hundred Flowers Campaign and the Chinese Intellectuals, R. MacFarquhar (Praeger), 27 Jan. 1961, 269
India: The Most Dangerous Decades, S. S. Harrison (Princeton Univ. Press), 3 June 1960, 1662
Marxism in Southeast Asia, F. N. Trager (Stanford Univ. Press), 22 Apr. 1960, 1207
The 1956 Presidential Campaign,
THE MIRACLE OF PAPERBACKS

At last the techniques of paperback production have been applied to some of the solid technical works from Cambridge. Printing and binding are astonishingly good; some of the prices are amazing.

INTRODUCTION TO FOURIER ANALYSIS, by M. J. Lighthill. "Stimulating and valuable . . . with a good deal of the charm of eighteenth-century mathematics. It may well become a minor classic." — Science $1.95

MODERN MAGNETISM, by L. F. Bates. The only major work treating magnetism from an experimental standpoint. $3.95

NOTES ON MICROSCOPICAL TECHNIQUES FOR ZOOLOGISTS. A guide through the embarrassing number of methods offered by handbooks of microscopy and histology. $1.75

STATICS, by H. Lamb. Includes hydrostatics and elements of the theory of elasticity. Gives prominence to geometrical methods and graphical statistics. $3.75

DYNAMICS, by H. Lamb. A sequel to Lamb's Statics. $3.75

The Political Economy of National Security, J. R. Schlesinger (Frazer), 15 Apr. 1960, 1093
The Politics of National Party Conventions, P. T. David, R. M. Goldman, and R. C. Bain (Brookings Institution), 8 July 1960, 80
The Presidency, H. Finer (Univ. of Chicago Press), 16 Sept. 1960, 730
The President's Cabinet, R. F. Fenno, Jr. (Harvard Univ. Press), 22 July 1960, 215
Presidential Power, R. E. Neustadt (Wiley), 22 July 1960, 215
Presidential Transitions, L. L. Henry (Brookings Institution), 9 Dec. 1960, 1757
The Purpose of American Politics, H. J. Morgenthau (Knopf), 10 Mar. 1961, 694
The Rebels, B. Crozier (Beacon Press), 16 Dec. 1960, 1829
The Rich and the Poor, R. Theobald (Potter), 3 Feb. 1961, 325
Thought Reform of the Chinese Intellectuals, T. H. E. Chen (Hong Kong Univ. Press; Oxford Univ. Press), 27 Jan. 1961, 269
The Unfinished Revolution, A. B. Ulam (Random House), 2 Sept. 1960, 612
The United States in the World Arena, W. W. Rostow (Harper), 22 July 1960, 218
The Weapon on the Wall, M. Dyer (Johns Hopkins Press), 1 Apr. 1960, 980
Who Wants Disarmament?, R. J. Barnet (Beacon Press), 20 Jan. 1961, 186

Psychology
Drugs and Behavior, L. Uhr and J. G. Miller, Eds. (Wiley), 24 Mar. 1961, 875
Emotion and Personality, M. B. Arnold (Columbia Univ. Press), 17 Feb. 1961, 455
Essentials of Psychological Testing, L. J. Cronbach (Harper), 22 Apr. 1960, 1209
Handbook of Aging and the Individual, J. E. Birren, Ed. (Univ. of Chicago Press), 15 July 1960, 140
The Nation's Children, Eli Ginzberg, Ed. (Columbia Univ. Press), 17 June 1960, 1802
The Open and Closed Mind, M. Rokeach (Basic Books), 15 July 1960, 142
The Strategy of Conflict, T. C. Schelling (Harvard Univ. Press), 1 July 1960, 28
Talent and Education, E. P. Torrance (Univ. of Minnesota Press), 3 Mar. 1961, 635

THE MATHMATICAL THEORY OF NON-UNIFORM GASES, by S. Chapman and T. G. Cowling. Gives the mathematical theory of gaseous viscosity, thermal conduction and diffusion. $2.95

THE MATHMATICAL THEORY OF RELATIVITY, by A. S. Eddington. Shows mathematically how the theory of relativity alters our concept of the world and laws of physics. $2.95

ELEMENTARY MATRICES, by R. A. Frazer, W. J. Duncan, and A. R. Collar. Detailed introduction to method of Matrices with applications. $2.95

THE MATHMATICAL THEORY OF ELECTRICITY AND MAGNETISM, by Sir James Jeans. The standard treatment of the electromagnetic theory for the non-specialist. $3.95

STATISTICAL THERMODYNAMICS, by Erwin Schrodinger. "This little book is so clear, and contains so much information and so many ideas, that I strongly recommend it to students." — George Gamow. $1.65

PLANE PROJECTIVE GEOMETRY, by E. A. Maxwell. On the use of the homogeneous coordinates; a study of methods, not a catalogue of theorems. $1.95

PALEONTOLOGY INVERTEBRATE, by H. Woods. The standard work for the last sixty years of fossils of the invertebrata. $2.50

CAMBRIDGE UNIVERSITY PRESS • 32 East 57th St. New York 22 EACH OF THESE BOOKS IS NOW AVAILABLE AT YOUR BOOKSTORE

21 APRIL 1961
Social Sciences

Automation and the Worker, F. C. Mann and L. R. Hoffman (Holt), 19 Aug. 1960, 463
From Field to Factory, J. S. Slotkin (Free Press), 29 Apr. 1960, 1307
The Forest and the Sea, M. Bates (Random House), 27 May 1960, 1604

The Future of Man, P. B. Medawar (Basic Books), 11 Nov. 1960, 1390
Graduate Education in the United States, B. Berelson (McGraw-Hill), 20 Jan. 1961, 186
Metropolis and Region, O. D. Duncan, W. R. Scott, S. Liberson, B. Duncan, and H. H. Winsborough (Johns Hopkins Press), 23 Sept. 1960, 802
The Ongoing State University, J. L. Morrill (Univ. of Minnesota Press), 12 Aug. 1960, 413
People, Jobs and Economic Development, A. J. Jaffe (Free Press), 22 Apr. 1960, 1206
The Professional Soldier, M. Janowitz (Free Press), 3 June 1960, 1664
The Stages of Economic Growth, W. W. Rostow (Cambridge Univ. Press), 22 Apr. 1960, 1201

Technology

Automatic Language Translation, A. G. Oettinger (Harvard Univ. Press), 5 Aug. 1960, 343
Handbook of Industrial Research Management, C. Heyel, Ed. (Reinhold; Chapman and Hall), 6 May 1960, 1367
Metallurgical Society Conferences (Interscience), 10 June 1960, 1727, vol. 1
Moisture in Textiles, J. W. Hearle and R. H. Peters, Eds. [Textile Book Publishers (Interscience); Butterworths], 8 July 1960, 83
Nutritional Evaluation of Food Processing, R. S. Harris and Harry von Loesecke, Eds. (Wiley), 29 July 1960, 291
Radiation, C. W. Shilling (Grune and Stratton), 26 Aug. 1960, 541
MATHESON GAS MIXTURES for Instrument Calibration

In addition to all of the calibration mixtures, Matheson supplies custom gas mixtures of every type, including radioactive gas mixtures. Extremely close tolerances on specifications can be held. Exact analysis of mixtures is available. Here are a few of the instruments for which calibration mixtures are offered:

- Oxygen Analyzers
- Gas Chromatography
- Infra Red
- Mass Spectrometer

Practically any mixture of the 85 gases listed in the Matheson Compressed Gas Catalog can be supplied, to your specifications. This Catalog contains information on the world's most complete line of compressed gases, and gas regulating and handling equipment.

Write for catalog

THE MATHESON COMPANY, INC.

East Rutherford, N. J.; Joliet, Ill.; Newark, Calif.

Space Handbook, R. W. Buchheim et al. (Random House), 22 Apr. 1960, 1215
Space Technology, H. S. Siefert, Ed. (Wiley; Chapman and Hall), 22 Apr. 1960, 1215

Zoological Sciences

Ascidiae, R. H. Millar (Cambridge Univ, Press), 8 July 1960, 83
Bionomics, Systematics, and Phylogeny of Lytta, a Genus of Blister Beetles (Coleoptera, Melolonthidae), R. B. Selander (Univ. of Illinois Press), 17 Mar. 1961, 751
Bird Portraits in Color, T. S. Roberts, revised by W. J. Breckenridge et al. (Univ. of Minnesota Press), 23 Dec. 1960, 1882
Birds of Anaktuvuk Pass, Kobuk, and Old Crow, L. Irving (Smithsonian Institution), 23 Sept. 1960, 802
Birds of Hawaii, G. C. Munro (Tuttle, Rutland, Vt.), 24 Feb. 1961, 574
Ecology and Distribution of Recent Foraminifers, F. B. Phleger (Johns Hopkins Press), 24 Mar. 1961, 874
Ecology of the Peregrine and Gyrfalcon Populations in Alaska, T. J. Cade (Univ. of California Press), 16 Dec. 1960, 1832
Encyclopaedia Zoologica Illustrated in Colours, vol. 4, Y. K. Okada et al. (Hokuryu-kan Publishing Co., Tokyo), 8 July 1960, 81
Die Entdeckung neuer Organisationstypen im Tierreich, P. Ax (Ziemesen Wittenberg, East Germany), 3 Feb. 1961, 326
The Kirtland's Warbler, H. Mayfield (Cranbrook Institute of Science), 23 Dec. 1960, 1882
Louisiana Birds, G. H. Lowery, Jr. (Louisiana State Univ. Press), 24 Feb. 1961, 574
Perspectives de la Zoologie Européenne, J. Leclercq (Duculot, Gembloux, Belgium; Rustique, Paris), 22 Apr. 1960, 1218
Systema Helminthum, S. Yamaguti (Interscience), 3 June 1960, 1665

NEW FROM KONTES

This K-28350 Concentrator is another new item in the expanding Bantam-wareline. In use, the more volatile components are boiled off, condensed, and removed to a side flask. Residue collects in a small sump at the bottom, for subsequent removal by pipetting. Hoses and springs are provided so that the boiler may be easily heated using oil. K-28350 Concentrator $20.90.

If you already have 7/12 Thermometers, they can be used with Bantam-ware, by assembling them with K-30925 Thermometer Adapters. The K-28745 Vacuum Jacketed Distillation Head is shown here with one 7/12 Thermometer and one 10/18 Thermometer. Both distillation head connections are 10/18. This is another example of the versatility of Bantam-ware.

bantamware by KONTES GLASS CO.
Vineland, N. J.
PAPERS ON BACTERIAL VIRUSES

Selected by Gunther S. Stent, University of California at Berkeley

New and up-to-date, this is an important collection of 25 significant experimental papers for use as text and supplementary reading. Presenting such important contributions as the early observations of F. D'Hérelle, Ellis and Delbrück's paper marking the beginning of modern phage research, and more recent studies on such topics as the resistance of bacteriophage to ultraviolet light, the text also provides incisive introductory material and a valuable bibliography of 164 references. 365 pages, paper $4.50

PAPERS ON BACTERIAL GENETICS

Selected by Edward A. Adelberg, University of California at Berkeley

Presenting 27 important papers by internationally known bacterial geneticists, this advanced text features such recent genetic discoveries as the transduction of bacterial genes by bacteriophages, the polarity of bacterial conjugation, the role of DNA as the germinal substance of bacterial viruses, and the structure of DNA itself. The text also provides a comprehensive introduction and an indispensable bibliography of 177 references. 400 pages, paper $4.50

LITTLE, BROWN and COMPANY  Boston / Toronto / SINCE 1837
scientist and a thoroughgoing scoundrel. Closer to our times, where was scientific honesty in F. Joliot's promotion of the germ-warfare fabrication in 1952? Didn't scientists participate in Nazi atrocity experiments or in Soviet brainwashing? On a more mundane level, I find scientists holding all manner of religious and antireligious beliefs, having all manner of political affiliations, just as do lawyers, doctors, and the rest. The ethical standards in scientific work are real (are they not also in other professions?), but that does not seem to keep us from having our full share of false prophets.

The supposition that particular technical knowledge possessed by scientists gives us a special claim to the role of leader (as opposed to technical adviser) I regard as silly, just as I regard parallel claims that generals and admirals should determine over-all war policy, that doctors and psychiatrists should decide on candidacy for sterilization or euthanasia, or that lawyers should rule on capital punishment.

