technique, the evidence from staining is, at least so far, negative. (2) Proponents of the microbial theory can point out that the aphid particles do not resemble classical mitochondria because of their stability and their size. However, the studies of Watanabe and Williams (*J. Gen. Physiol.*, 34, 675 [1951]) on the sarcosomes of insect flight muscles disclose another type which approaches the stability and size of the aphid particles. (3) The aphid particles are supposed to be added intact to the developing egg from the "mycetocytes" of the parent, so that the egg can be regarded as being infected by exogenous microorganisms. But if one examines the critical review of, and careful original work on, the subject of the ontogeny of the "mycetocytes" by Uichanco (*Philippine J. Sci.*, 24, 143 [1924]), one will find no direct or conclusive evidence for the continuity of the particles of the parental mycetocytes with the particles that suddenly appear in the developing egg or embryo in the oviduct. (4) The aphid particles are said to have been grown *in vitro*. All such claims need verification. Some reportedly successful experiments involve very simple techniques and can easily be repeated. My own attempts to cultivate them, including the use of hanging drop techniques where individual particles could be observed, were not successful.

If the aphid particles are cell particulates, mitochondrial in nature, the question is raised as to the function of cells apparently containing little more than mitochondria. These cells are intimately associated with the fat body in aphids, and what are possibly similar cells in some other insects are also imbedded in the fat body. Since mitochondria are centers of Krebs cycle activity, it might be tentatively postulated that there is a division of labor among the cells of the fat body, certain cells ("mycetocytes") being primarily responsible for providing the energy for the synthesis of fats, proteins, and glycogen, with the typical fat cells being responsible for the storage of these materials. Present work on the particles of the "mycetocytes" of aphids and other insects is exploring this possibility. The presence of Krebs cycle enzymes in the particles would not, of course, directly disprove the microbial hypothesis. The presence or absence of DNA appears to be the most critical question in this respect, and I feel that until someone can show conclusively that the particles contain DNA granules or nuclei, they should be regarded as cell particulates rather than as microorganisms.

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Book Reviews

Botany of Sugarcane. C. van Dillewijn. Waltham, Mass.: Chronica Botanica; New York: Stechert-Hafner, 1952. 371 pp. $6.00.

A comprehensive new book of value to sugar technologists and cane growers alike has been produced by Dr. van Dillewijn, formerly director of the Sugar Experiment Station, Cheribon, Java. The title page appears to suggest that the book is part of a series in preparation, or proposed, entitled "Handbook of Sugarcane." Volume I, *Botany of Sugarcane,* is devoted to the structure, growth, and physiology of the sugar-cane plant, with emphasis on the application of scientific studies to crop production. Chapters 1–6, inclusive, comprise a richly illustrated description of the outer and inner morphology of sugar cane, with separate discussions of the stem, bud, leaf, flower, and root and an evaluation of the characteristics useful in identification of sugar-cane varieties. Sources used by Dr. van Dillewijn in preparing this portion of the book consist of the published records of specialists from late in the past century to the most recent years.

Section II, under the general heading "Physiology," contains chapters on germination, tillering, growth, vegetative composition, chemical composition, nutrition, water relations, photosynthesis, and respiration.

For cane growers without access to the large volume of technical literature on sugar cane this book will provide in compact form an excellent, up-to-date, and full account of research on the biology of sugar cane. Of special interest are the careful descriptions of root development and tillering and the progressive development of ratoon crops after the plant cane crop is harvested. For the first time in a sugar-cane handbook space is given to the important growth-regulating substances. The whole treatment of growth processes contains much that is useful in practical manipulation of the crop. The chapters on nutrition and on water relations similarly present fundamental information on fertilizer and water requirements and the interrelation of these factors as they influence growth and sugar production. There are 617 references to technical literature.

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Short-Wave Radiation Phenomena, Vols. I and II. August Hund. New York–London: McGraw-Hill, 1952. 1382 pp. $20.00 the set.

It is not always easy to formulate a concrete opinion about a book of such tremendous proportions as this 1382-page opus. In the present case, this is even more difficult because it is hard to identify the reader to whom the work might have been addressed. It is cer-

tainly not useful for a college student who meets such subject matter for the first time, for the work is much too detailed. Neither is it for the specialist, who does not need the mass of detailed computation to orient him in a specific problem. Nor is it, finally, a comprehensive introduction to the subject of "short-wave radiation phenomena," for no modern book on the subject can afford to devote but two pages in its entire length to horns and only about one page to metal-lens antennas. Such disregard for the value of modern radiating systems might have been fully justified in a text largely devoted to important theoretical aspects of the subject, leaving no space for discussion of practical problems. No such lack can justly be claimed as an excuse, as a large amount of space is wasted in actual arithmetic, trivial trigonometric relations, and extensive numerical examples occupying page after page.

