

# SCIENCE

VOL. 90

FRIDAY, SEPTEMBER 1, 1939

No. 2331

*The British Association for the Advancement of Science:*  
*The Western Isles through the Mists of Ages:* SIR ALBERT SEWARD ..... 189

*Scientific Events:*  
*The Forests of Great Britain; The Australian Meteorite in the Collection of the Smithsonian Institution; The Proposed Inter-American University in Puerto Rico; The New York Meeting of the Electrochemical Society; Lectures at the Dundee Meeting of the British Association. Recent Deaths and Memorials* ..... 200

*Scientific Notes and News* ..... 203

*Discussion:*  
*Conditions and Opportunities at the Naples Zoological Station:* DR. R. E. COKER. *One-Man Authority Citations:* DR. CORNELIUS H. MULLER. *Spraying with Plant Growth Substances to Prevent Apple Fruit Dropping:* DR. F. E. GARDNER, P. C. MARTH and DR. L. P. BATJER. *"Distinction" in "Science":* DR. C. STUART GAGER ..... 206

*Special Correspondence:*  
*Research in Venezuela:* DR. GEORGE GAYLORD SIMPSON ..... 210

*Scientific Books:*  
*Malaria in Panama:* PROFESSOR W. H. TALIAFERRO ..... 211

*Societies and Meetings:*  
*The North Carolina Academy of Science:* PROFESSOR H. L. BLUMQUIST ..... 212

*Special Articles:*  
*Chemical Composition of the Tumor-producing Fraction of Chicken Tumor I:* DR. ALBERT CLAUDE. *Vitamin K Activity of Synthetic Phthiocol:* DR. ERHARD FERNHOLZ and DR. S. ANSBACHER. *Human Vaccination against Equine Encephalomyelitis Virus with Formolized Chick Embryo Vaccine:* DR. J. W. BEARD, DOROTHY BEARD and HAROLD FINKELSTEIN ..... 213

*Science News* ..... 10

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 WESTERN ISLES THROUGH THE MISTS OF AGES<sup>1</sup>

By Sir ALBERT SEWARD

PROFESSOR OF BOTANY EMERITUS OF THE UNIVERSITY OF CAMBRIDGE

### INTRODUCTORY

TWENTY-SEVEN years ago, when the British Association met for the second time in Dundee, Sir Edward Schäfer chose as the subject of his presidential address "The Nature, Origin and Maintenance of Life"; he discussed problems that will long continue to exercise the ingenuity and stimulate the imagination of biologists and chemists. A theme such as his is far beyond my reach. Seventy-two years ago the association met for the first time in this city. The Duke of Buccleuch occupied the presidential chair, and the opening words of his address are applicable to one who now finds himself in this privileged position; the Duke said: "No man has a title to state that he is unworthy of the post he is called on to fill, whatever may be his private feel-

ings as to his fitness for the post. To state that he is unworthy to be there placed is not only a disparagement to himself, but is no great compliment to those who thought him worthy of being so placed."

This, in my opinion, is not an occasion on which it is desirable to follow the easier course and address oneself in technical language to fellow workers in the pursuit of natural knowledge. The position which it is my great privilege to occupy affords a rare opportunity of talking to a large and, I venture to hope, a sympathetic audience, including some at least who are repelled by the jargon of specialists. My intention is to speak in ordinary language on a subject of which I know enough to realize how little that knowledge is, and briefly to describe an example of the way in which, within one small patch of an illimitable field, a student asks questions of nature and does his best to interpret the answers.

<sup>1</sup> Address of the president of the British Association for the Advancement of Science, Dundee meeting, August 30, 1939.

with the virus under natural conditions<sup>3</sup> and following laboratory contact with virus-diseased chick embryo tissues.<sup>4,5</sup> The occurrence of unrecognized infection in man has been demonstrated,<sup>5</sup> and in a recent study<sup>6</sup> of the incidence of such subclinical infections we have examined 184 human sera,<sup>7</sup> 69 of which were from individuals exposed to the Eastern strain virus. In 23 of these 69 sera antibodies sufficient to neutralize 100 to 1,000 infective doses of virus were found, and in one instance the serum fixed complement in the presence of

drawn prior to the first vaccination and after 7, 14 and 21 days.