I do believe that scientists should take active roles in community and national affairs, perhaps especially in areas where their technical knowledge and habit of open discussion is of help.

Let this be done, however, with innate humility, with complete respect for other educated and intelligent people, and with no prior assumption that the measured opinions of the nonscientists are less worthy than those of the scientist.

I would not be so concerned with this first aspect of Sir Charles's address were it not for the second, and its implicit conclusion. In it I detect the not uncommon condition of 20/20 vision in viewing Nazi horrors and decided myopia with respect to Soviet ones. Should we not shudder as much at the slaughter of peasants as at the cremation of Jews? as much at the Hungarian massacre as at that of Lidice? Do we not deserve, even from an ex-scientist, as realistic and frank an appraisal of current evils as of past ones?

It is only realistic to see that, in test cessation negotiations, the horrible risk is that we will make nontrivial concessions and divorce the subject from general disarmament, giving an unretrievable military advantage to an undeniably hostile, amoral, and imperialistic regime. The consequences are ones the Hungarians, at least, well understand.

On the other hand, I find the so-called N-nation problem largely irrelevant. The current test moratorium did not prevent France and will not prevent Mainland China and other nations from scratching together some nuclear devices. Really, this is a minor hazard as compared to that of the large stockpile, the effective delivery system, and the freedom from moral restraint of the Soviets. In the meantime, the overblown concern with the N-nation, as well as with the fallout, problem is steadily deflecting us from a clear and resolute facing of what is actually the dominant danger to the world today: Soviet power and aggressive intent.

ARTHUR W. ADAMSON
Department of Chemistry, University of Southern California, Los Angeles

I do not propose to reply piecemeal to comments on my article, certainly not to comments of this kind. When I am in the United States in April I shall probably take the occasion, in a lecture, to have a look at the problem in the light of what has been said since.

During that period there is going to appear an authoritative critical analysis of the kind of military review which I suspect Adamson supports. I would like this military analysis (which comes from a much more impressive source than mine) to be in the common pool before I have another go at the argument.

C. P. SNOW
199 Cromwell Road, London, England
Just Published .......... a new series

ANNUAL REVIEW OF PHARMACOLOGY

Volume 1 (April 1961)

Other Annual Reviews

ENTOMOLOGY Vol. 6 Jan. 1961
PSYCHOLOGY Vol. 12 Feb. 1961
PHYSIOLOGY Vol. 23 Mar. 1961
MEDICINE Vol. 11 May 1960
PLANT PHYSIOLOGY Vol. 11 Jun. 1960
BIOCHEMISTRY Vol. 29 Jul. 1960
PHYSICAL CHEMISTRY Vol. 11 Sept. 1960
NUCLEAR SCIENCE Vol. 10 Dec. 1960

$7.00 postpaid (U.S.A.); $7.50 postpaid (elsewhere)
Most Back Volumes Available

ANNUAL REVIEWS, INC.
231 Grant Avenue, Palo Alto, California

FRACTION COLLECTORS
...for every program...for every budget!

CONTINUOUS . . .
for long-term or overnight use.
• 240 test tubes, 18 x 130 mm.
• Four rows of 60 each.
• Turntable, 24" diameter.
• Time drop and volume collection.

REFRIGERATED . . .
the mobile coldroom, refrigerated from column to collecting tubes.
• Fractions in the turntable temperature-controlled.
• Fraction collectors removable for all-purpose cold-room work.
• Mobile—on casters.

* 30 different models, including SECTIONAL
(for processing during fraction collecting)

NOW AVAILABLE
U-V MONITOR Attachment
for rapid compound identification.
Adaptable to ALL fraction collectors.

For complete description of all Fraction Collectors write for Bulletin S3-4000

LABORATORY APPARATUS
BUCHLER INSTRUMENTS, INC.
514 West 147th Street, New York 31, N. Y.
ADirdonack 4-2626

Laboratory Box Furnaces by LINDBERG

Models B-2 and B-6

Model NEB-4
A compact, self-contained, versatile electric furnace (max. temp. 1850°F) ideally suited for medical, chemical and industrial laboratories. Write us for Bulletin 1074.

Model G-10
A rugged, complete furnace for laboratory use. Wide temperature range, operable continuously at temperatures from 300°F. to 2500°F. Write us for Bulletin 1053.

Laboratory Equipment Division
LINDBERG ENGINEERING COMPANY
2450 West Hubbard Street, Chicago 12, Illinois

Lindberg Laboratory Equipment is sold only through Laboratory Supply Dealers.

21 APRIL 1961

1273
Effective Use of Information

In the course of a study of the U.S. system for handling science and engineering information, the tremendous influence of the educational techniques employed in the training of U.S. scientists and engineers has become very apparent. Radical improvements in the information handling system are hamstrung by the educational system, which turns out a professional scientist or engineer accustomed to acquiring information by the complex, diffuse, and grossly inefficient techniques now in use. Habit patterns thus established in the schools are difficult to change.

The fruits of scientific and engineering discoveries (indeed, their very justification) lie in their application to mankind's daily problems, and the major stumbling blocks in the way of progress are human beings habituated to inefficient methods of acquiring, using, and disseminating information, floundering in an ever-growing morass of technical information. There seems little ground for hope that the flood of technical information will return quietly to its former, confined channels; the volume of published literature is doubling every decade or less. Piece-meal attempts to shore up the present information system will be helpful, but only for a short time. What is needed is a revolution in the training of scientists and engineers, so that their abilities to acquire information of a directly pertinent nature will be multiplied several-fold. I believe the average technically trained man could triple his productivity if he had a more efficient information system at his disposal, and if he were motivated and trained to use it.

It is true that some highly creative research workers on the frontiers of science are productive, even with the present inefficient information system. The numbers of people in these activities are, however, relatively small, and it is conceivable that even their creative productivity could be enhanced by better methods of acquiring and using available information. It is also true that groups of research scientists working with very large, expensive, experimental equipment such as linear accelerators probably know many workers engaged in similar research and exchange information with them informally. While this is true at one period in the history of any development, these frontier areas of science soon become like other well-established areas.

The incentive for a radical improvement in U.S. methods of handling technical information lies, of course, in the need for maximum utilization of the relatively few scientists and engi-
neers, in whose hands in large measure lies the national security. The extraordinary emphasis in the U.S.S.R. on training technicians to apply available information is well known. The emphasis which is given by the U.S.S.R. to technical information at the State Council of Ministers’ level is also well known (even if it is not so well known that the centralized information structure is performing erratically). The United States was founded to give the individual room for maximum development, and its educational system is based on giving each person an opportunity to develop his or her talents to the maximum extent possible. The United States might well make a large national effort to discover and apply new and better techniques for training individuals in the most effective use of information, and then to devise an information system which can serve these better-developed citizens.

W. T. Knox
Esso Research and Engineering Company, Linden, New Jersey

Style Manual for Biological Journals: Approval of Manuscripts

Researchers ordinarily submit manuscripts to their professional journals without prior approval by administrative officers of their institutions: at least this is true in universities. Do editors consider this an undesirable practice and one to be combated?

The Committee on Form and Style of the Conference of Biological Editors has issued a little book entitled Style Manual for Biological Journals. Chapter 3 of this begins, “The author should obtain approval from the responsible official within his institution before submitting a manuscript, to safeguard the interests of all staff members against erroneous or premature publication.”

It is true that erroneous and premature publication harms the author and makes his institution ridiculous, but that is a small matter compared with the good effects our present editorial system has on science in general. As a rule, the journals will consider a manuscript regardless of who the author is and will see that it is reviewed by experts. If these men think it is good, it will be published. If they think it is bad, and the author isn’t convinced, he can get the manuscript back and try a different journal. It is surprising that editors should undervalue their own role in the scientific process and should seek to legitimize a veto power by presidents, deans, and department heads.

Where administrative censorship is
Radiation from Solar Flares

We have read with some interest the article in *Science* [133, 312 (3 Feb. 1961)] entitled, "Limitations on space flights due to cosmic radiations," by Howard J. Curtis. The work discussed reported on the effect of concentrated doses, and the results represent an important finding, for they completely remove any doubt which may have remained about the ability of the galactic cosmic rays to cause radiation problems in space.

However, we are somewhat disturbed that an article on an important topic which is in a journal widely read by biologists should have omitted a discussion of the potentially most troublesome source of radiation. We refer to the frequent storms of solar cosmic rays originating in large flares.

These storms have been widely discussed at meetings of the American Physical Society and the American Geophysical Union. The literature abounds with papers on the subject, many of which point out the very serious radiation hazard to space flight outside the earth's magnetic field or in the polar regions. We are quite certain that every technical group considering space flight is well aware of this problem and has gone to considerable effort to examine the difficult problem of shielding against the solar cosmic rays. We have in our files many reports on the subject of shielding, as well as records of conferences with the space agency, the Radiation Research Society, the Air Force medical groups, and other organizations. All of the authors quoted in Curtis's article, we are sure, are also familiar with the solar cosmic rays and their potentially dangerous effect from the standpoint of radiation.
Great flares on 23 February 1956, in May 1959, and in July 1959 produced dangerous radiation levels and have been widely studied. The recent solar-flare eruptions in November of 1960 produced exposures, due to protons in the energy range 50 to 500 Mev, of 1 rad/hr in balloon instruments in the atmosphere. The free space radiation probably approached 100 rad/hr. This dosage represents a very large event, but the other strong events mentioned probably produced similar radiation levels. The total number of such events, of all sizes, was more than 35 during the last 3 years. For programs such as the Apollo program and others involving extended trips away from the earth, this radiation is a matter of serious concern and, at solar maximum, is difficult, if not impossible, to deal with.

John R. Winckler, Edward P. Ney
School of Physics, University of Minnesota Institute of Technology, Minneapolis

Winckler and Ney are quite correct in indicating that the solar-flare radiation is an important aspect of the radiation hazards of space flight. At the time my article was written, nearly a year ago, there had not been enough measurements in space for us to be able to assess the biological hazard, so I discussed the flares as a perturbation on the radiation belts. Now we know, largely through the excellent work of Winckler and Ney, that they constitute an additional hazard which will be very troublesome for some types of space travel. In such an active field, a review article may be out of date by the time it is published.

Howard J. Curtis
Department of Biology, Brookhaven National Laboratory, Upton, New York

Meeting of Zoologists

A most unfortunate impression of the recent annual meeting of the American Society of Zoologists is created by your story [Science 133, 89 (13 Jan. 1961)]. Although few in number, those present did devote much of the meeting to matters of professional concern to the members of the society, and it was only when adjournment appeared imminent that there was introduced the statement featured in your story. The subsequent discussion was hurried, and the action of the society on the many amendments and modifications of the statement you quote [recommendation for the implementation of programs for research and training in the]

Read pH to 0.003... The Beckman Model 76 Expanded Scale pH Meter combines all these indispensable features to satisfy the advanced and growing precision requirements of the modern industrial laboratory:

- Expansion of any 2 pH span full scale
- Readability and repeatability to 0.003 pH or 0.3 m.v.
- 0-14 pH range and 0-1400 m.v. range
- Accurate to ± 0.02 pH or ± 2 m.v.
- AC amplifier insures drift-free performance
- Easy, push-button operation
- Direct-reading, mirror-backed scale

The Model 76 may be used with a wide range of reliable Beckman standard or special electrodes and with a potentiometric recorder to provide permanent measurement records. For full information contact your Beckman laboratory apparatus dealer, or write for Data File 38-16-01. Beckman

Scientific and Process Instruments Division
Beckman Instruments, Inc.
Fullerton, California
field of birth control] was extremely confused. My own recollection of our last action on this matter before the conclusion of the meeting leads me to consider your story seriously inaccurate.

In the course of the discussion there was raised a question of the ability of this small group to consider this matter within the limitations imposed by the new constitution of the society. Without a formal ruling on this question, the matter was put to a vote. Of approximately 60 members present, two or three more than 30 favored the proposal, and two or three less than 30 opposed. Regret at the narrow margin of voting was expressed by several speakers, including, I think, those who had introduced and seconded the original proposal. A number of modifications and amendments were then introduced and discussed. Finally, it was moved and seconded that the proposal should be submitted for rewriting to a committee to be appointed by the president of the society. This motion was passed by a clear vote, and the meeting was adjourned. It appeared to me, at that time, that such action required the submission of the rewritten proposal to a subsequent meeting, after proper consideration of the possible constitutional requirement for the submission of the question to the written vote of the entire membership.

