

an irreversible recrystallization of the metal. Theoretical considerations show that the ions are emitted from the metal and are not formed after a neutral atom evaporates.

On shatter-oscillations in liquid columns: E. H. KENNARD (introduced by Ernest Merritt). In some experiments recently witnessed by the writer in an industrial plant an extraordinary and apparently little-known type of fluid oscillation was observed. A pipe thirty-one meters long, filled with water, was connected to a tank containing some water and above it air under a pressure of three to four atmospheres; to the other end of the pipe was attached a pump. A recording gauge attached to the pipe near the pump showed at regular intervals narrow peaks of pressure, ranging as high as seventy atmospheres, separated by calm intervals four to eleven times as long as the duration of the peaks, during which the pressure appeared to be slightly below atmospheric. The interval between the peaks was several times longer than the period of oscillation of the water column regarded as a closed organ pipe. The proposed explanation is that when the water column expands and its pressure sinks to zero, the column "shatters." Theory indicates that, as soon as the pressure reaches zero at one point, a shatter-front will sweep from that point in both directions along the column with a speed above that of sound, leaving the water in an expanding condition behind it; no large breaks in the column can occur, but it will become full of little cracks or holes. During the subsequent reconsolidation of the column the water may acquire high velocities toward the pump, and when the reconsolidation-front reaches the pump an impulsive "water-hammer" pressure will result. A detailed study of such oscillations in the laboratory would be of interest.

On the existence of integrals of Einstein's gravitational equations for free space and their extension to a variable: T. Y. THOMAS (introduced by O. Veblen).

Memoir of John Trowbridge: E. H. HALL.

Biographical memoir of John Merle Coulter: WILLIAM TRELEASE.

Two contradictions in current physical theory and their resolution: F. S. C. NORTROP. Our purpose is to show that two contradictions exist in current physical theory which can be met only by a certain amendment to our traditional atomic theory. The first contradiction will be demonstrated by establishing three propositions. (1) Atomicity is an inescapable fact. (2) Atomicity necessitates the existence of a referent other than the microscopic particles. (3) According to current scientific theory no such referent exists. It appears that the facts permit no conclusion but that a new referent must be introduced into our traditional atomic theory to replace the discarded absolute space. The second contradiction also rests on three propositions. (1) The metric of space is conditioned by matter. (2) This metrical structure exhibits uniformity over macroscopic distances. (3) Matter, as currently conceived, is incapable of producing

such uniformity. Since neither of the first two premises can be escaped it follows that our traditional theory of matter must be amended to provide a basis for the metrical uniformity which was previously assigned to absolute space. A consideration of what is required to produce the type of metric, which Einstein suggests and the facts reveal, indicates what the required amendment must be. In a relativity theory, space is a relation between objects. Hence metrical variability means that the relations between the ultimate atomic entities change; and metrical uniformity means that they do not. It becomes evident, therefore, that the kinetic and contingent properties of the microscopic elements of the traditional atomic theory insure their adequacy as the source of local metrical variability, but eliminate them as the source of macroscopic metrical uniformity. In short, the general macroscopic uniformity must be regarded as imposed upon their contingent relatedness from without. This calls for an entity which is atomic and physical in character, and so large in size and fixed in form as to surround and congest all the microscopic atomic entities of the traditional atomic theory.