Slight general reactions were observed in a few of 89 volunteers vaccinated. Sharp transient pain was experienced locally in most instances, followed occasionally by low-grade dull pain for from one to three days.

Sera from 23 of those vaccinated have been tested<sup>9</sup> for neutralizing antibodies against the Eastern strain virus, and a typical protocol is shown in Table 1. In

TABLE 1  
MOUSE PROTECTION TESTS AGAINST EQUINE ENCEPHALOMYELITIS VIRUS (EASTERN STRAIN) WITH SERUM OF WOMAN VACCINATED WITH FORMOLIZED CHICK EMBRYO VACCINE

Case	Serum	Date bled	Date vaccinated	Amount vaccine	Number of deaths in 4 injected mice				
					Virus dilution				
					10 <sup>-4</sup>	10 <sup>-5</sup>	10 <sup>-6</sup>	10 <sup>-7</sup>	10 <sup>-8</sup>
L. H.	a (control)	May 2	May 2	1.0 cc	4	3	2	2	0
	b	May 9	May 9	2.0 cc	4	4	3	1	0
	c	May 16			1	1	0	0	0
	d	May 23			0	0	0	0	0

Eastern strain virus purified by ultracentrifugation. Similar though less definite results were obtained in parallel studies with the Western strain. These findings have introduced the problem of protective vaccination, especially in workers frequently exposed to virus-diseased tissues and animals. We have vaccinated a group of men and women with formolized chick embryo vaccine<sup>8</sup> and have studied the probable effectiveness of the procedure by the examination of their sera for the presence of neutralizing antibodies.

Injections were made with a "bivalent" vaccine, prepared in the routine way for the immunization of horses. Vaccines consisting of 40 per cent. suspensions of diseased chick embryo tissue formolized to 0.4 per cent. were prepared separately for the Eastern strain and Western strain viruses. These were centrifuged at low speed, mixed in equal parts and used without further treatment. Two injections were made with an interval of 7 days. In some instances 1.0 cc was given as the first dose and 2.0 cc for the second. The majority, however, received two doses of 2.0 cc each. Routine injections were made deep in the gluteal muscles in two areas to lessen reactions to the formalin. Injections into the deltoid muscles of three individuals caused painful local reactions. Blood was

9 of the 23, serum taken 7 days after the first injection seemed to protect mice. In every case after 14 days, antibodies nearly as effective as those after 21 days were observed. After the latter interval the antibody content was sufficiently great to neutralize completely 100 to 1,000 infectious units of virus, except in one individual, whose serum neutralized only 10 units. In one instance, the serum drawn 21 days after a single injection of 1.0 cc vaccine protected against 1,000 infectious units.

The crude bivalent vaccine was thus found to be effective in the induction of antibodies against the Eastern strain virus, and to cause little discomfort. Vaccines containing less formalin and chick tissue debris may prove as effective and more useful for human vaccination.<sup>10</sup>

J. W. BEARD  
DOROTHY BEARD  
HAROLD FINKELSTEIN

DUKE UNIVERSITY SCHOOL OF MEDICINE

<sup>9</sup> P. K. Olitsky and I. M. Morgan, *loc. cit.*

<sup>10</sup> R. W. G. Wyckoff, *SCIENCE*, 89: 542, 1939.

## BOOKS RECEIVED

<sup>3</sup> L. D. Fothergill, J. H. Dingle, S. Farber and M. L. Connerley, *New England Jour. Med.*, 219: 411, 1938.

<sup>4</sup> R. R. Case, personal communication, Dr. R. W. G. Wyckoff.

<sup>5</sup> P. K. Olitsky and I. M. Morgan, *Proc. Soc. Exp. Biol. and Med.*, 41: 212, 1939.

<sup>6</sup> H. Finkelstein, D. Beard and J. W. Beard. Unpublished work.

<sup>7</sup> Obtained through the generous cooperation of members of the staff of Lederle Laboratories, Pearl River, N. Y., and Sharp and Dohme Company, Philadelphia, Pa.

<sup>8</sup> J. W. Beard, H. Finkelstein, W. C. Sealy and R. W. G. Wyckoff, *SCIENCE*, 87: 490, 1938.

