

SCIENCE

VOL. LXXI

FRIDAY, MAY 30, 1930

No. 1848

<i>The Franklin Institute:</i>		<i>Scientific Apparatus and Laboratory Methods:</i>	
<i>The Meaning of the Crystal:</i> SIR WILLIAM HENRY BRAGG	547	<i>An Improved Design for a Simple Laboratory Plant Drier:</i> L. R. TEHON	563
<i>A Momentous Hour at Panama:</i> DR. JOHN FRANK STEVENS	550	<i>Special Articles:</i>	
<i>Scientific Events:</i>		<i>Direct Transmission of Human Trachoma to the Monkey:</i> DR. PETER K. OLITSKY and JOSEPH R. TYLER. <i>Association and Constitution:</i> DR. EUGENE C. BINGHAM and HOLMES J. FERNWALT.....	
<i>Tropical Diseases Exhibit at Antwerp; The German Association of Scientific Men and Physicians; A Government Game Reservation; The Coal Research Laboratory of the Carnegie Institute of Technology; The Advisory Board of the Guggenheim Memorial Foundation</i>		564	
<i>Scientific Notes and News</i>		<i>The National Academy of Sciences</i>	
555		566	
<i>Discussion:</i>		<i>Science News</i>	
<i>The "Gibbs Phenomenon"—a Misnomer:</i> PROFESSOR TOMLINSON FORT. <i>The Problem of Saline Drinking Waters:</i> DR. IRA S. ALLISON. <i>A Survey of the Phytoplankton at Erie, Pennsylvania:</i> PROFESSOR O. E. JENNINGS. <i>The Vitality of Buried Seeds:</i> E. BROWN		x	
559			
<i>Special Correspondence:</i>			
<i>Research at the Mellon Institute:</i> DR. LAWRENCE W. BASS			
561			
<i>Quotations:</i>			
<i>A New Health Institute</i>			
562			

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal

Lancaster, Pa.

Garrison, N. Y.

Annual Subscription, \$6.00

Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

THE MEANING OF THE CRYSTAL¹

By Sir WILLIAM HENRY BRAGG

DIRECTOR OF THE ROYAL INSTITUTION OF GREAT BRITAIN

In the time which is allotted to me I should like to explain, if my audience will allow, the scope of the work in which, with my son and others, I have been recently engaged. I must first beg to remind you of certain facts. The elements of construction of the universe are the atoms, of ninety-two different kinds. The first constructive step is the assembling of the atoms into molecules. A molecule is a company of atoms in an association, which has some permanence great or small. The number of kinds of molecules is enormous. The water molecules consist of two atoms of hydrogen and one of oxygen. The molecule of ordinary salt contains one atom of chlorine and one of sodium; the molecule of an organic substance is generally more complicated, as, for example, that of naphthalene, which contains ten atoms of carbon and eight of hydrogen. If the atoms are likened to the

letters of the alphabet, the molecules must be compared to words.

The next step in nature's architecture is the linking of molecules to form solid substances, such as the subjects which we see around us and ourselves. The properties of all substances depend upon the way the molecules are put together, just as a house, or its interior, has a character and a usefulness, which depend upon its design, or just as the meaning of a sentence depends on the words it contains and on the way they are arranged.

This second step is not always made: the hindrance to its accomplishment is heat. Heat is a mode of motion. When, for example, the molecules of water are set in very rapid motion by imparting sufficient heat to them, the forces that would make them combine are overcome; the molecules exist as independent individuals and we have water vapor or steam. With less heat and less motion the molecules are always in part-

¹ Medal Day address, delivered at the Franklin Institute, Philadelphia, Pa., on May 21.

Outstanding New Texts

A SURVEY OF PHYSICS FOR COLLEGE STUDENTS

By **FREDERICK A. SAUNDERS**

Professor of Physics in Harvard University

This book will be hailed by a large number of teachers of physics as the best text of its kind in the field. Its standpoint is that of one interested in the phenomena of nature, with the applications taking second place. The 39 chapters are devoted to the analysis and discussion of the various phases of mechanics, heat, sound, electricity and magnetism, and light. The modern aspects of physics are introduced early, and their essential characteristics are indicated as much as possible without mathematical treatment.

Special features concerning the teachability of the text are the subordination of the mathematical part, the numerous new and practical problems, and the carefully thought-out and executed illustrations. An examination of this text will convince you of its excellence. \$3.75

OUTLINES OF MODERN BIOLOGY

By **CHARLES ROBERT PLUNKETT**

New York University

"The book impresses me as the most successful attempt that has been made to give a survey of the entire field of modern biology, and to show the present situation of knowledge on main lines in each of its subdivisions. To write such a book is a most difficult task; the author can be congratulated on having done it so well. The book will be extremely useful."—H. S. JENNINGS, *Johns Hopkins University*. \$3.75

TRIGONOMETRY

By **A. R. CRATHORNE and E. B. LYTLE**

University of Illinois

This book provides a simple and straightforward text in trigonometry adaptable to courses of various lengths. The trigonometry of the acute angle is considered first and the general angle taken up later, both authors having found from general experience that this approach was easiest and most natural for the majority of students. New ideas are taken up one at a time and spread throughout the course; thus keeping the beginner from the task of comprehending a number of new general notions without the necessary background of detail.