In contrast, the action on Prosser's resolution of opposition to Senate Bill 3570 [on regulating the use of laboratory animals] was definite and strong. It was apparent to all that such legislation would present a serious threat to the professional activities of the members of the society, and that such a direct attack upon the chief concern of the society, the advancement of biological research, required the strongest action and fullest energies of the society. Such concerted action was inhibited by the second resolution, as was apparent to nearly half of those present. That this expectation has been fulfilled could scarcely have been demonstrated more effectively than it was by your story. Beyond the short introductory paragraph, you devote 36 lines to the proposal of divided interest and only 19 lines to opposition to a major threat to biology—a ratio of nearly 2 to 1 in the wrong direction.

I hope that those concerned about Senate Bill 3570 are exaggerating the danger. But discussions among people not concerned with biological research do not support that hope. Indeed, such conversations suggest that even Prosser and Wilbur, who have been particularly active in this campaign, may be underestimating the public support for this pernicious proposal. If such be the case, it appears particularly unfortunate that we should divide whatever slight influence may be exerted by the society and by the AAAS.

It is hoped that your future treatment of the actions of associated societies may reflect more accurately the intensity of the concern of the membership for proposals before the legislatures. Surely, no member of Senate or House could be blamed for concluding, after reading your report, that the American Society of Zoologists is only mildly interested in Senate Bill 3570. To me, at least, this did not appear to be the sense of the meeting.

PAUL FOLEY NACE
McMaster University,
Hamilton, Canada

As retiring secretary of the American Society of Zoologists, I wish to comment briefly on Nace's assertion that the society acted hastily, confusedly, and probably illegally in passing a resolution urging governmental support of research and the training of medical personnel in the field of birth control while acting at the same time in a strong, definite, and admirable manner in passing a resolution against Senate Bill 3570, the so-called Cooper bill to regulate the use of laboratory animals. I would also like to comment on the charges that Science was "seri-
Micromethods have been found reliable, efficient, and rapid in all fields of chemistry including biochemistry, as well as in pharmacology, toxicology, and criminology. They have had useful applications in many branches of industry. Even greater benefits can be expected from applications still to be discovered in science and industry.

MIKROCHIMICA ACTA offers original papers and reviews by leading experts in microchemistry of many countries. Occasionally the authors differ widely in their approach to a particular problem; the journal thus contributes a desirable diversity of viewpoints. The articles are published in English, French, German, Italian or Spanish, with summaries in the first three languages.

MIKROCHIMICA ACTA goes back directly to Friedrich Emich and Fritz Pregl, the founders of microchemistry. In its present form, the journal has appeared since July 1953, and is the continuation of MIKROCHEMIE VEREINIGT MIT MIKROCHIMICA ACTA.

MIKROCHIMICA ACTA. Bimonthly. One volume per year of approximately 1000 pages. Price per annum $29.— (Plus registration postage $1.75)

SPRINGER-VERLAG IN WIEN
Distributors in the U.S.A.:

STECHERT-HAFNER, INC. WALTER J. JOHNSON, INC.
31 East 10th Street 111 Fifth Avenue
New York 3, N.Y. New York 3, N.Y.

PAPER CHROMATOGRAPHY APPARATUS

Write for Catalog K-50
Describing Special Apparatus for Paper Chromatography

Write for Electric desalter for the removal of inorganic salts from sugars, amino acids, and other organic acids in preparing samples for paper chromatography

KENSINGTON SCIENTIFIC CORPORATION
1717 FIFTH STREET  BERKELEY 10, CALIFORNIA

PAPER CHROMATOGRAPHY APPARATUS

Write for Electric desalter for the removal of inorganic salts from sugars, amino acids, and other organic acids in preparing samples for paper chromatography

KENSINGTON SCIENTIFIC CORPORATION
1717 FIFTH STREET  BERKELEY 10, CALIFORNIA

HELLER ELECTRONIC VARIABLE-SPEED

AC CONTROLLER and Matching DC MOTOR

2T60 ELECTRONIC CONTROLLER
with matching 1/50 H.P. DC MOTOR

$87
Complete, F.O.B., Las Vegas, Nevada

SPECIFICATIONS
- Thyatron tube operated controller gives stepless operation
- Input: 110-120 V., 60 cy. single phase
- Output: 0-120 V., 200 ma. DC to armature
- 1/50 H.P. ball bearing, right angle, gear head, shunt wound, DC motor
- Reversible
- Armature shaft is extended
- Armature speed 0 to 4000 R.P.M.
- Motors in gear ratios: 6, 18, 30, 60, 100, 300, 540, and 1120:1 in stock.

GERALD K. HELLER CO.
2673 South Western Street, Las Vegas, Nevada, P.O. Box 4426
ouslly inaccurate" in reporting the annual meeting at which these resolutions were passed, and that it showed gross bias in devoting 36 lines to birth control and only 19 to animals for research.

As to the facts of the reporting, there hardly is any room for inaccuracy in the *Science* account since it consists merely of a very short paragraph stating that the two resolutions were passed and then quotes each of the resolutions. The reason why 36 lines are devoted to birth control and 19 to animals for research is very simple: the birth control resolution required 36 lines to print, the animals for research resolution, 19 lines. Everyone admits that both resolutions passed and that well over a quorum was present, even under the new constitution, which more than doubled the number required.

I have reared both the new and the old constitution and can find no suggestion, much less requirement, that motions passed by the members at the annual meeting should be sent to absent members for a mail vote.

How much confusion there really was is a debatable point. A motion was offered favoring governmental support for research and medical training in the field of birth control. Only two or three people spoke against it. I myself, perhaps unfortunately, then urged an amendment, but the majority felt it weakened the resolution, which passed in its original form, 39 to 25. Thus 61 percent favored the resolution in its "strong" form. Presidents of great nations more than once have been carried into office on far slimmer margins. Nevertheless, the matter was still further discussed, and it was finally agreed, almost, but not quite, unanimously to accept the motion but with the provision that it should be reworded by a committee before publication. This was done. I was appointed to the committee myself.

Of course it is possible to argue that the customarily small number of people who show up at annual business meetings is not a representative sample. However, there are good reasons, based on past experience, for believing that, at least in the American Society of Zoologists, the members who attend are, in fact, reasonably representative.

It is also possible to argue that to advocate research and free access to scientific knowledge in the field of birth control is wrong because a scientific organization should remain morally uncommitted. This is clearly not Nace's view, because he strongly favors society action against Senate Bill 3570.

GARDNER B. MOMENT

American Society of Zoologists,
Goucher College, Baltimore, Maryland

Institutions and Scholars

The article "Personality and scholarship" [*Science* 133, 362 (10 Feb. 1961)] by Paul Heist, T. R. McConnell, Frank Matsler, and Phoebe Williams, of the staff of the Center for the Study of Higher Education, University of California, Berkeley (except for Matsler, who is at Humboldt State College), contains the following incorrect statement (p. 363, col. 2): "The institutions are listed in the order of the Knapp and Greenbaum indices of productivity. It may be noted that about 70 percent of the 216 male students attended the ten most productive institutions." [As stated by the authors, the Knapp and Greenbaum index of productivity was the "number of students per thousand graduates from 1946 to 1951 who later received either (i) Ph.D. degrees, (ii) university fellowships, (iii) government fellowships, or (iv) private foundation fellowships exceeding $400 per year." ]

Table 1 in the article is not arranged in the "order of the Knapp and Greenbaum indices of productivity," as stated. It is arranged according to the ratio of

<table>
<thead>
<tr>
<th>School</th>
<th>Scholars per 1000 graduates (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
</tr>
<tr>
<td>Swarthmore</td>
<td>61</td>
</tr>
<tr>
<td>Reed</td>
<td>53</td>
</tr>
<tr>
<td>University of Chicago</td>
<td>48</td>
</tr>
<tr>
<td>Oberlin</td>
<td>40</td>
</tr>
<tr>
<td>Haverford</td>
<td>40</td>
</tr>
<tr>
<td>California Institute of Technology</td>
<td>38</td>
</tr>
<tr>
<td>Carleton</td>
<td>35</td>
</tr>
<tr>
<td>Princeton</td>
<td>32</td>
</tr>
<tr>
<td>Antioch</td>
<td>32</td>
</tr>
<tr>
<td>Harvard</td>
<td>27</td>
</tr>
<tr>
<td>Yale</td>
<td>27</td>
</tr>
<tr>
<td>Queens</td>
<td>26</td>
</tr>
<tr>
<td>Grinnell</td>
<td>24</td>
</tr>
<tr>
<td>Wesleyan</td>
<td>22</td>
</tr>
<tr>
<td>Kenyon</td>
<td>22</td>
</tr>
<tr>
<td>Johns Hopkins</td>
<td>21</td>
</tr>
<tr>
<td>Massachusetts Institute of Technology</td>
<td>21</td>
</tr>
<tr>
<td>University of the South</td>
<td>20</td>
</tr>
<tr>
<td>Knox College</td>
<td>20</td>
</tr>
<tr>
<td>Cornell</td>
<td>20</td>
</tr>
<tr>
<td>Cooper Union</td>
<td>18</td>
</tr>
<tr>
<td>Beloit</td>
<td>18</td>
</tr>
<tr>
<td>Columbia</td>
<td>18</td>
</tr>
<tr>
<td>Pomona</td>
<td>17</td>
</tr>
<tr>
<td>Wooster</td>
<td>17</td>
</tr>
<tr>
<td>Augustana</td>
<td>17</td>
</tr>
<tr>
<td>DePauw</td>
<td>17</td>
</tr>
<tr>
<td>Females</td>
<td></td>
</tr>
<tr>
<td>Bryn Mawr</td>
<td>40</td>
</tr>
<tr>
<td>Barnard</td>
<td>40</td>
</tr>
<tr>
<td>Radcliffe</td>
<td>20</td>
</tr>
<tr>
<td>Vassar</td>
<td>17</td>
</tr>
<tr>
<td>Cornell</td>
<td>16</td>
</tr>
<tr>
<td>University of Pennsylvania</td>
<td>16</td>
</tr>
<tr>
<td>McMurray</td>
<td>12</td>
</tr>
<tr>
<td>Mt. Holyoke</td>
<td>12</td>
</tr>
<tr>
<td>Smith</td>
<td>11</td>
</tr>
<tr>
<td>Sienna Heights</td>
<td>11</td>
</tr>
<tr>
<td>University of Chicago</td>
<td>11</td>
</tr>
</tbody>
</table>

At all bookstores
National Merit Scholarship students per thousand students enrolled. The actual "order of the Knapp and Greenbaum indices of productivity" [R. H. Knapp and J. J. Greenbaum, The Younger American Scholar (Univ. of Chicago Press, Chicago, 1953), pp. 16, 70] is as shown in Table I.

Although in general there is a high degree of correlation between the two listings with respect to the schools included, comparison of the two tables will show that there are gross differences between the two in the rankings for individual schools, as would be expected. Moreover, a few of the schools that appear in the listing given here do not appear at all in Table 1 of the article—for example, Antioch, Queens, Kenyon, Cooper Union, Beloit, and Wooster for males and McMurray and Stenna Heights for females. On the other hand, the following schools listed in Table 1 of the article were not among the first 27 for males in the Knapp and Greenbaum index of productivity: Amherst, Williams, Brown, University of Pennsylvania, and Dartmouth. Swarthmore and Grinnell were not among the first 11 for females. It is obvious that this is due to the meager statistical significance of many of the data in Table 1 of the article. More than half of the schools listed in that table had four or fewer National Merit Scholarship students. The table should have indicated that the data were for one year only (1956), and that many of the individual listings were not statistically significant. (Or, obviously, data that were not statistically significant could have been left out, or the table could have included the eight schools mentioned above that were in the Knapp and Greenbaum indices for productivity but did not happen to have any National Merit Scholarship students in 1956.)

There is a critical lack of published information that can give an indication of the comparative qualities of various schools; it is desirable to have information published that can be used to help fill this need. But precisely because of the intensity of interest in this kind of information, because of the use to which any data such as these will be put, and because of the sensitivity of any such ranking as this (involving both productivity and ratio of National Merit Scholarship students), it was incumbent upon Heist et al. to make every effort to forestall inaccurate interpretations. In this instance, without knowledge of the Knapp and Greenbaum book, it would be very difficult for the average reader to obtain an accurate impression.