BIGGER, JOSEPH W. *Man Against Microbe*. Pp. 304. 17 figures. 18 plates. Macmillan. \$2.50.

HARRISON, GEORGE R. *Massachusetts Institute of Technology Wavelength Tables, with Intensities in Arc, Spark, or Discharge Tube*. Pp. xxviii+429. Wiley. \$15.00.

SCHNEINFELD, AMRAM and MORTON D. SCHWEITZER. *You and Heredity*. Pp. xvii+434. Illustrated. Stokes. \$3.00.

TINKLE, WILLIAM J. *Fundamentals of Zoology*. Pp. xvi+492. 278 figures. Zondervan, Grand Rapids, Mich. \$3.00.

TRELOAR, ALAN E. *Elements of Statistical Reasoning*. Pp. xi+261. 47 figures. Wiley. \$3.25.

WEEKS, MARY E. *Discovery of the Elements*. Pp. v+470. Illustrated. Journal of Chemical Education, Easton, Pa. \$3.00.

---

# Outstanding McGraw-Hill Books

---

## Internal Constitution of the Earth

Edited by BENO GUTENBERG, California Institute of Technology. 413 pages,  $6\frac{3}{4} \times 9\frac{5}{8}$ . \$5.00

This important new book is Volume VII of Physics of the Earth, a series of monographs prepared under the direction of various committees of the National Research Council. Preceding volumes have been published by the Council. *Internal Constitution of the Earth* gives a review of the features of the interior of the earth written by a group of distinguished geologists and geophysicists. Some of the topics covered are: origin of the solar system; elastic properties of rocks and materials in the earth's crust; temperatures in the earth's crust; deep-focus earthquakes; density, gravity, pressure; etc.

## Terrestrial Magnetism and Electricity

Edited by J. A. FLEMING, Carnegie Institution of Washington. 794 pages,  $6\frac{3}{4} \times 9\frac{3}{4}$ . \$8.00

This book is Volume VIII of the Physics of the Earth, and represents an attempt, through the combined efforts of a number of competent investigators specializing in the various fields, to set forth in an authentic manner the present status of our knowledge of the earth's magnetic and electric phenomena.

## Electricity and Magnetism.

An Introduction to the Mathematical Theory

By JOHN B. WHITEHEAD, Johns Hopkins University. *Electrical Engineering Texts.* 221 pages,  $5\frac{1}{2} \times 8$ . \$3.00

The primary purpose of this book is to provide a condensed but consecutive development of the physical theories of electricity and magnetism, beginning with the simplest manifestations of mechanical forces by electrostatic and magnetic phenomena.

## Geomorphology

By A. K. LOBECK, Columbia University. 731 pages,  $6 \times 9$ . \$4.50

This long-awaited text in the fundamental principles of geomorphology will be of immediate interest to teachers of geography, geology, and related subjects. Intended for the beginning student, the book covers Rocks and Structures, Weathering, Underground Water, Streams, Alpine Glaciation, Continental Glaciation, Waves, Wind, Organisms, Coastal Plains, Plains and Plateaus, Dome Mountains, Block Mountains, Folded Mountains, Complex Mountains, Volcanoes, and Meteor Craters.

## A Source Book in Geology

By KIRTLEY F. MATHER, Harvard University, and SHIRLEY L. MASON, Geologist, Houston, Texas. *Source Books in the History of the Sciences.* 702 pages,  $6 \times 9$ . \$5.00

The purpose of this book is to give a comprehensive view of the development of geological science during the past four centuries by presenting the significant passages from writings of the great contributors to that science. The excerpts include portions of the work of 130 geologists, each of whom was influential in molding the geological thought of his time. The original statements of many important principles and theories are thus made available.

