is on physical principles, and the treatment throughout is mathematical—where this is appropriate—rather than simply descriptive.

In his preface the author directs the book to students of meteorology, rather than to physicists or chemists, and to this end he includes a chapter on the thermodynamics of phase equilibrium to provide necessary background material. At the same time, there is an introductory chapter on the thermodynamics of moist air; although meteorologists might be expected to be familiar with this topic, the chapter gives a convenient summary for those whose training is in pure physics.

After these introductory chapters the book follows a familiar and logical pattern. A treatment of nucleation processes is given, which is well balanced between oversimplification and the complexity of a thoroughgoing mathematical discussion. Having established the importance of soluble particles in condensation and of insoluble solid particles in ice crystal formation, the book goes on to examine the sources, distribution, and behavior of these particles in the atmosphere.

The next two chapters discuss the growth of droplet populations and of ice crystals in clouds and the way in which the droplet size distribution is modified by collision and coalescence. It is in the development of precipitation that the interaction between macro- and microphysical processes becomes of prime importance, but the discussion here is confined to the microphysical scale.

The final chapter on cloud dynamics is a brief, self-contained survey of some important models for convective clouds. This is useful material, but the treatment is very brief and no indication is given of the success of these models in describing real clouds.

Topics purposely omitted by the author are cloud electricity and radar studies. Some may be surprised to find no more than passing reference to cloud modification, but the present confused situation in this field justifies its omission from this relatively short book.

Byers has produced an authoritative and readable account of his subject, which should prove a very useful textbook for courses in meterology and cloud physics. The book itself is attractively presented, with numerous figures, an adequate index, and a useful set of up-to-date references.

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Meyrick's Microlepidoptera

Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History), Described by Edward Meyrick: vol. 5, Timyridae, Hyponomeutidae, Ethmiidae, Metachandridae, Cosmopterigidae, Walshiidae, Blastodacnidae and Scythridae (British Museum, London, 1965. 581 pp. Plates. £15), by J. F. Gates Clarke, continues the publication of Clarke's study of the enormous Meyrick Collection, and the material from which Meyrick named thousands of species of microlepidoptera, chiefly from the tropical regions of the Old and the New World. Meyrick used external taxonomic characters exclusively, paying little, if any, attention to the genitalia, which are now known to be almost all-important. During Meyrick's time, moreover, different and varying rules of nomenclature were followed. This made subsequent study such as that carried out by Clarke imperative to avoid complete chaos in the classification of these large, worldwide groups. Type specimens are fixed, where necessary, and other type material listed. Dissections of the genitalia (whenever possible of the type) are figured, as well as the pattern and, in many instances, the head, palpi, and venation. The type species of Meyrick's genera are given. Some generic synonomy is given where Meyrick species fall into other genera, or are junior synonyms of other authors' species. With Clarke's studies the way is cleared for taxonomic work on the groups; without it, such work would be gravely handicapped. The present volume covers about 163 genera and 653 species. The majority are Ethiopian, Indo-Australian, and Neotropical, only a small number being Nearctic. Future volumes will complete the series; the final volume is to include an all-important index.

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Medicine

Studies in Epidemiology: Selected Papers of Morris Greenberg. Fred B. Rogers, Ed. Putnam, New York, 1965. xxviii + 418 pp. Illus. $8.50.

The collection of papers here presented is a splendid tribute to the remarkable ability exhibited by Morris Greenberg, long-time epidemiologist and director of the Bureau of Preventable Diseases of the New York City Department of Health. This teeming city of many races and many cultures constituted an unlimited source of pathogenic influences and disease. Greenberg's purpose was to reduce that potential by identifying the mechanisms at play and applying corrective or specific, preventive measures. As practicing epidemiologists, Greenberg and his colleagues were perforce committed to the investigation of outbreaks of many kinds, illustrated by the now famous 11 blue men with sodium nitrite poisoning, by food infections, and others. One series of unusual cases led to the initial recognition of rickettsialpox, a mite-borne disease almost unique to apartment life in New York City. The excellent system of reporting disease and of diagnostic confirmation in the city provided unusual opportunity for Greenberg's inquiring mind. He hewed to the mainline problems of infectious disease, polio, hepatitis, measles, and rubella, studying trends, modes of spread, and effects of preventive measures.

Greenberg's other career as a clinical pediatrician clearly influenced his epidemiological studies, with attention centered on the effect, on the fetus and infant, of maternal disease during pregnancy. Many of these efforts were to clarify moot points raised by inadequate observations. He designed and prosecuted the studies with careful attention to the biases and the numerical difficulties. Smallpox vaccine did not affect the outcome of pregnancy; poliomyelitis in early pregnancy was associated with evidence of increased fetal death; repeated studies of improving design were conducted to obtain acceptable data on the frequency of rubella effects, supporting a conclusion that the influence was generally limited to early pregnancy with the total of congenital anomalies more nearly 10 to 15 percent than the widely bruited 90 percent. (It is of interest that the data were difficult to

accumulate because acceptance of the higher figure led to justifiable termination of pregnancy.) Study of the 1957 epidemic of Asian influenza emphasized the high mortality among pregnant women. Other investigations were concerned with the potency of vaccine preparations and with the preventive effect of gamma globulin on various infections.