BOOKS RECEIVED

- BORING, EDWIN G. *A History of Experimental Psychology*. Pp. xvi + 699. Century. \$4.00.
- BRYANT, HAROLD CHILD. *Outdoor Heritage*. Pp. ix + 465. Illustrated. Powell. \$5.00.
- CANU, FERDINAND, and RAY S. BASSLER. *Bryozoa of the Philippine Region*. Pp. xi + 685. Smithsonian Institution. U. S. National Museum. Bulletin 100, Vol. 9. 224 figs. 94 plates.
- CLARK, W., T. SLATER PRICE and B. V. STORR, Editors. *Proceedings of the Seventh International Congress of Photography*. Pp. xiii + 571. Illustrated. Heffer. 25s.
- CONDON, EDWARD U., and PHILIP M. MORSE. *Quantum Mechanics*. Pp. xiii + 250. 28 figs. McGraw-Hill. \$3.00.
- CROFTS, DORIS R. *Haliotis*. Liverpool Marine Biology Committee. Memoirs. XXIX. Pp. viii + 182. 8 plates. University Press of Liverpool. 10s. 6d.
- EIPPER, PAUL. *Animals Looking at You*. Pp. x + 163. Photographs by Hedda Walther. Viking Press.
- EWER, BERNARD C. *Social Psychology*. Pp. ix + 436. Macmillan. \$2.25.
- HELLMAYR, CHARLES E. *Catalogue of Birds of the Americas*. Part VI. Pp. v + 258. Field Museum of Natural History. Publication 266. Zoological Series. Vol. XIII. Field Museum.
- MEISTER, MORRIS. *Magnetism and Electricity*. Pp. xiv + 210. 149 problem pictures. Living in a World of Science. Scribner.
- PEAKE, HAROLD, and HERBERT J. FLEURE. *The Corridors of Time*. Vol. VI. The Way of the Sea. Pp. viii + 168. 72 figs. Yale University Press. \$2.00.
- ROE, JOSEPH H. *Principles of Chemistry*. Pp. 427. Second edition. Mosby. \$2.50.
- SIMPSON, WALTER M. *Tularemia*. Pp. xix + 162. 53 text illustrations, 2 colored plates. Hoeber. \$5.00.
- SMITHSONIAN INSTITUTION. *Annual Report, 1928*. Pp. xii + 763.
- VOLKRINGER, H. *Les Étapes de la Physique*. Pp. ix + 217. Gauthier-Villars. Paris.
- La Propriété Scientifique ou le Droit du Savant sur l'Exploitation Économique de sa Découverte*. Société des Nations. Institut International de Coopération Intellectuelle. Cahiers des Droits Intellectuels. II. Pp. 11 + 265.



Five Fast Trains
Daily
Between Chicago and
Des Moines

Shortest and Best Route
to

**American Association
for Advancement
of Science
Convention**

December 27--January 2

| Leave La Salle St. Station | Leave Englewood Union Sta. | Arrive Des Moines |
|----------------------------------|----------------------------------|-------------------------|
| 10:30 a. m. | 10:42 a. m. | 7:05 p. m. |
| 6:30 p. m. | 6:43 p. m. | 3:25 a. m. |
| 8:25 p. m. | 8:36 p. m. | †4:37 a. m. |
| 11:30 p. m. | 11:41 p. m. | 7:55 a. m. |
| 12:50 a. m. | 1:05 a. m. | 11:20 a. m. |

† Sleeper may be occupied until 8:00 a. m.

All trains leave Chicago's most convenient stations—La Salle Street Station, in the heart of the city—only station on the Elevated Loop and on the route of every elevated train—Englewood Union Station (63rd Street) in the South Side residential district.

This service permits of stopover at Davenport (to visit the Davenport Public Museum, formerly Academy of Sciences) and at Iowa City, for State University of Iowa.

Fine fast service from all Mid Western Cities.

Ask nearest Rock Island Representative for further information, or address

L. M. Allen, V. P. & P. T. M.

Rock Island Lines
Room 723, La Salle St. Station, Chicago, Ill.

The Wistar Institute Bibliographical Service

is of invaluable assistance to

Librarians—Investigators—Teachers

It brings to them, in AUTHORS' ABSTRACT form, a brief review of all original papers on Biological Subjects which appear in the following journals:

Journal of Morphology and Physiology
The Journal of Comparative Neurology
The American Journal of Anatomy
The Anatomical Record
The Journal of Experimental Zoology
American Journal of Physical Anthropology
The American Anatomical Memoirs
Folia Anatomica Japonica (Tokio, Japan)
Stain Technology (Geneva, N. Y.)
Physiological Zoology (Chicago, Ill.)

Advance Abstract Sheets

issued semi-monthly, bearing Authors' Abstracts without bibliographic references, offer a practical means of making research immediately available in abstract form and of purchasing articles of special interest in reprint form without the necessity of subscribing to all the journals. Subscription, \$3.00 per year.

Bibliographic Service Cards

with complete bibliographic references, printed on Standard Library-catalogue cards, are of value and assistance to Librarians and Investigators. Subscription, \$5.00 per year.

Abstracts in Book Form

referred to above, are brought together periodically, with Authors' and Analytical Subject Indices. Price \$5.00 per volume.

Subscriptions to the Bibliographic Service and orders for reprints should be sent to

The Wistar Institute of Anatomy and Biology
Thirty-sixth St. and Woodland Ave. Philadelphia, Pa.

New Publications of THE PHILIPPINE BUREAU OF SCIENCE

RECENT MADREPORARIA OF THE PHILIPPINE ISLANDS. By Leopoldo A. Faustino. 310 pages and 100 plates; post-paid, \$2.50.