*Send for copies on approval*

---

# McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York, N. Y.

Aldwych House, London, W.C.2

# Examine These MOSBY Texts

## BEFORE MAKING YOUR FALL ADOPTIONS

### Biology and Zoology

**TEXTBOOK of ZOOLOGY**—By George Edwin Potter. 843 pages, 440 illustrations. Price, \$5.00.

**LABORATORY OUTLINE for GENERAL ZOOLOGY**—By George Edwin Potter. 281 pages. Illustrated. Price, \$1.75.

**A TEXTBOOK of GENERAL BIOLOGY**—By E. Grace White. 2nd Edition. 667 pages, 336 illustrations. Price, \$3.50.

**A LABORATORY OUTLINE of GENERAL BIOLOGY**—By E. Grace White. 261 pages. Illustrated. Price, \$1.50.

**FUNDAMENTALS of BIOLOGY**—By William C. Beaver. 896 pages, 299 illustrations. Price, \$4.50.

**LABORATORY OUTLINES of GENERAL BIOLOGY**—By William C. Beaver. 165 pages, 25 illustrations. Price, \$2.00.

**OBSERVATION and STUDY GUIDE for STUDENT TEACHERS**—By Edgar M. Cook and John H. Cates. 137 pages, 40 observation sheets. Price, \$1.50.

**ELEMENTS of PSYCHOLOGY**—By Knight Dunlap. 499 pages, 66 illustrations. Price, \$3.00.

**AN INTRODUCTION to EXPERIMENTAL HUMAN PHYSIOLOGY**—By W. W. Tuttle and G. Clinton Knowlton. 138 pages. Price, \$1.50.

### Hygiene

**PERSONAL and COMMUNITY HEALTH**—By Clair E. Turner. 5th Edition. 650 pages, 128 illustrations, 4 color plates. Price, \$3.00.

**PERSONAL HYGIENE**—By Clair E. Turner. 335 pages, 84 illustrations, 3 color plates. Price, \$2.25.

### Miscellaneous

**FUNDAMENTALS of ANATOMY**—By Carl C. Francis. 320 pages, 175 illustrations, 26 color plates. Price, \$2.75.

**TEXTBOOK of HISTOLOGY**—By Evelyn E. Hower. 365 pages, 340 illustrations. Price, \$4.50.

**A TEXTBOOK of BACTERIOLOGY**—By R. W. Fairbrother. 457 pages. Price, \$4.50.

**SYNOPSIS of CLINICAL LABORATORY METHODS**—By W. E. Bray. 2nd Edition. 408 pages, 51 illustrations, 17 color plates. Price, \$4.50.

**ESSENTIALS of COLLEGE CHEMISTRY**—By G. H. Whiteford and R. G. Coffin. 514 pages, 32 illustrations. Price, \$4.00.

**AN OUTLINE of LABORATORY WORK in INORGANIC CHEMISTRY**—By G. H. Whiteford, R. G. Coffin, and Elizabeth M. Wing. 222 pages. Price, \$1.50.

### Physiology

**TEXTBOOK of PHYSIOLOGY**—By W. D. Zoethout. 6th Edition. 714 pages, 291 illustrations. Price, \$4.00.

**LABORATORY EXPERIMENTS in PHYSIOLOGY**—By W. D. Zoethout. 2nd Edition 256 pages, 95 illustrations. Price, \$2.25.

**FUNDAMENTALS of HUMAN PHYSIOLOGY**—By J. J. R. Macleod and R. J. Seymour. 424 pages, 108 illustrations, 4 color plates. Price, \$2.50.

**LABORATORY MANUAL for ELEMENTARY PHYSIOLOGY**—By Lalia V. Walling and Kenneth Siler. 3rd Edition. 176 pages. Price, \$1.50.

**PHYSIOLOGICAL CHEMISTRY**—By J. F. McClendon and C. J. V. Pettibone. 6th Edition. 454 pages, 34 illustrations. Price, \$3.50.

**Macleod's PHYSIOLOGY in MODERN MEDICINE**—Edited by Philip I. Bard. 8th Edition. 1051 illustrations. Price, \$8.50.

**CLINICAL LABORATORY METHODS and DIAGNOSIS**—By R. B. H. Gradwohl. 1607 pages, 492 illustrations, 44 color plates. Price, \$12.50.

**INTRODUCTION to ANIMAL BIOLOGY**—By John B. Parker and John J. Clarke. 500 pages, illustrations. In Preparation.

**LABORATORY INSTRUCTIONS of GENERAL BIOLOGY**—By John B. Parker and John J. Clarke. 148 pages. Price, \$1.50.

**The C. V. MOSBY CO., Pine Blvd., St. Louis, Mo.**