Book Reviews

The Dancing Bees. An account of the life and senses of the honeybee. Karl von Frisch. Harcourt, Brace, New York, 1955. xiv + 183 pp. Illus. + plates. $4.

This book is a translation of the 1953 edition of von Frisch's *Aus dem Leben der Bienen*. It includes much fine material not previously available in a comparable context in the English language. The translation is excellent, having been made by Dora Ilse of the University of Poona, India, one of von Frisch's students and herself a student of bees. The style is easy and such technical terms as are used are fully explained.

The first 40 pages, approximately, contain descriptions, with adequate illustrations, of the major features of the life-history and structure of honeybees. Such chapter titles as "The brood" and "The swarm" indicate the type of material contained in this section of the book. The next 100 pages are the heart of the book, containing a fine account of the work for which von Frisch has become famous. Such topics as the chemical senses, vision, orientation, and communication of bees are very interestingly discussed. The accounts of the dances concerned with communication are as excellent as could be expected. The last part of the book consists of miscellaneous short chapters on such matters as enemies and diseases of bees and other insect communities. Some of these chapters are so brief that they might better have been omitted.

CHARLES D. MICHENER
Department of Entomology, University of Kansas

Elements of Servomechanism Theory. George J. Thaler. McGraw-Hill, New York–London, 1955. x + 282 pp. Illus. $7.50.

This volume is planned as a textbook for a one-semester undergraduate course in servomechanisms. Operational calculus is avoided, and frequency-response methods are emphasized, in both polar and logarithmic form. Familiarity with differential equations is assumed. Of the 10 chapters intended for the course, seven have problems for assignment to students. The student's grasp of the material will be easier if he has had some network theory. Indeed, many of the problems assume such background.

The author uses the problems to instruct the student in the field of carrier frequency servos and the compensation of such systems. This is questionable procedure: a few paragraphs on that subject would help even the brightest student. For instance (problem 4-3), the equation of a loaded parallel "T" network, with source impedance included, is a tedious derivation, and the mere instruction to "Derive appropriate transfer function" will probably not produce the form that is most instructive.

It is quite apparent that the material in the book has been used in actual classroom practice. The presentation is elementary, patient, and thorough. An interested college student should be able to follow the material easily. The book should fill the existing need for an elementary college textbook and should find wide use in the courses that are being set up in many schools.

CARLTON W. MILLER
Engineering Department, Perkin-Elmer Corporation

Biology of Deserts. J. W. Cloudsley-Thompson, Ed. Institute of Biology, London, 1954. iv + 224 pp. Illus. 14s.

With increasing problems arising from world overpopulation, attention of scientists in various lines is turning to interdisciplinary study of marginal regions, particularly deserts, and their possibilities for occupation and exploitation, as was exemplified by the recent International Arid Lands Meeting in New Mexico, at Albuquerque and Socorro, 26 April–4 May [*Science* **121**, 659; **122**, 61 (1955)], and by the earlier symposium whose proceedings are published in this report—a conference on "The biology and productivity of hot and cold deserts," held in London, 25–27 September 1952, organized by the Institute of Biology and supported in part, as was the recent New Mexico gathering, by UNESCO funds.

Five topics were covered in the several sessions of the conference, as follows (the number of papers for each is given in parentheses): "Climate and physical environment" (4); "Plant ecology" (6); "Entomology and ecology" (5); "Economic aspects" (4); "Mammalian physiology and ecology" (9). Six pages of discussions are also included.

The second half of the last subject (4 papers) is concerned with adaptability of one particular mammal, our own species. The conclusion is indicated that men of various races can, with proper precautions, live and work in hot arid country and in cold environments as well as in the humid tropics.

The four papers listed under "Economic aspects" deal with man-made deserts, desiccation caused by deforestation, cultivation, burning and overgrazing, and programs for halting the march of the deserts. Discussions of insects and of plant diseases are also particularly good to have.

These, and the other, general and biological, papers are all interesting and valuable, forming a most important compilation.

ERIK K. REED
National Park Service, Santa Fe

Solubilization and Related Phenomena. M. E. Laing McBain and E. Hutchinson. Academic Press, New York, 1955. ix + 259 pp. Illus. $7.50.

Although our factual knowledge of the theoretically and practically important subject of solubilization has vastly increased during the last decade, it is still impossible to give an exact interpretation of the experimental results. The main reason is that knowledge of the intimate structure of micelles is lacking. This situation has led to many ad hoc interpretations of the experimental data.

Evidently there is a great need for a book on solubilization which summarizes systematically all experimental data and discusses the interpretations in a fair and critical way. McBain and Hutchinson have succeeded admirably in providing us with such a book, and it will be of great service to anyone interested in the subject.

After a concise treatment of the historical developments in Chapter I there is a brief description of solubilization as a sorption phenomenon in Chapter II. This is followed by a concise chapter dealing with the thermodynamic properties of solutions of colloidal electrolytes. Extremely valuable is the long Chapter IV (more than 100 pages), which summarizes and discusses in a systematic way the host of experimental data found in the literature. Many clear graphs facilitate the reading of this factual chapter. The various views dealing with the mechanism of solubilization are discussed in Chapter V. Phenomena related to solubilization as cosolvency, blending, and hydrotropy are presented in Chapter

VI. The last two chapters deal with the physiological aspects and some more general applications of solubilization. Appendix I gives a concise theory of light scattering, and Appendix II discusses briefly the behavior of polysoaps.