ROBERT T. JORDAN
Council on Library Resources, Inc.,
Washington, D.C.
We want to thank Robert T. Jordan for calling attention to the following incorrect statement in our article: “The institutions are listed in the order of the Knapp and Greenbaum indices of productivity.” The title of our Table 1, however, is correct: “Distribution of male and female National Merit Scholarship students among institutions ranked high in the production of scientists and scholars.” This table head indicates the basis for ordering the institutions.

The sentence immediately following the incorrect statement is accurate as it stands; the “70 percent of the 216 male students” refers to the number of the ten most productive institutions (California Institute of Technology excluded) listed in the Knapp and Greenbaum volume.

Needless to say, we would like to avoid giving the reader a basis for inaccurate interpretation, and we believe that the article does not imply that there are differences in quality among the institutions listed in Table 1. We avoided making any qualitative comparisons among these schools, since our purpose was simply to present differences between the students who entered a group of more productive institutions and the students who entered a group of less productive institutions.

There would be no point in computing the statistical significance of the differences in numbers or proportions of National Merit Scholarship students attending the institutions listed in our Table 1. This would obviously be irrelevant.

For the purpose of simplicity, we included in our Table 1 only those of the 50 highest-ranking institutions in the Knapp-Greenbaum list in which one or more of the 1956 National Merit Scholarship students happened to be enrolled. We see no reason why a careful reader would find any implication concerning the relative quality of institutions in this table.

Knapp and Greenbaum did not include Swarthmore and Grinnell in their final list for females because the two institutions did not have 400 graduates over the period of the study. We included these two colleges in our Table 1 for the following reasons: (i) the number of graduates from these institutions approached the Knapp-Greenbaum criterion figure of 400 (397 for Swarthmore and 372 for Grinnell) and far exceeded the figure for most of the other institutions; (ii) the Knapp-Greenbaum indices of the number of female scholars per 1000 graduates [Knapp and Greenbaum, The Younger American Scholar (1953), appendix 1, p. 103] placed these two institutions second and third, respectively, following only Bryn Mawr in order of rank; (iii) both institutions ranked high on the indices for male graduates.

We believe that the text made it clear that the data were for one year only, since it was stated that “the sample... consisted of all the winners and a 10-percent sample of those who received certificates of merit (the near-winners) from the National Merit Scholarship Corporation in the spring of 1956.”

PAUL A. HEIST
T. R. McCONNELL
Center for the Study of
Higher Education,
University of California, Berkeley

Salivary and Motor Conditioning

I was greatly astonished when reading a report by Martin M. Shapiro published in Science under the title “Respondent salivary conditioning during operant lever pressing in dogs” (1). The result obtained by the author, as formulated in the abstract, runs as follows: “Respondent salivary conditioning was found to occur during operant
IMPORTED HARD PORCELAIN FILTERS

These hard porcelain filters have been developed for bacteriological and other filtration problems in the chemical/pharmaceutical laboratory. The glazed porcelain construction facilitates cleaning and is particularly useful for work with metal-attacking or metal-sensitive materials. Acids in concentrated form have no effect on this porcelain. Multi-purpose design permits universal application to a variety of problems. Five different arrangements for operation under pressure or suction; five versatile assemblies from a single basic system.

Clarifying and sterilizing under pressure
Clarifying under suction
Standard alluvial system
Alluvial system under pressure
Standard suction arrangement

BRINKMANN INSTRUMENTS, INC.
115 Cutter Mill Road, Great Neck, N.Y.
Philadelphia • Cleveland • Houston • Miami • Menlo Park, Cal.

Write for catalog 99 FR 1.

CALL US COLLECT AT ANY TIME
JUST TO GET ACQUAINTED

Day, Station to Station, PROspect 1-5750
Night, Person to Person, Dan Broida, WYdown 3-6418

The Research Laboratories of S I G M A
CHEMICAL COMPANY
3500 DEKALB ST., ST. LOUIS 18, MO., U. S. A.
"Indispensable...henceforth, no one can work at the professional level in this field without reference to Hull and Kelso."—G. G. Simpson, American Museum of Natural History, in Science.

The MAMMALS of NORTH AMERICA
E. RAYMOND HALL, University of Kansas; and KEITH R. KELSON, National Science Foundation

A comprehensive manual on the 3,800 named kinds of North American mammals. Orders and sub-groups are arranged in evolutionary sequence, with a series of 500 maps detailing the geographical distribution of the species. Subspecies are cross-referenced to original description and first usage of current name-combination. There are diagnoses for all taxonomic categories above subspecies, keys to species identification, and concise statements on habits. "The most valuable single work to appear in American systematic mammalogy."—William H. Stickle in Wildlife Review, 1,241 pp. 2 vols.: $35

BIOGEOGRAPHY
An Ecological Perspective
PIERRE DANSEAU, New York Botanical Garden

Pioneering study provides a synthesis of the environmental relationships of living organisms, with emphasis on the higher plants. The components of the biogeographic community are analyzed in terms of their historical setting, their climatic tolerance, adjustment to habitat and to one another, and genetic make-up. Book achieves an integrated perspective which provides common ground for the interpretation of environmental complexes. "Remarkable in the amount of material that is encompassed...a penetrating evaluation."—William T. Penfield, University of Oklahoma, 1957, 394 pp. $8.50

INTRODUCTION to QUANTITATIVE GENETICS
D. S. FALCONER, University of Edinburgh

This book focuses on the inheritance of quantitative differences between individuals, differences of degree rather than kind—which form the major part of biological variation. The basic theory of quantitative variation is developed, showing what variations can be attributed to genetic and non-genetic causes. Synthesizing a wealth of previously scattered material, book fully covers the relationship of quantitative characters and biological fitness, the causes of genetic variability in natural populations, and the properties of genes concerned with quantitative variation. 1960, 348 pp. $6

Konorski has raised the question of the extent to which my report in Science was a new contribution to the study of the relationship between operant and respondent conditioning. Unfortunately, particularly in psychology, even minor differences in experimental procedure seem to make quite a difference both in the results obtained and in their interpretation. There are major differences between the procedures used by Konorski in his studies and those used in my series, of which the report to which we are referring was the first publication. (i) In the work described by Konorski (1), a leg-lifting lever-pressing conditioning, the occurrences of the two conditioned responses being positively correlated.

The method of combining the salivary (type 1) with the motor (type 2) conditioned response used by Shapiro was first described by Konorski and Miller as early as 1930, in French, under the title "Méthode d'examen de l'analysateur moteur par les réactions salivo-motrices" (2). Since that time a great number of experimental studies have been published in which this method was used in various experimental conditions. Although extensive monographs dealing with our prewar studies of this subject were published only in Polish (3) and Russian (4), references to these and other papers, as well as the general description of the facts obtained, were presented not only in my English monograph concerning conditioning (5) but also in various American papers and monographs by Razran (6), Hilgard and Marquis (7), and others. After the war all papers of our laboratory were published in English in Acta Biologicalis Experimentalis, a journal easily available in America. The method is also used in several Russian laboratories.

It is really regrettable that facts which are generally known by those concerned in the given subject are published among the papers reporting new scientific achievements.

J. Konorski
Department of Neurophysiology, Institute of Experimental Biology, Warsaw, Poland

References
2. J. Konorski and S. Miller, Comp. rend. soc. biol. 184, 909 (1931).

Konorski has raised the question of the extent to which my report in Science was a new contribution to the study of the relationship between operant and respondent conditioning. Unfortunately, particularly in psychology, even minor differences in experimental procedure seem to make quite a difference both in the results obtained and in their interpretation. There are major differences between the procedures used by Konorski in his studies and those used in my series, of which the report to which we are referring was the first publication. (i) In the work described by Konorski (1), a leg-lifting lever-pressing conditioning, the occurrences of the two conditioned responses being positively correlated.

The method of combining the salivary (type 1) with the motor (type 2) conditioned response used by Shapiro was first described by Konorski and Miller as early as 1930, in French, under the title "Méthode d'examen de l'analysateur moteur par les réactions salivo-motrices" (2). Since that time a great number of experimental studies have been published in which this method was used in various experimental conditions. Although extensive monographs dealing with our prewar studies of this subject were published only in Polish (3) and Russian (4), references to these and other papers, as well as the general description of the facts obtained, were presented not only in my English monograph concerning conditioning (5) but also in various American papers and monographs by Razran (6), Hilgard and Marquis (7), and others. After the war all papers of our laboratory were published in English in Acta Biologicalis Experimentalis, a journal easily available in America. The method is also used in several Russian laboratories.

It is really regrettable that facts which are generally known by those concerned in the given subject are published among the papers reporting new scientific achievements.

J. Konorski
Department of Neurophysiology, Institute of Experimental Biology, Warsaw, Poland

References
2. J. Konorski and S. Miller, Comp. rend. soc. biol. 184, 909 (1931).
response was conditioned by following the passive lifting of the leg with food. The experimenter, by mechanical means, produced the response in the initial training trials. In the experiment which I reported, lever pressing was conditioned by following its operant occurrence with food. (ii) Konorski's animals were restrained in a stand. My animals were in an experimental space with freedom of movement. (iii) The relationship between operant and respondent behavior was studied with regard to a specific schedule of reinforcement—fixed interval. It is conceivable that the nature of the relationship will be found to be a function of the different reinforcement schedules—that is, "facts which are generally known by those concerned in the given subject" may not be general facts.

I was pleased to find that Konorski had read my paper in Science, or the reprint which was sent to him unsolicited. I have always found the published reports of Konorski's experiments most interesting and was grateful for the opportunity to discuss with him personally on two separate occasions, once in Baltimore, Maryland, and once in Bloomington, Indiana.

MARTIN M. SHAPIRO
Department of Psychology,
University of Houston, Houston, Texas

Reference

Wildlife Ranges in Alaska

I have tardily read a news note (Science 132, 1878 (1960)) dealing with Alaskan wildlife ranges. It is unfortunate that so respected a publication should inadvertently be a tool for propagating misinformation concerning these national wildlife ranges.

First, I would like to observe that Canada has expressed only opposition to the establishment of comparable ranges in the Yukon Territory adjacent to the Arctic Wildlife Range of Alaska.

Second, I would like to point out that the ranges are not needed for the protection of "Arctic caribou, grizzly bears, Dall sheep, moose, and marine mammals, whose numbers are dwindling," as reported in the published news note. Many of these species are probably as abundant as ever before in the history of white man's occupancy of Alaska.

Alaska's caribou, sheep, and moose populations are all at high levels of abundance, and even the most intensively hunted populations around human population centers are being maintained or increased under the state's
management program. We recognize that grizzly bears are not compatible with land development by human beings, but even these animals are certain to maintain their numbers over most of Alaska with the protection and management being afforded them by the state.

The question as to whether or not there was justification for establishing additional, enormous wildlife ranges in Alaska does not, therefore, hinge on the welfare and continued abundance of certain species of game animals, but is rather tied in much more closely with the issue of whether federal or state control of huge parcels of land is the more desirable.

Federal control of vast areas in Alaska precludes implementation of Section 4, Article 8 of the Constitution of the State of Alaska, which reads: “Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State, shall be utilized, developed and maintained on the sustained yield principle, subject to preference among beneficial uses.”

It is the contention of many Alaskans that absentee authorities, which so long directed the destiny of Alaska as a territory, are less apt to provide the wisest possible management of the state’s resources. It is, furthermore, certain that Alaskans above all others cherish and wish to preserve their wild and renewable resources, including the wilderness aspect of Alaska.

In view of these considerations I suggest that the pros and cons concerning establishment of these new wildlife ranges in Alaska are somewhat complex, and that more is involved than the protection of certain animals, as implied in your news note.

