cases is at variance with the results obtained by these methods. This tendency to consider the microscope as an independent tool of research is reflected by the fact that the thousand or so references are concerned exclusively with electron microscopy. The reader will have to refer to these references for further details of specimen preparations, although, to the reviewer's knowledge, Dr. Wyckoff has never described his methods in as great detail as he does in this book. It should, therefore, find a place in the library of every electron microscopist.

THOMAS F. ANDERSON

University of Pennsylvania

Freeze-Drying: Drying by Sublimation. Earl W. Flosdorf. New York: Reinhold, 1949. 280 pp. $5.00.

This timely little book is written for those who use and study the technique of drying from the frozen state as applied to a variety of experimental fields—micropathology, immunology, histology, pharmacology, and engineering. The author foresees that "probably few will read the book from cover to cover," but it is equally certain that many will find a wealth of information in it.

Particularly instructive is the chapter on "Basic Principles," with its good review of the bibliography. In "Applications" the author covers thoroughly the various aspects of the art, especially as applied to medicine. "Equipment for Food" is a very stimulating chapter, as it opens a hopeful view of things to come. Various portions of the historical review may appear somewhat one-sided, but the chapter dealing with equipment for medical products is a very clear and complete catalogue.

The competence of the author makes the publication a most desirable and practical reference book, completed as it is by an excellent index.

MAX M. STRUMIA

Bryn Mawr Hospital

Oscillations of the Earth's Atmosphere. M. V. Wilkes. New York: Cambridge Univ. Press, 1949. 76 pp. $2.50.

This book deals with the lunar and solar atmospheric tides. It summarizes observational facts and theory, and discusses the implications tidal theory has for the exploration of the high atmosphere. The semidiurnal solar tide was discovered not very long after the invention of the barometer, when the first observations were made at tropical latitudes; whereas lunar tidal effects, which are considerably smaller, were first found about the middle of the 19th century. It was early recognized that the smallness of the lunar tide as compared with the solar tide requires some special explanation because the tide-generating gravitational force of the moon is more than twice as large as that of the sun. Such an explanation was advanced by Lord Kelvin's "resonance" theory, according to which the semidiurnal variation of the air pressure is caused by the diurnal temperature variation. In the latter the diurnal term is, of course, much larger than the semidiurnal, but Kelvin suggested that the atmosphere has a free period in the vicinity of 12 hours so that even with small amplitude of the generating force the semidiurnal term in the pressure oscillation becomes much larger than the diurnal term. Early investigations by Pièrre de Laplace and later ones by Max Margules, Horace Lamb, and V. Bjerknes indicated that an autobarotropic atmosphere—that is, an atmosphere in which the law of compression and the actual density distribution are such that a displaced fluid particle assumes always the density of the environment—has a free period in close proximity to that required by the resonance theory, and that such oscillations can be discussed in terms of those of an equivalent ocean whose depth determines the length of the period of oscillation. However, since the atmosphere is not autobarotropic, it appeared that the "equivalent depth" of the atmosphere is too large and the period therefore too long to give the degree of resonance postulated by Kelvin, until Chaim Pekeris showed, following G. I. Taylor's work, that an atmosphere in which the temperature agreed with the observations up to 40 miles and did not contradict the indirect evidence then available for higher levels has a period of the required length. This work of Pekeris and subsequent investigations by the author of the book together with K. Weeks are dealt with at length in the book under review. An analogy to the theory of the propagation of electromagnetic waves permits an easy discussion of the possible trapping of energy when different types of vertical temperature distributions, analogous to different types of distribution of the refractive index in electromagnetic theory, are assumed. Such considerations of the trapping of the energy give valuable hints concerning the nature of the actual vertical temperature distribution that point toward oscillations with the period required by the resonance theory. The actual calculation of various temperature profiles gave free periods of a length required by the resonance theory. Thus this theory would seem well established, although there are still some minor problems and difficulties to be resolved, as discussed in the last chapter of the book.

Shortly after the appearance of the book, however, considerable doubt was thrown on these favorable results by two reports on research projects sponsored by the National Advisory Committee for Aeronautics—demonstrating again, if such demonstration is needed, the very rapid development of upper-air research. Z. Kopal, L. G. Jacchia and Pièrre Carrus at Massachusetts Institute of Technology have shown in a preliminary report that the resonance magnification becomes too small to support the resonance theory when more recently adopted vertical temperature profiles, such as that adopted by NACA or that based on V-2 flights, are substituted for the profiles used by Wilkes. Pekeris found that the equivalent depth increases indefinitely with the period in an atmosphere in whose top layer the temperature increases linearly with height. The reason for this is that in such a layer the energy continues to spread to higher elevations as the period is lengthened. Tides in an atmosphere with a top layer of vertically increasing temperature may thus differ markedly from tides in an atmosphere with an inversion or decreasing temperature at the top, which latter tides are analogous to those in an ocean of equivalent depth.

