larger than the number of independent references, but it is still striking testimony to the industry of the author. The book is truly a comprehensive work and a boon to the literature searcher.

The larger type and other changes in styling have given the volume a distinctly improved and attractive appearance. It is well illustrated.

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La Végétation de Kaniama (Entre-Luishi-Lubilash, Congo Belge). Série Scientifique No. 61. William Mullenders. Institut National pour l'Etude Agronomique de Congo Belge, Brussels, Belgium, 1954. 499 pp. Illus. + plates. Paper, F. 180.

This book presents the results of the botanical part of a detailed pedo-botanical survey of an irregular area of several hundred square kilometers in south-central Belgian Congo. The Braun-Blanquet system of formally named, hierarchically arranged vegetational units is used throughout. Twenty-nine such units are recognized, of which several are "new." As with other treatments in which the units of vegetation are so finely and (to judge from the maps) precisely divided, the status and significance of these units in relation to a larger region are obscure.

The evidence from the area studied is considered to corroborate the view, previously advanced by others, that the extensive savannahs in the Belgian Congo lying between the equatorial forests and the more southern, dry and open forests are anthropic rather than climatic, with fire as a principal factor. Two main climax types, both dense forests of Guinean affinities, are recognized in the area, correlated with the nature of the soil and underlying rock. These forests are now largely destroyed and replaced by savannahs rich in Sudano-Gambesian elements.

Eight hundred sixty-five species of vascular plants are recorded from the area, each represented by one or more collections deposited at the herbarium of the Institut National pour l'Etude Agronomique du Congo Belge, at Yangambi, C.B., and at the Jardin Botanique de l'Etat, Brussels. The identifications have been carefully done, with the help of well-known specialists in some groups.

Mullenders' detailed, thoughtful, and technically competent work provides some of the basic data toward an understanding of the vegetation of tropical Africa.

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Deterioration of Materials. Causes and preventive techniques. A collaboration under the joint auspices of the Service Technical Committee of the Department of Defense (contract No. N7-mr-29127) and the Prevention of Deterioration Center, Division of Chemistry and Chemical Technology, National Academy of Sciences–National Research Council. Glenn A. Greathouse and Carl J. Wessel, Eds. Reinhold, New York, 1954. xvii + 835 pp. Illus. $12.

Deterioration of materials is constantly going on around us, but only when we are faced with the cost of a repair or replacement do we give the matter much thought. That deterioration of materials associated with our daily life and our industries is important is highlighted by the conservative figure of $12 billion, exclusive of foodstuffs, used by the editors of this book in assessing the nation's annual loss.

World War II was instrumental in demonstrating to our government, industry, and men in the armed services the terrific cost potential of deterioration. As a result, attention was focused on the entire problem. Problems of decay, corrosion, water damage, and weathering, which had been present but not extremely acute in our temperate zone, assumed tremendous importance when we were fighting a global war, with men and materiel exposed to all the known extremes of climatic conditions.

In compiling the most up-to-date information on deterioration in one book, the editors hope that it will serve as a guide to those engaged in the handling of materials everywhere as well as stimulate further research in unsolved areas of deterioration. Some of this information has been known for years and has been published in various journals and books, other data are the result of recent research dating from the early 1940's.

Each chapter was prepared by one or more specialists in the field, and the authors are to be complimented on striking a happy balance between condensation and information, while at the same time presenting their material in a readable, logical way. Those interested in a single material or a single aspect of deterioration may feel that too much has been sacrificed for brevity's sake. However, for those who wish to pursue a subject further, a list of literature citations and, in some instances, an additional bibliography included at the end of each chapter will be of great value.

Although it would be unjust to say that any one part or chapter was more important than the others, I wish to call particular attention to those chapters in part I that so clearly set forth some of the factors that bring about deterioration. Solutions to deterioration problems come only through an understanding of those climatic, chemical, physical, and biological factors and an appreciation of their importance.

Part II is concerned with individual materials and their reaction to the several factors of deterioration. In general, the problem of deterioration prevention is somewhat simpler when one deals with individual materials than when several materials are brought together in one unit. Part III describes the deterioration problems and the prevention methods that have been developed for two general classes of assembled units.

The three chapters in part IV deal with quite diverse subjects, but all are important in the over-all field of deterioration. "Dehumidification," the title of Chapter 13, is not particularly informative. The chapter deals with storage of materials in a relatively dry atmosphere. Techniques developed by the U.S. Navy, which is successfully using this preservation method for both ships and warehouse-stored material, are described.

The appendix deserves mention because it gives information on sources and identifying symbols of government specifications.

The editors and authors are to be complimented on gathering this information into one volume. The book should be of value to all who are in any way concerned with deterioration, whether in industry, research, or government service. As one who was associated with packaging of war materiel during World War II, I only wish that such a book had been available in 1942.

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Contributions to the Theory of Partial Differential Equations. L. Bers, S. Bochner, and F. John, Eds. Annals of Mathematics Studies, No. 33. Princeton Univ. Press, Princeton, N.J., 1954. vi + 257 pp. Paper, $4.

In October 1952 a conference on partial differential equations organized and sponsored by the National Academy of Sciences–National Research Council was held at Arden House, Harriman, N.Y. Fifteen papers presented there and subsequently submitted for publication are collected in this volume. Their authors are well-known specialists in the field of partial differential equations connected with various American universities: Bergman, Bers, Bochner, Browder, Diaz, Douglis, John, Lax, Leray, Loewner, Milgram, Morrey, Nirenberg, Protter, and

Rosenbloom. Some of the papers are the usual type of research papers, complete with detailed definitions and proofs; others give a review of recent advances made by their authors and their associates or announce results of work that is in progress. Most have extensive bibliographies appended to them.