C. L. Anderson
Alaska Department of Fish and Game, Juneau

Quantum Mechanics and Freedom

The article by S. S. Kety, “A biologist examines the mind and behavior” [Science 132, 1861 (1961)], points out correctly that in order to grasp a biological problem the investigator has to understand the necessity of using various approaches in both the methodological and the conceptual sense, because a biological structure is a composite of different levels of organization. Kety errs, however, when he brushes away, as irrelevant to the problems of mind and behavior, the principle of indeterminacy of quantum mechanics and the acausal character of the elementary quantum processes, by assuming that the source of this principle and of the acasuality of elementary quantum processes is the clumsiness of our instru-
ments, which has made it impossible for us to determine, simultaneously, the position and motion of every particle. ("It would seem," he says, "that the concepts of freedom and purpose in the universe should be based upon nobler stuff than the clumsiness of our instruments.")

The point made by the quantum mechanics is that the inability to establish, simultaneously, precise measurements of the position and motion of an elementary particle is due to the inherent acausal "freedom" of this particle. As expressed by P. A. M. Dirac [The Principles of Quantum Mechanics (Oxford Univ. Press, New York, new ed., 1935), p. 10]: "When an observation is made on any atomic system which has been prepared in a given way and is thus in a given state, the result will not in general be determinate, i.e., if the experiment be repeated several times under identical conditions several different results may be obtained." Consequently, if certain mental processes are elicited by quantum processes on the molecular level of observation, which seems quite possible, the quantum mechanical "freedom" as highly relevant to these processes is a hypothesis not to be minimized in our concepts of the problems of mind. I am referring, in this connection, to the book by Pascual Jordan, Die Physik und das Geheimniss des organischen Lebens (Vieweg and Sohn, Brunswick, Germany, 1948).

SILVIO FIALA
Department of Pathology, Columbia University, New York, New York

I am grateful to Fiala for pointing out what could have been interpreted as a rather cavalier dismissal of a controversy which has rocked modern physics for the past three decades.

While the Heisenberg principle of indeterminism may originally have been only a simple recognition of instrumental interference, it quickly became elaborated by Bohr and by Heisenberg himself into a doctrine of the inherent unpredictability and, in fact, acausality in the behavior of the elementary subatomic particles. This inference of the "Copenhagen school of physics" has received wide acceptance by quantum physicists, although it would not be correct to imply that it has achieved universal acceptance. In fact, de Broglie, Planck, and Einstein remained unconvinced of its validity.

I should like to point out, however, that those who accept that doctrine and wish to use it as a scientific basis for a belief in human freedom should be willing to assume a difficult if not impossible task. Since a single neuron is composed of thousands of billions of such elementary particles and a single

---

If your parts are large or small — Equipto drawers will take them all

Equipto Drawers
now in all sizes

The vast and varied Equipto line offers the widest selection of capacities and combinations ever built into drawer storage units. They include everything from simple 2 drawer units to the large 7' high multi-drawer combination shown above. They are of heavy duty construction and not to be confused with other units on the market. Different types of interchangeable drawers permit thousands of arrangements within the units to satisfy your needs — up to 6,184 drawer compartments in only 3 sq. ft. of floor space.

Some of the drawers are shallow for tiny parts . . . others are Jumbo size for large objects. Up to (17" long by 11¼" wide by 6½” deep) All have adjustable dividers that lock in place — can’t creep up — small parts cannot get from one compartment to another. Heavy gauge steel construction protects parts . . . prevents sagging or sticking . . . prolongs life of units.

Equipto is the most complete line of drawer and drawer units on the market. Send for your free copy of big 32 page drawer catalog No. 302 showing hundreds of different units. Don’t delay, act today!

SHELVING  BENCHES  DRAWER UNITS LOCKERS  EQUIPTO ROBE  STOCK CARTS  EQUIPTO ANGLE

Equipto
618 Prairie Avenue
Aurora, Illinois

21 APRIL 1961
WHY LIQUID NITROGEN PROVIDES THE MOST SATISFACTORY SYSTEM FOR PRESERVING BIOLOGICAL MATERIALS

To preserve biological materials indefinitely, very low temperatures are required. Only at temperatures below -130°C. (202°F.) is all chemical and physical activity reduced to a negligible level.

Only with liquid nitrogen (-196°C, -320°F.) can you obtain safe, economical long-term storage...for months, years, even centuries.

Liquid nitrogen does not react with the materials with which it comes in contact. It has no effect on the pH of solutions.

HOW LINDE PROVIDES USERS OF LIQUID NITROGEN WITH A MORE COMPLETE SERVICE THAN ANY OTHER SOURCE

Only LINDE provides Total Liquid Nitrogen Service—freezing equipment, refrigerating storage equipment, and nationwide availability of liquid nitrogen.

SERVICE AT YOUR DOOR—thanks to LINDE’s unique distribution network, no point in the U. S. is more than a few hours from a ready supply of LINDE liquid nitrogen.


LINDE COMPANY
UNION CARBIDE

"Linde" and "Union Carbide" are registered trade marks of Union Carbide Corporation.
of them—or their lack of scientific discipline, may have a great deal to offer. This is all to the good. But why stop at psychoanalysts? How about social workers, who are also in the day-to-day business of trying to understand and modify behavior? Although their terminology is not as exotic as that of the analysts, I can assure you that they are just as biased, and furthermore, they outnumber psychoanalysts about 50 to 1.

And finally, let us not forget the poets. Perhaps in the last analysis it may very well be the rare insight possessed only by some future poet which will unlock a few of the mysteries of human behavior.

JOSEPH ANDRIOLA
Department of Mental Hygiene,
Atascadero State Hospital,
Atascadero, California

Palestine Refugee Problem

Wendell Cleland, in his review of Lengyel's *The Changing Middle East* [Science 132, 614 (1960)] cites Lengyel's failure to mention the assassination of Count Bernadotte as an example of pro-Israel bias. The assassination of Count Bernadotte, for which the small and dissident Stern group was held responsible, was abhorred and condemned by the government and people of Israel. The group was forcibly disbanded immediately afterwards. The military action of the Irgun Zvi Leumi (Etzel) at the village of Dir Yassin, near Jerusalem, took place before Israel existed as a state. Both of these terrorist groups during the British mandate refused to accept the discipline or the democratic will of the Jewish community of Palestine, expressed through its national council and defense group, Haganah. To hold Israel responsible for these two actions, condemned by the Jewish authorities, population, and defense forces, is certainly unjust. Moreover, this action at Dir Yassin was the only action of its kind conducted by any Jewish group, dissident or otherwise; hence, the expression "the massacres of Arab villagers which created the refugee problem" is a distortion.

The fact is that the Dir Yassin incident did not create the Palestine Arab refugee problem, nor the problem of the 450,000 Jewish refugees who fled from the Arab states (a problem which Cleland significantly fails to mention). Both of these refugee problems were the direct outcome of the Arab invasion of Palestine in 1947–1948 in violation of the United Nations Partition Decision of 29 November 1947. Had this invasion not taken place, had the Arab command not issued instructions to the
Palestine Arabs to evacuate the designated battlefield, and had these Arabs listened to Jewish appeals to stay put, as those who chose to remain and are today free citizens of Israel did, no Palestine Arab refugee problem would today exist.

Cleland’s phrase “or the ignoring [by Israel] of United Nations’ resolutions looking toward a settlement” make strange reading in the light of the fact that the two basic resolutions, the U.N. Partition Decision and the Armistice Agreements between Israel and each of the Arab states, entered into under United Nations auspices, have been violated by the Arabs since 1947. No United Nations resolution has been violated by Israel. The Armistice Agreements were designed by their architects as a bridge to peace, and they have the inbuilt provision that the two sides will sit together and amicably resolve still outstanding problems. The Arabs have refused to sit with any Israeli delegation to discuss these problems but instead have resorted to maritime blockade, economic boycott, infiltration, and armed attack and have waged war by other means. In the United Nations resolutions, return of the Palestine Arab refugees is made conditional on the willingness of the Arabs to live in peace and on the practicability of the return. The Arabs have expressed the opposite of such willingness and by their belligerence have made their return impractical. Not Israel but the Arab states have violated even this resolution. The very bias that Cleland claims to find exhibited by the author of The Changing Middle East is, unhappily, displayed by his own comments.

Yaakov Morris
Department of Research and Publications, Israel Office of Information, New York, New York

Morris’s repudiation of the actions of the Stern Gang and the Irgun Zvi Leumi are welcome. But the general opinion is that the State of Israel did not take sufficient action to redeem the bad situation these bandits caused. On the contrary, Israel has accepted every advantage she got from their criminal actions.

As for why the Arabs evacuated their homes, the situation certainly was chaotic, but there is little doubt, if any, that the evacuation was sparked by the Dir Yassin massacre, which occurred five weeks before any of the Arab states sent their forces into Palestine—a move made to preserve order in the vacuum created by the British withdrawal on 14 May 1948.

As to Morris’s statement that “no United Nations resolution has been violated by Israel,” the facts are quite the opposite. Three of the United Nations resolutions of 1947 and 1948 are
still being ignored, in whole or in part.

1) The boundaries set in the original resolution of 1947, which would require Israel to return to the Arabs 22 percent of her present territory occupied during the fighting, but of which Israel has declared she will yield absolutely none. The implication that the Armistice Agreements of 1949 confirm these boundaries is quite unjustified, as the Egypt-Israel Agreement, article V, paragraph 2, reads, "The Armistice Demarcation Line is not to be construed in any sense as a political or territorial boundary, and is delineated without prejudice to rights, claims and positions of either Party to the Armistice as regards ultimate settlement of the Palestine question." If Israel holds that the armistice boundaries are unchangeable, then the armistice continues, and that the war is only in suspension, with no peace in sight.

2) The right of the refugees to opt whether they will return to their homes and property or accept compensation. The option has been denied, except in a limited number of cases where a choice was allowed in order to reunite families. Morris's statement that the Arabs "by their belligerence have made their return impractical" would seem to be related to the haste of the government of Israel to bring in a million Jews from other countries since 1949 in order to occupy the Arab lands and make the return to the owners impossible.

3) The international status of Jerusalem. Israel has totally ignored this resolution, has incorporated parts of this area in her state, and has declared Jerusalem her capital. This defiant action on the part of Israel has not been accepted by the United States Government and by certain other members of the United Nations, who refuse to acknowledge Jerusalem as the capital and still maintain their embassies at Tel Aviv. Any official negotiations between the U.S. embassy and the Israeli Foreign Office have to take place in Tel Aviv, or outside the international zone.

The other occupant of the Jerusalem zone is Jordan, and Jordan will not agree to negotiate evacuation as long as Israel publicly proclaims her right to Jerusalem, contrary to the United Nations resolution.

There is no question that the situation in Palestine is becoming more and more complicated, and it seems to me that the burden of proof as to rights there lies distinctly on those whose invasion of the country, previously a peaceful land, brought on all the troubles.

W. Wendell Cleland
American University,
Washington, D.C.

21 April 1961

---

**Physical Methods of Organic Chemistry**

*Third Edition In Four Parts*

*Edited by Arnold Weissberger, Eastman Kodak Company*

1960 Part 1: 930 pages $24.50
Part 2: 938 pages $24.50
Part 3: 870 pages $24.50
Part 4: 984 pages $26.00

**Treatise on Analytical Chemistry**

*A Comprehensive Account in Three Parts*

1: Theory and Practice
2: Analytical Chemistry of the Elements
3: Analysis of Industrial Products

Edited by I. M. Kolthoff and Philip J. Elving, with the assistance of E. B. Sandell. A many-volume work. Three volumes have been published to date.

**Organic Electronic Spectral Data**

Published under the auspices of Organic Electronic Spectral Data, Inc.

Volume 1 (1946-52) edited by M. J. Kamlet
1244 pages $28.50

Volume 2 (1953-55) edited by H. E. Ungnade
775 pages $17.50

Additional volumes in preparation
Subscription prices available

**Physical Chemistry of Surfaces**

By Arthur W. Adamson, University of Southern California

1960 642 pages $12.75

**An Introduction to the Chemistry of Heterocyclic Compounds**

By R. M. Acheson
1960 356 pages $5.00

**Preparative Methods of Polymer Chemistry**


1961 348 pages $10.50

**Aerosols—Science and Technology**

Edited by H. R. Shepherd, Aerosol Techniques, Inc.