These very recent results leave the issue of the resonance theory again in doubt. Nevertheless Wilkes' book is a very well-written account of the atmospheric tidal problem, its empirical results, and its theory. The volume has been well and attractively printed, but it is to be regretted that its price could not have been set considerably lower.

B. HAURWITZ

New York University

Reviewed in Brief

Penicillin: Its Practical Application, 2nd ed. Sir Alexander Fleming. London, England: Butterworth; St. Louis, Mo.: C. V. Mosby, 1950. 491 pp. $7.00.

Only four years have passed since the publication of the first edition of this book. During this time many new antibiotics have been discovered and their virtues heralded. Penicillin, the first member of this group to be described, has unequivocally maintained its position as the best. The present volume is a complete revision and about 100 pages have been added, including four new chapters and two appendices discussing penicillin resistance and, very briefly, the data on aureomycin and chloramphenicol. Sir Alexander was aided in this task by some 33 colleagues, most of whom were active in the preparation of the first edition.

This new volume will be welcomed by the many workers who enjoyed the first edition.

Proceedings of the First Clinical ACTH Conference. John R. Mote, Ed. Philadelphia-Toronto: Blakiston Company, 1950. 607 pp. $5.50.

In the fall of 1946 a preparation of ACTH (adrenocorticotropic hormone) was made available for research on the properties of the hormone in man. During the succeeding two years the effect of stimulating the adrenal cortex with ACTH was studied in normal human beings and individuals with obvious endocrine defects by a number of investigators.

The contents of this volume constitute the proceedings of a conference held in Chicago on October 21 and 22, 1949 under the auspices of Armour and Company. The attendance was limited to those workers who had been actively engaged in these studies. There are 52 formal papers with the supplementary discussions. It is perfectly clear from a perusal of these contributions (in some instances only one patient was studied) that they represent merely progress reports. As such, they will be of inestimable value in the planning of future research.

Surface Tension and the Spreading of Liquids. 2nd ed. R. S. Burdon. New York: Cambridge Univ. Press, 1949. 92 pp. $2.50.

This is a remarkably fine treatment of the phenomenon of spreading of liquids over both solid and liquid surfaces. The author presents much of the pertinent literature, but concentrates on the theoretical aspects of the subject, and his analysis serves to show how rudimentary is our knowledge concerning even the forces which bring about spreading.

The present monograph is a second edition of this book, which originally appeared in 1940 in the Cambridge Physical Tracts series. Chapters 1 and 2 discuss the nature of surface forces and their measurement—a treatment that comprises the usual advanced textbook section on surface tension. Chapter 3, on the surface tension of mercury, is justified by the very considerable lack of agreement among observers as to what the value for the surface tension of Hg actually is. Chapters 4, 5, and 6 are devoted to a consideration of spreading on water and Hg. A number of the more obscure phenomena encountered in spreading studies are analyzed and indeed these chapters are the most useful ones for a reader with some previous knowledge of surface phenomena. Chapter 7 concludes with a consideration of spreading on solids (i.e., lubrication). Such phenomena, in spite of their obvious practical importance, are as poorly understood as spreading over liquids.

Medical Entomology. 2nd ed. Robert Matheson. Ithaca, N. Y.: Comstock Publ., 1950. 612 pp. $7.50.

The first edition of this well-known text appeared in 1932 and established at once a most enviable reputation. The global aspects of World War II brought millions of people into intimate contact with insects and evoked to a marked degree an appreciation for the role they play in the well-being of mankind. Not only do they transmit bacteria mechanically, as was so beautifully demonstrated for the house fly and typhoid fever during the Spanish American War, but they are hosts to such forms as the etiological agents of filariasis, a disease that threatened members of our armed forces stationed in certain areas of the Far East. The development of insecticides such as DDT and repellants of the phthalate series were outstanding war measures for the protection of troops. These investigations and many others carried out during and since the war have immeasurably advanced our knowledge of insects in relation to diseases of man and animals.

The second edition of *Medical Entomology* has been completely rewritten and contains data available to the end of 1948. The contents are arranged in somewhat the same manner as in the first edition and the final chapter gives simple directions for collecting and preserving insects. The text is recommended to the physician, the public health worker, the medical student, and the layman as an authoritative survey of our present knowledge.

Quantitative Ultramicroanalysis. Paul L. Kirk. New York: John Wiley; London: Chapman & Hall, 1950. 310 pp. $5.00.

The present volume is intended to summarize the current status of microgram procedures for analyses of all types that have been proved practical and to include the smaller-scale procedures of colorimetry that have been tested. The ten chapters are headed introduction, volumetric apparatus and technique, colorimetry: apparatus and technique, general apparatus and technique, microgram titrimetry, metallic constituents: titrimetric methods, nonmetallic constituents: titrimetric methods, volu-