Taken together, the papers give a fairly comprehensive picture of the progress that has been made in the theory of partial differential equations during the last 10 years, at least in this country. The progress is impressive. It is concerned with the classification of partial differential equations of higher order and of systems with respect to their type, roughly elliptic, parabolic, or hyperbolic, the appropriateness of various problems for each of these types, the function-theoretic behavior of the solutions, with the most emphasis on their regularity properties, but with some attention to their singular behavior, the "coherence" of the solutions with the coefficients of the equations and with the initial and boundary data. It is remarkable to what extent these specific problems of classical analysis are attacked by the concepts and the methods of modern abstract functional analysis. Although this volume will probably be studied only by those who work in this or a related field, it is an important guide to present research in this very active and fascinating branch of mathematics.

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Mosquitoes: Their Bionomics and Relation to Disease. William R. Horsfall. Ronald Press, New York, 1955. viii + 723 pp. $16.

William Horsfall has given, in this book, a general review of the literature on mosquito biology, with particular emphasis on studies of life-histories and behavior and on relationships with disease-producing organisms. The material is arranged by taxonomic categories. There is a discussion, some 40 pages long, of the general characteristics of the subfamily Culicinae, followed by summaries of the pertinent literature on each genus and species. The author's intention seems to be to supply a reference book for mosquito workers, rather than a review for general biologists. The book forms a sort of gigantic abstract and index of the mosquito literature, with little attempt at evaluation or generalization. This indeed is almost automatically precluded by the taxonomic arrangement of materials.

The coverage of the literature is thorough and the material, particularly in relation to phenomena of disease transmission, is frequently arranged in convenient tabular form. It is unfortunate, from the point of view of reference, that the bibliography is given in skeleton form, without titles of journal articles. This makes it difficult for the user of the book to decide which citations to look up when he is searching for further material on a particular topic. Further, there is no author index and no subject index to topics such as oviposition, food behavior, light reactions, and the like. The material is clearly enough arranged under each species, but the user, to find this, must know which mosquito species are likely to have been studied from this point of view. The book thus presupposes a considerable knowledge of mosquitoes on the part of the user; for people with such background, it will be a great convenience.

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Degradation of Vinyl Polymers. H. H. G. Jellinek. vol. III of *Physical Chemistry,* A series of monographs. Eric Hutchinson, Ed. Academic Press, New York, 1955. 329 pp. Illus. $8.50.

Synthetic polymers are extremely important to our modern civilization. This is evident when we consider the enormous amounts used as plastics, rubbers, and textiles. Unfortunately, their chief disadvantage is often a susceptibility to chemical changes in relatively short periods of time owing to heat, light, and oxygen or other chemicals in the air, which render them less and less useful. Considering the greatly increased production of these materials and our increasing dependence on them, it is apparent that investigations of the type reviewed in this book are of great value in promoting more intelligent and efficient utilization of such materials.

Numerous chapters on this subject have appeared in other books on polymers and related subjects during the period of the last 20 years. However, this book comes at a time when the number of studies on the decomposition of polymers by a variety of means—thermal, light, atomic radiation, ultrasonics, and chemical—is increasing at an accelerated pace.

This book attempts not only to review the formal kinetic theories of degradation but also to discuss possible actual mechanisms. Although it is quite free of trivial errors, it reveals apparent discrepancies and inconsistencies upon close inspection. The formal kinetics are fairly well presented, but the viewpoints subsequently expressed, such as the frequent implication that a rate of volatilization depending linearly on the mass of polymer (so-called "first order") proves chain end initiation, are often not tenable. In the appendix the afore-mentioned behavior suddenly means independence of rate of volatilization—that is, monomer formation—of chain length. An additional conclusion that the degradation of polystyrene initiates at chain ends is also on a highly tenuous basis in my opinion. It is felt that in view of possible variations owing to different methods of polymer preparation, all conclusions on decomposition mechanisms should have been extensively qualified. Although this consideration is mentioned, relatively briefly, it appears to have been forgotten in many cases.

The author, in general, makes many positive statements without qualification, ignoring in the process possible alternative mechanisms. In this respect, the book is somewhat superficial. For the worker new to the field it should provide an excellent starting point, the coverage of the literature being as complete as could reasonably be expected.

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Advances in Food Research. vol. V. E. M. Mrak and G. F. Stewart, Eds. Academic Press, New York, 1954. x + 538 pp. Illus. $11.50.

Like the preceding volumes in this series, volume V gives a masterful coverage of certain scientific and technologic aspects of foods. There are seven articles dealing with various fundamental and applied problems. These include the oxidative changes in fats and heme pigments that lead to rancidity and discoloration in meat, chemistry of the sugar-sulfite reaction and the use of sulfur dioxide in the preservation of fruit and vegetable products, flavonoids, color measurements, organic constituents of wines, and concepts in statistics and methods of calculation in food research. Each article is well organized and systematically presented, with a comprehensive bibliography that includes the titles. The article on wines contains approximately 1000 references.

Of the 11 authors, 10 are connected with academic institutions. One is an Englishman; the others live in the United States. Two of the writers belong to the editorial board of *Advances in Food Research.* All are specialists in the subjects for which they are responsible.

The format of the book and the quality of the writing are particularly good, but there are a few errors. Occasionally