1961 562 pages $22.50

---

**Theoretical Physics in the Twentieth Century**

A Memorial Volume to Wolfgang Pauli

Edited by M. Fierz and V. F. Weisskopf

1960 336 pages $10.00

**Introduction to Elementary Particle Physics**

By R. E. Marshak and E. C. G. Sudarshan, University of Rochester

1961 212 pages paper: $2.50/cloth: $4.50

---

**Books from Interscience**

**A Selection of Recent Titles**

**Reactor Handbook**

*Second Edition In Four Volumes*

Prepared under contract with the U. S. Atomic Energy Commission

1960 1223 pages $36.50

1961 Approx. 700 pages About $22.00

In preparation

Volume 3: *Physics and Shielding*

Volume 4: *Engineering*

**Information Retrieval and Machine Translation**


Part 1: 700 pages $23.00
Part 2: 800 pages $25.00

**Scientific Russian**

*A Textbook for Class and Self-Study*

*Second Edition*

By James W. Perry, University of Arizona

1961 592 pages $9.50

---

**Complete Catalog available on request**

**INTERSCIENCE PUBLISHERS, INC.**

250 Fifth Avenue, New York 1, N.Y.
**GYROTOR® WATER BATH SHAKER**

For Reproducible Temperature and Agitation

- Variable speed control, from 85 to 285 rpm or 140 to 400 rpm.
- Heats rapidly to pre-set temperatures from ambient to 100° C. within ±0.5° C.
- Adjustable level device automatically maintains desired water level in the bath.
- Triple-eccentric-shaft drive transmission assures smooth, uniform agitation of all flasks.
- Built with precision for continuous operation.
- Performance is cool, quiet, vibrationless.
- A bench-top unit with interchangeable platforms having large capacity for flasks, tubes, and beakers. Used with gaseous atmospheres.
- Operates under lab benches and desks with space-saving dolly accessory.
- Models available with reciprocating action.
**EATON-DIKEMAN**

**FILTER PAPER**

Used in 7 out of 10 laboratories

---

**HERE’S WHY!**

- **Complete range** — whatever rapidity, and retention characteristics you desire, chances are there’s a standard E-D paper available. Made with smooth or creped surfaces, in plain or fluted circles, in strips, or rolls, or cut to your individual requirements.

- **Highest purity** — only the purest pulp available is used.

- **Uniform quality** — every step of the manufacturing process is carefully controlled and checked.

- **Excellent wet strength** — special resins incorporated.

- **Complete technical service** — whatever your filtering problem may be, Eaton-Dikeman with its broad background of more than seventy years of manufacturing filter papers exclusively, can probably solve it.

Also available—papers for chromatography and electrophoresis, as well as bibulous and lens papers. Write for free samples.

---

allows observation and measurement of characteristic curves of both n-p-n and p-n-p transistors and of diodes. It permits display of characteristic curves with collector current on the vertical axis and either collector-emitter voltage or base-emitter voltage on the horizontal axis (Tektronix, Inc., Dept. Sci146, Box 500, Beaverton, Ore.)

**TACHOMETER** accomplishes digital measurement of shaft speeds by use of an integral light source, a 60-segment rotating interrupter, a photo-junction cell, and a transistor amplifier. Every 6 deg of shaft rotation results in a 2-volt pulse. The resultant square wave is fed into a digital counter with one-second base time to provide a reading of speed in revolutions per minute. Range is 0 to 25,000 rev/min; torque required is 0.05 in. oz at 3600 rev/min. (Servo-Tek Products Co., Dept. Sci147, 1086 Goffle Rd., Hawthorne, N.J.)

**CHROMATOGRAPHIC COLUMN PACKING** of diethylene glycol adipate polyester treated with phosphoric acid is available for separation of the C1 through C9 common fatty acids, including unsaturates, without the need for preliminary esterification. With a 6-ft long, 6-mm inside diameter U-tube column and a column temperature of 217°C, approximate retention times in minutes are: caprylic, 2; capric, 3.4; lauric, 6; myristic, 10; palmitic, 17; stearic, 28.7; oleic, 32.1. (Applied Science Laboratories, Inc., Dept. Sci137, 140 N. Barnard St., State College, Pa.)

**TEMPERATURE RECORDER** is a miniature thermocouple instrument that operates directly from the thermocouple without signal amplification. The instrument operates on the clamber-bar principle with a 4-sec clamping period. Pressure sensitive chart paper is used to record. Minimum temperature span is 0° to 500°F; maximum span is 0° to 2500°F. Accuracy is said to be ±2 percent of full scale. Electrical requirement is 115 volt a-c. (Assembly Products, Inc., Dept. Sci158, Chesterland, Ohio)

**INFRARED DETECTORS** of photoconductive indium antimonide peak at a wavelength of 6.8 µ. Time constant is said to be less than 1 µsec. The detectors are custom built and supplied in any configuration including arrays. (Block Associates, Inc., Dept. Sci172, 385 Putnam Ave., Cambridge, Mass.)

**SPECTRUM ANALYZER** analyzes signals in the frequency range of 0.0025 to 1000 cy/sec on a real-time basis. Seven sensitivity scales are provided. Selectivity on the lowest scale is 0.0037 cy/sec, and on the highest it is 3.75 cy/sec. The analyzer operates on the
frequency multiplication principle with multiplication factors of 100 to 100,000. The frequency-multiplied signal is analyzed in a heterodyne frequency analyzer. Typically, the band between 0.5 and 200 cy/sec is analyzed in 1.6 sec with equivalent filter bandwidth of 0.75 cy/sec. Range of the instrument can be expanded by heterodyning to cover any band in 1000 cy/sec intervals. (General Applied Science Laboratories, Dept. Sci.55, Merritt & Stewart Avenues, Westbury, N.Y.)

- **Physiologic Data Monitor** displays condition of the patient continuously and automatically in digital form. All parameters are also recorded on a 10-in.-wide record. Monitor-scope and wave form recorders for electrocardiograms and electroencephalograms are included. Plug-in units and transducers are available for a variety of measurements including temperature, blood pressure, heart rate, respiration rate, skin resistance, medication flow, urine output, oxygen saturation, carbon dioxide level, and others. An alarm function is actuated should any deviation from preset limits occur in the condition of the patient. Modular construction permits expansion or modification as the situation requires. (Starling Corp., Dept. Sci.171, 2047 Sawtelle Blvd., Los Angeles 25, Calif.)

- **X-Y Plotter** is a 30- by 30-in. instrument said to be accurate to ±0.05 percent of full scale and to repeat exactly from any direction. Input to the plotter may be IBM cards, punched paper tape, or keyboard. Slewing speed is 20 in./sec. The printing head contains 12 symbols, which can be selected at random. Other print sectors can be added to plot digital as well as symbol information. (Gerber Scientific Instrument Co., Dept. Sci.156, Hartford, Conn.)

- **Ionization Detector Module** permits the modification of existing gas chromatographs to flame ionization detection. The module permits 2-in. insulation to be used between the detector burner assembly and the bulkhead which contains terminals for hydrogen, combustion air, and high-voltage lines and for the electrometer and flame igniter. Collector insulation is sapphire. The manufacturer's model 21 electrometer is normally used with the detector. (Loh Engineering Co., Dept. Sci.162, 2092 N. Lincoln Ave., Altadena, Calif.)

- **Ultraviolet-Visible Spectrophotometer** covers the ranges 190 to 390 m/ in the ultraviolet and 350 to 750 m/ in the visible. Dispersing element is a 60-deg, fused-quartz prism. Each spectral range is recorded linearly in

---

**Fisher's New Integrating Recorder Gives You Accurate Peak Areas**

You make gas chromatographic analyses faster, easier, surer. Automatically, the new Recorder precisely computes the areas under each peak on the chromatogram...gives you an accurate figure for determining the concentration of each compound. Quiet, 1-mv Integrating Recorder has "gear shift" for different chart speeds...variable counting rates of 10, 20 or 40 chart-widths a minute...adjustable zero...rapid pen response. It's the perfect partner for the Fisher Gas Partitioner. Get free Bulletin FS-220 from your Fisher branch, or write Fisher Scientific Company, 139 Fisher Building, Pittsburgh 19, Pa.
absorbance with a range of 0 to 1.5 units on 8.5- by 11-in. preprinted chart paper. Changeover from one range to the other is accomplished by moving the recorder drum past the end of its normal travel. Accompanying interchange of an air-cooled hydrogen lamp for ultraviolet work and a tungsten-filament source for visible work is automatic. Two scanning rates can be used, covering the spectral ranges in 2 or 8 minutes. An automatic gain control system increases spectral information in regions of heavy absorption. Detector sensitivity gain is maintained sufficiently at all times. (Perkin Elmer Corp., Dept. Sci167, Norwalk, Conn.)

**MICROMANOMETER** measures differential gas pressure with full-scale sensitivity of 0.004 in. The measuring head consists of two symmetrically arranged cavities, separated by a metal diaphragm, and two fixed electrodes. These form two capacitors that constitute part of the capacitances of two tuned circuits. Difference of capacitance of the two capacitors, caused by motion of the diaphragm, is measured and displayed on a panel meter. Several measuring heads of different ranges can be used with the same instrument. Static working pressures up to 1000 lb/in.$^2$ and differential overloads up to ten times full-scale pressure can be applied without damage. The sensitive element in the measuring head is said to respond to sinusoidal pressure variations of 200 cy/sec. A switch is provided to increase the time constant of the measuring circuit to 0.3 to eliminate rapid fluctuations of measured values. Output for operation of an external recorder is included. (Gelman Instrument Co., Dept. Sci174, 106 N. Main St., Chelsea, Mich.)

**OSCILLOSCOPE TRACE PLOTTER** (Fig. 2) uses a photoelectric pickup to detect, amplify, and plot trace deflections as small as 1 μ and is capable of time resolution in the submillimicrosecond region to the limits of the manufacturer's TW deflection tube. Designed for use with the manufacturer's high-frequency oscilloscope, the plotter can nevertheless be used with virtually any oscilloscope, according to the manufacturer. The trace on the face of the oscilloscope tube is reproduced on a presealed piece of graph paper on an x-y recorder; sensitivity of the trace is increased about 15 times. Settings of the x and y axes are independent of each other; magnification of the axes is arbitrarily adjustable as determined by the recorder. According to the manufacturer, no optical distortion of the image is introduced and no accuracy is lost in converting the pulse from the cathode-ray tube to electrical x-y analogs. A trace or a particular section of a trace may be scanned and magnified to obtain full-scale recorder drawings of deflections as small as 1 μ. Traces are reproduced in 1½ to 3 min. (Edgerton, Germeshausen & Grier, Inc., Dept. Sci94, 170 Brookline Ave., Boston, Mass.)

**AUTOMATIC TITRATOR** (Fig. 3) uses a motor-driven burette that dispenses titrant into a vessel placed in the path of a beam of light which passes through the unknown solution and then into a detector. The instrument automatically stops the titration and provides a digital readout of the equivalence volume of titrant when the end point, determined by color change, is reached. Data obtained may be fed to a recorder, volume data may be printed, or data can be logged on printers or computers exhibiting both sample and titrant volumes. A remote-readout digital indicator permits monitoring of the burette volume from another area. (American Instrument Co., Dept. Sci133, 8030 Georgia Ave., Silver Spring, Md.)
adjustable closed end

McLEOD GAGE*

- High precision single linear scale 0—100 mm
- Multiple ranges
  0—1 mm in .01 mm
  0—0.1 mm in .001 mm
- Closed end easily opened for cleaning
- Micrometer adjustment of meniscus

1. High vacuum "O" ring seal and precision ground rod creates an adjustable closed end.
2. This permits multiple selection of range with a single linear scale.
3. High precision obtained with precision bore capillaries and permanent ceramic scale.
4. White background for easy accurate readings.
5. Removable precision ground rod allows for easy cleaning and removal of mercury separations.
6. Vacuum sealed plunger allows for compact simple adjustment of mercury meniscus.
7. Compactness and simplicity makes this instrument unique.

G 1400 Gage McLeod complete as described above without mercury $45.00

See your Local Laboratory Supply Dealer

Made for each other

This convenient combination provides greater ease and safety in handling. Prevents contamination from the air and reduces evaporation to approximately 1/2 that of conventional Erlenmeyer flasks and cotton plugs. Immediate shipment on 7 sizes (ml.): 25, 50, 125, 250, 300, 500, 1000.

*PATENTS PENDING

Write or wire for full specifications and prices.