A special feature of this text is its elasticity for class use. The authors have outlined in the Preface how the material in the book may be abridged for the two or three hour course or lengthened for the longer courses. \$2.40

GUIDE TO THE STUDY OF NON-METALLIC MINERAL PRODUCTS

By **W. S. BAYLEY**

University of Illinois

"This book is well written. . . . The author has very skillfully chosen his material with a view to brevity and completeness. Both of these features appeal to me as a teacher in a comparatively small university. It seems ideally suited to the average class in Economic Geology in a college or small university. For that reason I shall be glad to use it next year."—W. A. VER WIEBE, *University of Wichita*. \$4.00

HENRY HOLT AND COMPANY

ONE PARK AVENUE

NEW YORK

The New York Homeopathic Medical College and Flower Hospital

Offers opportunity for highest grade medical training to one hundred men and women selected competitively.

In addition to thorough training in the Preclinical Sciences and the usual courses in Medicine and Surgery, special emphasis is given to Homeotherapy.

Seventy-first annual announcement mailed to those interested.

450 East 64th Street
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

JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

The School of Medicine is an Integral Part of the University and is in the Closest Affiliation with the Johns Hopkins Hospital.

ADMISSION

Candidates for admission must be graduates of approved colleges or scientific schools with two years' instruction, including laboratory work, in chemistry, and one year each in physics and biology, together with evidence of a reading knowledge of French and German.

Each class is limited to a maximum of 75 students, men and women being admitted on the same terms. Applications may be sent any time during the academic year but not later than June 15th.

If vacancies occur, students from other institutions desiring advanced standing may be admitted to the second or third year provided they fulfill the requirements and present exceptional qualifications.

INSTRUCTION

The academic year begins the Tuesday nearest October 1, and closes the second Tuesday in June. The course of instruction occupies four years and especial emphasis is laid upon practical work in the laboratories, in the wards of the Hospital and in the dispensary.

TUITION

The charge for tuition for 1930-31 will be \$600 per annum, payable in two installments. There are no extra fees except for certain expensive supplies, and laboratory breakage.

Inquiries should be addressed to the
Recorder of the School of Medicine, Johns Hopkins
University, Washington and Monument Sts.,
Baltimore, Md.

Graduates in Medicine who satisfy the requirements of the heads of the departments in which they desire to work are accepted as students for a period not less than three quarters. Tuition charge is \$50 a quarter.

The Review of Scientific Instruments

Published monthly by the Optical Society of America in co-operation with the Scientific Apparatus Makers of America

Contents for May, 1930

A Constant Frequency Oscillator.
Note on a Modified Randall Universal Calibration Curve for Ballistic Galvanometers.
A Vacuum Tube Electrometer.
The Use of the Grid Glow Tube in a Thermoregulator.
A Sodium-Argon Glow-Tube.
A New Research Microscope.
A Ratiometer.
A Point-Soldering Pencil.
A Simple Manometer and Source for Hot Vapors.

Subscription \$4.00 per year
(With JOURNAL OF THE OPTICAL SOCIETY OF AMERICA, \$5.00 per year)

F. K. RICHTMYER, Manager
Rockefeller Hall, Ithaca, N. Y.

New McGraw-Hill Books

Miles and Mikesh's Calculus

By **Egbert J Miles**, Associate Professor of Mathematics, Yale University, and **James S. Mikesh**, Master in Mathematics, Lawrenceville School. 638 pages, 6 x 9. \$3.75.

This book is one which marks a distinct departure in the teaching of calculus. It is an outgrowth of the authors' conviction that it is desirable to make the concepts of functionality and functional behavior play a more active and dominant part in calculus by considering the chief processes of the subject from the rate of change standpoint.

Knowlton and O'Day's Laboratory Manual in Physics

By **A. A. Knowlton**, Professor of Physics, Reed College, and **Marcus O'Day**, Assistant Professor of Physics, Reed College. 127 pages, 6 x 9, 62 illustrations. \$1.25.

Fifty-nine experiments, varying in difficulty and covering a considerable range of concepts, for a first-year laboratory course in physics.

Edwards, Frary and Jeffries' The Aluminum Industry

By **Junius D. Edwards**, Assistant Director of Research, **Francis C. Frary**, Director of Research, and **Zay Jeffries**, Consulting Metallurgist, Aluminum Company of America, with the collaboration of a group of experts from the staff of Aluminum Company of America. *Chemical Engineering Series*.

Volume I.—Aluminum and Its Production. 358 pages, 6 x 9, 63 illustrations.

Volume II.—Aluminum Products and Their Fabrication. 870 pages, 6 x 9, 344 illustrations.

Two volumes (not sold separately) Per Set \$12.00.

Volume I covers the history of the discovery of aluminum and the development of the industry, the ores of aluminum and their mining and refining for the production of pure alumina, and closes with a discussion of the production of metallic aluminum.

Volume II gives the reader a broad view of the various processes by which aluminum is fabricated, and discusses also the properties and uses of aluminum.

Pauling and Goudsmit's The Structure of Line Spectra

By **Linus Pauling**, Associate Professor of Theoretical Chemistry, California Institute of Technology, and **Samuel Goudsmit**, Associate Professor of Theoretical Physics, University of Michigan. *International Series in Physics*. 263 pages, 6 x 9, 68 illustrations. \$3.50.

A theoretical discussion of the structure of line spectra, based on the visualizable vector model of the atom combined with the results of the quantum mechanics.

Belling's The Use of the Microscope

By **John Belling**, Cytologist, Carnegie Institution of Washington. *McGraw-Hill Publications in the Agricultural and Botanical Sciences*. 315 pages, 6 x 9, 28 illustrations. \$4.00.

A handbook for routine and research work on the correct use of the microscope.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

Penn Terminal Building

370 Seventh Avenue

New York