Perhaps there will be a group of readers who will appreciate having as a permanent reference the minute examination of the problems of reflection, refraction, and diffraction. These subjects occupy about half of Volume II. Here one finds, in the problem of radiation in free space, the detailed examination of reflection and refraction of plane waves in passing from one isotropic medium into another. The examination of this problem, with arbitrary angles of incidence, requires 8 pages of general discussion and 27 pages of tabulated calculations and discussion. This is then followed by some 150 additional pages of discussion of related topics, such as calculation of Brewster's angle for various conditions, magnitude and phase of reflections from the earth, and calculation of field patterns from simple radiators in the presence of a reflecting medium. Each of these is considered in great detail and should be of value to anyone to whom the specific problems happen to be important.

The subject of electromagnetic diffraction is also discussed in considerable detail, starting with the usual basic principles—i.e., Huygen's principle, Fresnel wave interference, and other matters usually taken up in a course in physical optics. These are applied to the study of parabolic electromagnetic radiators, wave propagation through apertures, diffraction from sharp edges, diffraction around a spherical earth, etc., each case being considered thoroughly and completely. Here the book is at its best, and the reader will find the matter well presented, with numerous references to the original works in the field.

The first volume is divided as follows: Chapters I, II, and III present the fundamental concepts and relations of currents and electromagnetic fields, occupying a space of 360 pages. In their scope, they represent a standard introduction, containing the required elements of the theory of electricity and magnetism for the study of radiation phenomena. Chapter IV, entitled "Propagation Characteristics," discusses the properties of the propagation constant in unbounded and guided space, including such topics as phase, group, and signal velocities and cutoff frequency for waveguides. Chapter V discusses transmission line problems, starting with the usual formulas, impedance matching with stubs, and suggests the use of acorn tubes for standing-wave detector probes. It concludes with problems of radiation from transmission lines. Chapter VI deals with the problem of free-space radiation. This can be considered as the first chapter on radiation phenomena, with the preceding 528 pages being more or less preparatory material. In this 255-page chapter one meets the classical problems of radiation from simple dipoles and combinations of such dipoles in radiating arrays. As can be seen from the number of pages devoted to this, the discussion is quite detailed. Chapter VII is concerned with radiation in presence of "obstructions," such as the ground. Chapter VIII is the chapter on diffraction, mentioned earlier. Chapter IX contains 60 pages on waveguides and cavities, being rather brief, with completely standard material. It is doubtful if one would have any reason to prefer this chapter to any of numerous and well-known references on the subject.

As a whole, the book leaves much to be desired. In spite of its bulk, it covers but a small fraction of the important problems of interest today. The superfluity of numerical details is oppressive and does not make it easy to understand the basic problems. In no sense can it be construed to be a "modern" treatise on the important subject of short-wave radiation.

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Scientific Book Register

The Scientists Look at Our World. The Benjamin Franklin Lectures of the University of Pennsylvania, fourth series. John M. Fogg, Jr., Ed. Philadelphia: Univ. Pennsylvania Press, 1952. 147 pp. $3.00.

Electrodynamics: Lectures on Theoretical Physics, Vol. III. Arnold Sommerfeld; trans. by Edward G. Ramberg. New York: Academic Press, 1952. 371 pp. $6.80.

The Clinical Application of Antibiotics: Penicillin. M. E. Florey. New York: Oxford Univ. Press, 1952. 730 pp. $17.50.

Fleas, Flukes & Cuckoos: A Study of Bird Parasites. Miriam Rothschild and Theresa Clay. New York: Philosophical Library, 1952. 304 pp. Illus. $8.75.

The Range of Human Capacities. 2nd ed. David Wechsler. Baltimore: Williams & Wilkins, 1952. 190 pp. $4.00.

Paper Chromatography: A Laboratory Manual. Richard J. Block, Raymond LeStrange, and Gunter Zweig. New York: Academic Press, 1952. 195 pp. Illus. $4.50.

Basic Medical Physiology. W. B. Youmans. Chicago: Year Book Pub., 1952. 436 pp. Illus. $7.50.

Imperfections in Nearly Perfect Crystals. Symposium held at Pocono Manor, October 12–14, 1950. Sponsored by the Committee on Solids, Division of Physical Sciences, National Research Council. W. Shockley *et al.*, Eds. New York: Wiley; London: Chapman & Hall, 1952. 490 pp. $7.50.

Education and the Spirit of the Age. R. W. Livingstone. New York: Oxford Univ. Press, 1952. 114 pp. $2.00.

Deformation and Flow in Biological Systems. A. Frey-Wyssling, Ed. Amsterdam: North-Holland Pub.; New York: Interscience, 1952. 552 pp. $11.50.