BELLCO GLASS INC. VINELAND, NEW JERSEY
<en>

- THIOLATED GELATIN is used to measure enzyme activity. This gelatin is said to be attacked by any enzyme that can hydrolyze gelatin. The product is cross linked with a mild oxidant to produce rigid gels that do not dissolve in boiling water. The cross-linked gels, unlike gelatin, cannot be penetrated by the enzyme, and hydrolysis is restricted to the surface. Because the lysis products are soluble, the gel slowly dissolves away maintaining its shape so that the length of all edges decreases at a constant rate. The rate of change of the length of an edge is a measure of enzyme activity. (Schwarz BioResearch, Inc., Dept. Sci163, 230 Washington St., Mt. Vernon, N.Y.)

- DATA SYSTEM will monitor up to 250 channels of low-level or high-level data representing temperatures, pressures, displacements, and voltages. Stepping rate is 10 channels per second. Analog signals are digitized and transmitted through an audio radio channel, telephone leased line, or telephone handset. At the recording point, the data channel identification, and other pertinent information are printed or perforated. Over-all accuracy, including transmission over the line, is said to be ±0.1 percent. Operation may be unattended. (Communication Control Corp., Dept. Sci161, 14707 Keswick St., Van Nuys, Calif.)

- TIME-RESOLVED SPECTROGRAPHS are designed to permit temperature measurements in the 2000° to 20,000°K region of events resolved in time to $3 \times 10^{-8}$ sec and with wavelength distribution through the 2000-9000-A range. Photographic recordings can be made of events in these classes by coupling the manufacturer’s sweeping image camera to one of the spectrographs. Recorded film densities, when related to a calibration standard, provide temperature measurements said to be accurate within ±5 or ±10 percent depending upon the temperature range. (Beckman & Whitley, Inc., Dept. Sci165, San Carlos, Calif.)

- RECORDER is a portable instrument with a self-contained power source. Battery life is said to be 250 hr in normal use. The chart is driven by an 8-day clockwork motor; standard chart speeds are $\frac{1}{2}$ to 12 in./hr. Full-scale deflection ranges are available between 0 to 5 mv and 0 to 100 mv; over-all accuracy is said to be ±0.5 percent; input impedance is 15,000 ohms. Inkless recording is employed on a chart 3 in. wide. (Instrument Corporation of America, Dept. Sci148, 516 Glenwood Ave., Baltimore 12, Md.)

Joshua Stern
National Bureau of Standards,
Washington, D.C.

---

**Palo**

Finger Tip

FLUID DISPENSER

Offers Greater Safety

In The Laboratory!

No Bottle Drip . . . No Finger Burns . . .
No Table Top Corrosion . . . No Back-and-forth Pouring . . . No Vapor Escape . . .
No Waste!

Here's a semiautomatic fluid dispenser which eliminates all of the losses, contamination, unwieldiness and guesswork experienced with old-fashioned bottle pouring. It's ideal for frequent dispensing of fluids—reagents, medicinal, pharmaceuticals, sterile solutions, corrosives, volatile solvents, etc.—in routine laboratory, pharmaceutical and hospital needs.

Precision made for lifelong service, the Palo dispenser can be used with bottom tubulated aspirator bottles utilizing gravity feed and with siphon feed from standard containers and storage carbons . . . unit clamps to any shelf or flat surface.

C33-874 Finger Tip Fluid Dispenser complete with Pyrex Brand glass nozzle, shield and Tygon R-3606 delivery tubing . . . . $1.95

Palo LABORATORY SUPPLIES, INC.
75 NINTH AVE. NEW YORK 11, N. Y.

---

Give this ingenious machine tool just 16 inches
AND YOU'VE GOT IT MADE!

3" swing
7" between centers

UNIMAT
FOR RESEARCH LABS & MODEL SHOPS

Engineers and designers supplement their sketches and blueprints with machined-to-scale models anybody can "read." Technicians in research labs turn out machine work with amazingly small tolerances, down to .0005-of-an-inch. Manufacturers developing new products find UNIMAT indispensable in the mock-up shop. A complete machine shop in miniature, UNIMAT converts from lathe to drill press, tool and surface grinding machine, vertical milling machine, or polisher/grinder—in seconds! Hundreds of efficiency-minded companies, hospitals and government agencies are now putting their UNIMATS through a-thousand-and-one paces. So can you!

Write for illustrated literature and price list
AMERICAN EDELSSTAHL INC.
Dept. AD, 350 Broadway, New York 13, N.Y.

---

0.001 CPS RESOLUTION REAL TIME SPECTRUM ANALYZER

For analysis of:
- seismic waves
- structural vibrations
- heart beats
- flutter phenomena
- underwater sound

This Very Low Frequency Spectrum Analyzer provides up to 1000 line resolution for frequency ranges from 0-1 cps to 0-1000 cps. Analysis time in all frequency ranges is 1 second. Transistorized Models SA-12 and SA-14 will provide expanded frequency range and, with GASL auxiliary equipment, offer power density or normal density capability.

General Applied Science Laboratories, Inc.
Merrick and Stewart Aves.
Westbury, L.I., N. Y. • Edgewood 3-6960

---

1300

SCIENCE, VOL. 133
Meetings

Forthcoming Events

May
5-7. American Soc. of Internal Medicine, Miami Beach, Fla. (G. T. Bates, 350 Post St., San Francisco 8, Calif.)
5-7. Wisconsin Acad. of Sciences, Arts, and Letters, 91st annual, Waukesha. (T. J. McLaughlin, Secretary, 2865 N. Prospect Ave., Milwaukee, Wis.)
5-8. American Psychoanalytic Assoc., Chicago, Ill. (Mrs. H. Fischer, 1 E. 57 St., New York 22)
6-7. Academy of Psychoanalysis, annual, Chicago, Ill. (J. H. Merin, 49 E. 78 St., New York 21)
7-10. American Inst. of Chemical Engineers, Cleveland, Ohio. (J. F. Van Antwerpen, American Inst. of Chemical Engineers, 25 W. 45 St., New York 36)
7-11. Institute of Food Technologists, New York, N.Y. (C. S. Lawrence, 176 W. Adams St., Chicago 3, Ill.)
7-12. Medical Library Assoc., Inc., Seattle, Wash. (Miss R. J. Mann, Mayo Clinic Library, Rochester, Minn.)
7-12. Society of Motion Picture and Television Engineers, Toronto, Canada. (SMPTE, 55 W. 42 St., New York 36)
8-9. Titrimetric Methods of Analysis, symp., Cornwall, Ontario, Canada. [J. R. McCallum, Courtaulds (Canada) Ltd., Cornwall]
8-10. Mathematical Theories of Biological Phenomena, symp., New York, N.Y. (N. Rashevsky, Committee on Mathematical Biology, 5741 Drexel Ave., Chicago 37, Ill.)
8-12. American College of Physicians, 42nd annual, Miami Beach, Fla. (American College of Physicians, 4200 Pine St., Philadelphia 4, Pa.)
9-11. Western Joint Computer Conf., Los Angeles, Calif. (W. F. Bauer, 8433 Fallbrook Ave., Canoga Park, Calif.)
10-12. National Science Fair—International, 12th, Kansas City, Mo. (Science Service, 1719 N Street, NW, Washington 6, D.C.)

NEW METROHM EQUIPMENT FOR

pH STAT

AND TITRATION CURVES

Fully automatic recording of titrant volume as a function of pH (mV) and only new Metrohm equipment has these

EXCLUSIVE FEATURES:

1) Micro and macro assemblies including interchangeable burette cylinders with capacities from 1.0 to 50.0 ml.

2) Meter accuracy of 0.01 pH

3) Switch-over system for different recorder speeds

4) Built-in magnetic stirrer

5) Temperature controlled titration vessels for minimum volumes of 0.5 ml.

Write for descriptive catalog No. 778CT.

BRINKMANN INSTRUMENTS, INC. 115 Cutter Mill Road, Great Neck, N.Y.

Philadelphia • Cleveland • Houston • Miami • Montauk Park, Calif.

21 APRIL 1961
A Mousellany of Animal Care Developments

They Said It Couldn’t Be Done

The new Polycarbonate Econo-Cage #27 is clear, autoclavable and unbreakable.

To operate most efficiently animal colonies must use cages which withstand the rough and tumble of mechanized washing systems and the high temperatures at which these systems and autoclaves operate. Because colonies must be inspected quickly, cages should afford maximum visibility. Until now the cages were either transparent or durable, but none had both characteristics.

The new Polycarbonate combines the optical and thermal properties of glass with an impact resistance unmatched by any other clear material. A good example of the degree of impact resistance was furnished by a doubting Thomas who could not break the cage by dropping it out of a fourth floor window. Polycarbonate retains this remarkable strength from 275° F. to –40° F. It is the first clear plastic which can be autoclaved repeatedly.

This new material, a linear aromatic polyester of carbonic acid, has a very low absorption level. Odor producing gases are not absorbed, resistance to most acids and bases is very good.

The cage is constructed to NIH Spec. EG-84. For housing mice, the cage is 11½″ x 7½″ x 5″ deep. The cages nest for easy storage.

This is one of the “20 Series” of Econo-Cages, which includes cages of fibre glass, acrylonitrile-styrene-copolymer, polypropylene and polycarbonate. These are all 11½″ x 7½″ x 5″ deep. There are four lid styles which are interchangeable on all “20 Series” cages. Write for complete information on this series.

Working With Restraint

Two new pieces of animal restraining equipment are now available from the Econo-Cage Division of Maryland Plastics, Inc. A small restrainer for mice weighing from 10 to 40 grams (Econo-Cage #88), and a large unit for rats and hamsters weighing from 250 to 600 grams (Econo-Cage #91), are new additions which supplement Econo-Cage #90 for 150 to 300 gram rats and hamsters.

These clear acrylic plastic units afford rapid and safe immobilization of animals, easy access and maximum visibility of animals in restraint. Econo-restrainers prevent unanesthetized animals from attacking tubes, cannulae, and other fixtures; provide extended housing during nutritional studies; restrain animals during administration of intravenous, intraperitoneal, intramuscular, and subcutaneous injections; and are useful for administering intravenous fluid drips and anaesthetic.

Econo-Cage #88, #90, #91

All three sizes have an adjustable tailgate which fits into any of three slots to vary cage length, confine the animal, and serve as a cage door. Openings at the top, bottom, and tail provide easy access to any part of the animal (the bottom slot also permits drainage of animal waste). A hopper permanently attached to the front of the unit includes a trough for granular feeds and a water tube inlet.

The small restrainer, Econo-Cage #88, can be varied from 2″ to 3½″ in length and is 1¼″ wide. The medium restrainer, Econo-Cage #90, can be varied from 4½″ to 6″ in length and is 2½″ wide. The large restrainer, Econo-Cage #91, can be varied from 5″ to 7″ in length and is 3″ wide. All these units can be cleaned chemically or with hot water, they are not autoclavable.