An additional value is the presentation of plans and protocols that are models of honesty and clarity. Greenberg's outlines of the practice and theory of epidemiology were intended primarily for education and to improve the practitioner's outlook. He also provided stimulating instruction to students of epidemiology at Columbia University. The many examples of sound philosophy and of well-conceived productive effort make this book a valuable asset for the student of epidemiologic methodology. It contains much valuable information as well.

Forewords contain tributes from three commissioners under whom Greenberg served. They express an appreciation that can be shared by those who become acquainted with Morris Greenberg through his selected works.

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Electrochemistry

Electrochemistry. Proceedings of the First Australian Conference (Sydney and Hobart), February 1963. J. A. Friend and F. Gutmann, Eds. Pergamon, New York, 1965. xvi + 954 pp. Illus. $30.

As a record of a very successful conference on electrochemistry this book is a valuable contribution to the literature. It is especially noteworthy as a compendium of recent electrochemical work done by the scientists down under and by those scientists who traveled there to discuss problems of mutual interest. The individual contributions are grouped in 12 sections that correspond to the 12 conference sessions: Solid-State Chemistry (7 papers); Thermodynamics of Electrolytes (6 papers); Corrosion (4 papers); Theory of Double Layers (4 papers); Electroanalytical Methods (7 papers); Applications—Electroplating, Anodizing (8 papers); Non-aqueous Electrolytes (5 papers); Molten Salts (6 papers); Fuel Cells (6 papers); Electrode Processes (7 papers); Electrochemical Processes (5 papers); and Electrowinning and Electrorefining (8 papers). In general, the scope of the sections is broader than the titles indicate. Three papers in the section on nonaqueous electrolytes deal with electrode processes in nonaqueous media rather than nonaqueous electrolytes per se. The section on thermodynamics of electrolytes contains a paper on electrode potentials and one on electrode phenomena in addition to four papers that deal strictly with electrolytes. In the section on solid-state chemistry there is a paper on the solid-aqueous interface of germanium with a discussion of the liquid phase. These examples emphasize the fact that the book covers a wider range of topics than is indicated by the section titles. There is also some overlapping of subject matter between sections, but this adds to rather than detracts from the overall presentation.

Theory constitutes about 65 percent of the book; the remaining 35 percent is devoted to applications of electrochemical principles to electrolytic extractions, corrosion control, chemical analysis, energy production, metal deposition, and thin-film formation. The technology and fundamentals of fuel cells and the intrinsic properties of molten salts, topics that are currently of much interest, are given good coverage. Polarography and potentiometric titrations are emphasized in the section on electroanalytical methods.

The papers, with three exceptions, are of nearly equal length (12 pp.). The longer papers are concerned with the theory of the double-layer equilibrium (49 pp.), the structure of charged interfaces (32 pp.), and the mechanism of hydrogen evolution at metal surfaces (30 pp.) Accordingly, a large portion of the book deals with the electrode-solution interface; in fact, the book begins with a discussion of solid-state chemistry which has an important bearing on an understanding of the fundamentals of electrode processes.

With few exceptions, the papers are of high quality and carefully edited. This fine book belongs in the library of all who have a serious interest in electrochemistry.

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Ultrasonic Studies

Physical Acoustics: Principles and Methods. vol. 2, pt. A, *Properties of Gases, Liquids, and Solutions*. Warren P. Mason, Ed. Academic Press, New York, 1965. xviii + 476 pp. Illus. $17.

Ultrasonic studies can give detailed information on molecular processes in gases and liquids, and in particular on relaxation phenomena associated with the rate of energy exchange and of structural changes in fluids. Although this subject was rather neglected in books on ultrasonics published prior to 1959, three treatments have since appeared: *Absorption and Dispersion of Ultrasonic Waves* by Herzfeld and Litovitz (1959); *Dispersion and Absorption of Sound by Molecular Processes* (Proceedings of the International School of Physics "Enrico Fermi") edited by D. Sette (1963); and now part A of the second volume of the comprehensive series on physical acoustics being edited by W. P. Mason of Bell Telephone Laboratories.

The first three chapters of the present volume deal with the application of ultrasonics to understanding the properties of gases. All three are expanded versions of brief treatments given by the same authors in the "Enrico Fermi" volume. M. Greenspan, in his treatment of transmission of sound waves in gases at very low pressures, reviews the theories of translational dispersion and absorption in gases, with only a brief discussion of experimental methods and results, the latter restricted to monatomic gases. Utilizing the methods of thermodynamics of irreversible processes, H.-J. Bauer treats in detail the phenomenological theory of relaxation phenomena in gases, with emphasis on multiple relaxation processes. Comparison of this theory with experiments on polyatomic molecules is presented in a chapter by H. O. Kneser. This latter chapter in particular is outstanding for its clarity and succinctness of presentation; the nonexpert should read it first, rather than last, of the three chapters on gases.

The final three chapters deal primarily with relaxation effects in liquids. J. Lamb treats of thermal relaxation accompanying the propagation of a compressional wave through a liquid; his brief theoretical discussion is followed by an interpretation of the ex-