GOBIES OF THE PHILIPPINES AND THE CHINA SEA. By Albert W. Herre. 352 pages, 30 plates, and 6 text figures; post-paid, \$2.50.

THE PHILIPPINE JOURNAL OF SCIENCE, a monthly, issued in three volumes a year; per year, \$5.00.

A list of the publications of the Philippine Bureau of Science and a sample copy of the Philippine Journal of Science will be sent upon request.

Subscriptions and orders for publications should be sent to

THE BUSINESS MANAGER
Philippine Journal of Science

Bureau of Science

Manila, P. I.

Important new textbooks in PSYCHOLOGY

V. E. FISHER

AN INTRODUCTION TO ABNORMAL PSYCHOLOGY

The author is Assistant Professor in Psychology at New York University

THIS new textbook presupposes only such knowledge as results from a course in general psychology. Its introductory chapters treat the individual as a biologic entity, with an inherent nature often ill-adapted to the meeting of the many problems of our highly socialized life. Several chapters are then devoted to different modes of reaction to difficulties, bearing out the thesis that mental abnormalities are non-adjustive reactions to personal problems. The psychoses and neuroses are treated in some detail. A chapter is devoted to sexual neuroses. Sleeping, dreaming, hypnosis, and suggestion are dealt with in their relation to mental abnormalities.

512 pages
12mo
\$2.60

EDMUND S. CONKLIN

THE PSYCHOLOGY OF RELIGIOUS ADJUSTMENT

The author is Professor of Psychology in the University of Oregon

THIS book seeks definitely to avoid the inclusion of theological, philosophical, and devotional material. It is a strictly psychological consideration. The author analyses the religious feeling and describes its mode of expression. He summarizes the best material on conversion, mysticism, ecstasies, prophetic states, etc. Although he does not treat religion as an abnormal phenomenon, he uses his knowledge of abnormal psychology to discuss forms of religious fanaticism and other extreme features of the religious experience.

340 pages
12mo
\$2.00

BERNARD C. EWER

SOCIAL PSYCHOLOGY

The author is Professor of Psychology at Pomona College

THE aim of this volume is to offer for courses in social psychology a comprehensive and systematic presentation of the subject with a general account of social behavior. Outstanding features of the book are its explicit statement of the nature of higher and lower levels of social process, and its emphasis upon thought as a supremely important social function.

436 pages
Crown 8vo
\$2.25

MACMILLAN, 60 FIFTH AVENUE, NEW YORK



COLOR PLATES

A GFA Color Plates, the modern miracle of photographic science, are increasingly being adopted by laboratory workers and scientists who require authentic photographs in natural color for permanent record or lantern-slide projection.

Natural color photography has a direct application to your work.

Write for free Agfa Color Plate handbook

AGFA ANSCO CORPORATION
BINGHAMTON, N. Y.

PHOTO-ELECTRIC CELLS THE BURT CELL

**Without Fatigue—Highly Sensitive
Absolutely Reproducible—Instantaneous in Response**

The **BURT-CELL** is made by a new method and should not be confused with any other photo-electric cell. By a special process of electrolysis, the photo-electric metal is introduced into a highly evacuated bulb directly through the glass wall of the bulb, giving photo-electric material of absolute purity. The superiority of the **BURT-CELL** is due to these features, making possible results never before obtainable.

Described in Bulletin No. 271

QUARTZ CELLS—We are pleased to announce that we are manufacturing reproducible quartz photo-cells for measurement of ultra-violet.

We also manufacture the **STABILIZED OSCILLOSCOPE**—the only **VISUAL OSCILLOGRAPH** having a linear time axis and no inertia—giving an accurate picture of high frequency wave forms. This is a most powerful tool for the study of periodic phenomena.

Write for Bulletin 273

DR. ROBERT C. BURT

Manufacturing and Consulting Physicist
327 S. Michigan Ave., Pasadena, Calif.

Dried Brewers' Yeast

of

HIGHEST QUALITY

for

**RESEARCH and
PHARMACEUTICAL Purposes.**

WALLERSTEIN LABORATORIES
171 Madison Avenue
New York City

TRIARCH BOTANICAL PRODUCTS

Live and Preserved Plants
Prepared Slides for General Botany
Special Preparations for Plant Pathology
Microscopes and Microprojectors

*"Prepared by a Botanist
for Botanists"*



Write for our illustrated catalog
GEO. H. CONANT
RIPON, WISCONSIN