16-18. Western Conf. on Anesthesiology, biennial, Portland, Ore. (J. O. Bradford, 2307 NW Overton St., Portland 9, Ore.)
18-20. Host Tumor Interactions, intern. symp., Detroit, Mich. (M. J. Brennan, Oncology Div., Henry Ford Hospital, Detroit 2)
22-24. Telemetering Conf., natl., Chicago, Ill. (J. Becker, AC Spark Plug Division, General Motors Corp., Milwaukee 1, Wis.)
22-25. American Urological Assoc., Los Angeles, Calif. (W. P. Didusch, 1120 N. Charles St., Baltimore 1, Md.)
22-25. National Tuberculosis Assoc., Cincinnati, Ohio. (J. G. Stone, 1790 Broadway, New York 19)
22-26. Society of Photographic Scientists and Engineers, annual, Binghamton, N.Y. (M. G. Anderson, Anasco, Vestal Parkway East, Binghamton, N.Y.)
22-27. International Acad. of Legal Medicine and of Social Medicine, 5th cong., Vienna, Austria. (M. Helpem, Chief Medical Examiner, City of New York, 55 East End Ave., New York 28)
25. Gastroenterology Research Group, Chicago, Ill. (N. C. Hightower, Scott and White Clinic, Temple, Tex.)
25-26. Medical Technology, symp., Cleveland, Ohio. (J. W. King, Cleveland Clinic, 2020 E. 93 St., Cleveland 6)
26-27. Cardiovascular Tissue Culture Conf., Dover, Del. (O. J. Pollak, Dover Medical Research Center, Inc., P.O. Box 228, Dover)
26-3. American Acad. of Dental Medicine, cruise to Bermuda and Nassau. (H. Ward, 15 Bond St., Great Neck, N.Y.)
29-31. Cancer Sympt., 6th annual, Regina, Saskatchewan, Canada. (A. J. S. Bryant, Allan Blair Memorial Clinic, Regina)
29-31. Chemical Inst. of Canada, 44th annual, Ottawa. (Chemical Inst. of Canada, 48 Rideau St., Ottawa 2)
31-2. Canadian Federation of Biological Societies, Guelph, Ontario, Canada. (E. H. Bensley, Montreal General Hospital, 1650 Cedar Ave., Montreal 25, P.Q.)
31-2. Radar symp., 7th annual, Ann Arbor, Mich. (Coordinator, 7th Annual Radar Symposium, Institute of Science and Technology, Box 618, Ann Arbor)

June

2-3. Canadian Soc. for Clinical Chemistry, annual general meeting, Guelph, Ont. (C. R. Cameron, Ontario Veterinary College, Guelph)
2-5. Latin-American Congress of Physical Medicine, Lisbon, Portugal. (C. Lopes da Victoria, 245 E. 17 St., New York, N.Y.)
3-11. Medical-Surgical Film Festival, 4th intern., Turin, Italy. (Minerva Medica, Corso Bramante 83-85, Turin)
4-9. Mass Spectrometry, ASTM Committee E-14, Chicago, Ill. (G. Crable, Gulf Research Center, P.O. Box 2036, Pittsburgh 30, Pa.)
4-10. World Congress of Psychiatry, 3rd, Montreal, Canada. (A. Roberts, Allan Memorial Inst., 1025 Pine Ave. West, Montreal 2, P.Q.)
4-12. Cellular Regulatory Mechanisms, 26th Cold Spring Harbor Symp. on Quantitative Biology, Cold Spring Harbor,

Stress parts of a preparation ... combine separated details ... observe and draw various layers of the object, one at a time ... secure a facsimile or enlarged illustration of the microscope picture — without impairing normal operator comfort. Add these and other capabilities to those inherent in the basic instrument with its many accessories and attachments for all types of observation.

Can any other microscope offer more versatility, precision and adaptability than the Wild M-20? Your own evaluation of this great instrument will provide the answer.

Write for Booklet M-20d

*The FIRST name in a complete line of Surveying Instruments, Photogrammetric Equipment and Microscopes.

21 APRIL 1961


5-10. International Colloquium on Spectroscopy, 9th, Lyon, France. (Secretariat, Groupement pour l’Avancement des Méthodes Spectrographiques, 1, rue Gaston Boissier, Paris 15)

5-16. Operations Research and Systems Engineering, Baltimore, Md. (Dean, School of Engineering, Johns Hopkins Univ., Baltimore 18)

6-8. Tissue Culture Assoc., 12th annual, Detroit, Mich. (F. E. Payne, Dept. of Epidemiology, Univ. of Michigan, Ann Arbor)


8-18. International Organization for Standardization, general assembly (members only), Finland. (American Standards Association, 70 East 45 St., New York 17)


9-17. European Convention of Chemical Engineering, Frankfurt, Germany. (DEHEMA, Postfach No. 7746, Frankfurt/Main 7)


12-16. Molecular Structure and Spectroscopy, symp., Columbus, Ohio. (R. A. Oetjen, Dept. of Physics and Astronomy, Ohio State Univ., Columbus 10)

12-18. European Assoc. for Animal Production, 8th intern. cong., Hamburg, Germany. (European Assoc. for Animal Production, Via Barnaba Oriana 26, Rome, Italy)


13-16. Institute of Aerospace Sciences and American Rocket Soc., Los Angeles,
lost experiments
with
MICROSCOPIC SLIDE LABELING

Eliminate guesswork... greasemark mistakes. Get positive identification. Simply pull tab and a fresh, clean label "pops" out. Fast, self-sticking labels dispensed one at a time. Available in standard or "tissue-high" thickness. They accept pen, pencil, ball point pen or typewriter marking. 1000 labels per carton.

Write for detailed information and the name of your nearest TIME distributor.

PROFESSIONAL TAPE CO., INC.
360 Burlington Ave. • Riverside, Ill.

REGULATED POWER SUPPLY
Used with "Teledelets" papers No. 70-155 through 70-159 for making permanent record of physiological and pharmacological experiments. Electrical power unit has twelve separate electrical circuits and controls. Cannot be damaged by shorting output leads. Any conventional kymograph may be adapted to this form of writing.
Cat. No. 70-144

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

Quantitate...
Total Nitrogen by Kjeldahl
Total Protein by Biuret
Total Protein by Folin—Ciocalteau (Lowry modification)
Amino Groups by Nihydrin
Tyrosine by Folin—Ciocalteau
Histidine by Pauly Diaz Reaction
Arginine by Sakaguchi
Glutamic Acid by Decarboxylase
Lysine by Decarboxylase
Albumin by HABA Dye
[2-(4'-hydroxyazobenzene) benzoic acid]

Analyze...
Biological Fluids directly
Effluent from DEAE or Resin Chromatographic Column
Effluent from Poraeth Electrophoretic Column
Electrophoretic Starch Block Fractions
Electrophoretic Paper Chromatogram Segments
Check point stages in Protein Fractionation
Counter Current Distributions

with the TECHNICON®

AutoAnalyzer®

Any or all of these determinations may be run on the same AutoAnalyzer: Takes only two minutes to change from one type of analysis to another. Any combination may be run simultaneously from the same sample by adding additional standard AutoAnalyzer modules. The response time is such that most of the analyses may be run at 40 samples per hour.

for information, select area of interest and write to

TECHNICON CHROMATOGRAPHY CORP.
42 RESEARCH PARK • CHAUNCEY, NEW YORK

21 APRIL 1961
for heavy-demand laboratory work and process control

**VITREOSIL®**

**PURE FUSED QUARTZ**

**FOR USE IN PRODUCTION OF SEMI-CONDUCTOR METALS...**

Where you produce such metals as germanium and silicon, VITREOSIL is ideal for use. For special requirements or special problems, write us your requirements. Now available Quartz to metal seals. See our ad in Chemical Engineering, Electronic Engineers Master & Electronic Designers’ Catalogues.

**SPECTROSLIL**

**FOR HYPER-PURITY IN SEMI-CONDUCTOR WORK**

Unique Transmission characteristics

- **PURITY** — purest form of fused silica
- **TRANSPARENCY** — unique optical properties
- **HOMOGENEITY** — completely homogeneous and free from granularity
- **AVAILABILITY** — block material for lenses, prisms, etc.; rod, fiber, wool; hollow ware as tubing, crucibles, and special apparatus.

Write for complete illustrated catalog.

---

**THERMOLYNE CORPORATION**

568 Huff St., Dubuque, Iowa

---

**TEMCO**

**TYPE 1600 ELECTRIC FURNACE**

A ruggedly built unit that heats quickly and maintains evenly distributed temperatures. Now available for 2000° F continuous and 2130° F intermittent operation. Being of medium size and adaptable to a variety of controls, it is suitable for a wide range of applications. Type 1600 brings to the laboratory a relatively large chamber capacity (5½” x 4½” x 9”) or 5½” x 4½” x 13½”) for processing sizable samples or other work loads.

**LONG-LIFE HEATING ELEMENTS** form the sides, top and bottom of the chamber. Each element is made of the highest quality nickel-chromium or iron chromium aluminum (for high temperature models) alloy coiled embedded in a refractory plate for protection against damage and corrosion or oxidation.

**DURABLE CONSTRUCTION** — The furnace case is of heavy-gauge welded and reinforced steel construction. A full 4½” thickness of multiple-type, high-grade firebrick and back-up insulation gives maximum insulating values to the heating chamber. All models heat fast—reach 1400° F (760° C) in approximately 60 minutes.

$137.50 to $192.50 according to size and temperature range.

**Write for literature and name of nearest dealer.**
Cancer, intern. symp. (by invitation only), Perugia, Italy. (L. Severi, Div. of Cancer Research, Univ. of Perugia, P.O. Box 167, Perugia)
25-30. International Union of Leather Chemists Societies, 8th cong., Washington, D.C. (J. O'Flaherty, Dept. of Leather Research, Univ. of Cincinnati, Cincinnati 21, Ohio)
26-28. Control of Noise, symp., Ted- dington, England. (Director, National Physical Laboratory, Teddington, Middlesex)
26-9. Large Dams, 7th intern. cong., Rome, Italy. (U.S. Committee on Large Dams, c/o Engineering Joint Council, 29 W. 39 St., New York 18)
27-30. American Home Economics Assoc., Cleveland, Ohio. (Miss M. War- ren, School of Home Economics, Univ. of Oklahoma, Norman)

ENCYCLOPAEDIC DICTIONARY OF PHYSICS Volume 1
Editor in Chief: J. Thewlis
The Dictionary is being written by those scientists who are most closely in touch with each branch of pure and applied physics. The articles defining each term will be up to 2,000 words in length and illustrated. They will be arranged alphabetically. Cross references in each article being complete in itself, although references to related topics will be appended to the articles, with bibliographies designed to guide the reader in pursuit of further knowledge. It will serve as a counterpart in the English language, and will be entirely new from beginning to end. It is intended to serve all who require easily accessible information on physical and related topics.
Vol. 1 available; Vols. 2-7 in press. $240.00 per set

A LABORATORY MANUAL OF ANALYTICAL METHODS OF PROTEIN CHEMISTRY
(Including Polypeptides) Three Volumes
Edited by F. Alexander, R. J. Block
Volume 1: The Separation and Isolation of Proteins $8.50
Volume 2: Composition, Structure and Reactivity of Proteins $14.00
Volume 3: Determination of the Size and Shape of Protein Molecules $8.50
It is aimed to make this book the laboratory bench, covering chemical methods and physical methods on separation and interaction. Analytical aspects predominate and extensive examples from the literature are included.

PHYSICAL OCEANOGRAPHY
Volumes I and II
ALBERT DEFANT, Emeritus Ord. Professor of Meteorology and Geophysics at the University of Innsbruck, Austria
Physical Oceanography will undoubtedly be accepted as the standard textbook on the subject. It is concerned with the fundamentals of this geographical-geophysical science. The spatial, material and energetic characteristics of the water envelope of the earth are dealt with, in particular the physical and chemical properties of sea-water, the three-dimensional distribution of the oceanographic factors in the oceanic total space and their periodic as well as aperiodic changes. Detailed treatment of the possible forms of motion inside the ocean currents is presented (inertial and wind waves) and finally accepted in oceanic periodic movements of the water masses occurring with waves and tides and related phenomena (dynamics of the periodic phenomena). The contents of the textbook concern therefore the general geography of the oceans, the physics and chemistry of sea-water as well as the complete dynamics of the world oceans.
Set $35.00

PLASMA PHYSICS AND THE PROBLEM OF CONTROLLED THERMONUCLEAR REACTIONS
Four Volumes
This work comprises a large and authoritative selection of articles on the theoretical and experimental investigations carried out at the Institute of Atomic Energy (U.S.S.R. Academy of Sciences between 1951 and 1958 on the prob- lem of the controlled thermonuclear reaction and on the questions of the physics of plasma associated with it. All the articles included in this collection are previously unpublished. The col- lection is divided into four volumes, and the articles are presented generally in chronological order.
4 Vols.—each $24.00

THE COLLECTED WORKS OF IRVING LANGMUIR
(Twelve Volumes)
Executive Editor: Harold E. Way, General Electric Research Laboratory, Schen- ectady, New York
The complete works of the late Dr. Irving Langmuir are to be published in 12 volumes. Dr. Langmuir was associated with the General Electric Research Lab- oratory from 1909 until his death in 1957 and was the first American industrial scientist to receive a Nobel Prize. He was widely recognized as one of the great- est and most versatile scientific geniuses of the twentieth century. Twenty-nine leading scientists from throughout the world are serving as members of the edito- rial advisory board for these volumes, under the chairmanship of Dr. Guy Suits. Set $150.00

PERGAMON PRESS INCORPORATED
122 E. 55 St., New York 22, N.Y.
NEW YORK OXFORD LONDON PARIS

21 APRIL 1961