There are relatively few shortcomings in this book. It is somewhat surprising that no mention is made of potentiometric studies of colloidal electrolytes, although such data provide valuable information on the properties of colloidal electrolytes. The section dealing with emulsion polymerization (p. 129) is disappointing and very weak; no mention is made of the important theory proposed by Ewart and Smith in 1948.

Fittingly the book is dedicated to the late James W. McBain, the pioneer in the field of solubilization, who has contributed so much to its development. Some statements made by him are reproduced in the introduction.

I. M. KOLTHOFF
University of Minnesota, School of Chemistry

Bibliography on Hearing. S. S. Stevens, J. G. C. Loring, D. Cohen, compilers. Harvard University Press, Cambridge, Mass., 1955. 599 pp. $7.

This bibliography is an enlargement of an earlier one, *A Bibliography in Audition,* by G. A. Miller, R. Galambos, W. A. Rosenblith, and I. J. Hirsch. It contains more than 10,000 titles listed alphabetically by author and includes a scheme of subject classification.

The procedures used in the compilation are not specifically outlined in the preface, nor is there a listing of the particular fields intended to be covered, although it is mentioned that, in comparison with the former edition, this one places added emphasis upon deafness, ultrasonics, the effects of drugs on hearing, information theory, and the psychological and acoustical effects of music.

A necessarily sketchy examination of the titles themselves indicates that there is extensive coverage of general and theoretical aspects of hearing, of the phenomena of pitch, fatigue, and masking, and of the special fields of speech and music. There appears to be somewhat limited coverage of historical material, of the anatomy of the ear, of hearing in animals, and of problems of deafness. Other topics, such as the physics of sound, the effects of noise, auditory testing, and the phenomena of beats, combination tones, and sound localization, seem to have an intermediate status, with a fair degree of coverage.

The subject classification, which is at the back of the book, consists of a division of the field into 315 topics and then under each of these a listing of the names of the authors whose relevant works are included in the bibliography. A person interested in a particular topic will look up the listed names and, when several articles appear under one name, must discover for himself which ones are concerned with his topic. This system is serviceable, despite its indefiniteness, but doubtless will evoke certain expressions of annoyance from its users.

It is made clear in the preface that the titles were assembled largely from secondary sources, and the usual errors from such a procedure are to be expected. I noticed only a few errors, mostly of a minor nature. Somewhat surprising is the listing "Tyndall, J. *Der Schall*" and the omission of this famous book in its original English. Errors noticed in the subject classification are of two sorts: some names listed are not to be found in the bibliography, and others are inappropriate. An amusing instance of the latter sort is the reference to articles by Cooseman on "Hearing in beetlers" under the topic "Animal studies; frequency range: invertebrates"; for beetlers are people who work in cotton mills—not members of the order Coleoptera.

This bibliography represents a great deal of exacting, routine work and will be of considerable service to students in the auditory field.

E. G. WEVER
Department of Psychology, Princeton University

Integers and Theory of Numbers. Abraham A. Fraenkel. Scripta Mathematica, Yeshiva University, New York, 1955. 102 pp.

This volume, the author explains in the preface, is essentially a translation of the first part of his earlier book, *Mavo LeMathematika,* which was written in Hebrew and grew out of talks given by him, over a period of many years, as part of the adult-education program in Israel. It is to be followed by two more volumes of a similar nature, one on the fundamental concepts of modern algebra, the other on the theory of sets.

The four chapters are entitled "Natural numbers as cardinals," "Natural numbers as ordinals," "Theory of numbers," and "Rational numbers." The first, second, and fourth present a construction of the number system through the rationals. Many results are proved, but there is no attempt to provide a step-by-step development, such as is found in Landau's *Grundlagen der Analysis.* The third chapter discusses some of the well-known results and unsolved problems of classical number theory. Throughout the book there are numerous references to more detailed treatments of various topics.

The foregoing remarks do not, however, do justice to the book. It is an attempt by a mathematician of wide and deep learning to give the intelligent layman some understanding of the nature of our number system and of mathematics in general. It will prove to be a difficult book for such a person, and I shall not try to predict how many there will be who will devote the necessary effort to the task. Those who do, however, will find it an enlightening and stimulating experience.

JOHN DYER-BENNET
Department of Mathematics, Purdue University

The Nitrogen Metabolism of Micro-organisms. B. A. Fry. Wiley, New York; Methuen, London, 1955. ix + 166 pp. Illus. + plates. $2.

In this little Methuen monograph B. A. Fry has achieved his aim: "to survey as comprehensively as possible the nitrogen metabolism of microorganisms and . . . to reflect current trends in modern biology." This book is a survey, and, like a surveyor, Fry covers a vast area going from one well-defined point to another with brief attention to the details between. The area of nitrogen metabolism has been covered well; if any major points have been omitted I was not aware of them. Those who might wish to get more details will find the list of references very complete. "Current trends in modern biology" are reflected especially in chapters on absorption of amino acids and on the mode of action of chemotherapeutic agents.

This monograph, for a modest cost, will provide all but a specialist in the field with a fine introduction to nitrogen metabolism.

S. G. KNIGHT
Department of Bacteriology, University of Wisconsin

Biochemistry and Physiology of Protozoa. vol. II. S. H. Hutner and A. Lwoff, Eds. Academic Press, New York, 1955. xiv + 388 pp. Illus. $9.

By virtue of their favorable characters as compared with other microorganisms and with a growing number of forms cultivable *in vitro* free from other organisms, Protozoa are becoming increasingly popular as "biochemical tools." Therefore, the appearance of the second vol-