BOOK REVIEWS, continued

The Chemistry and Biochemistry of Nitrogen Fixation

This scholarly treatise covers the advances made in the last decade toward unraveling the complex catalytic reactions involved in nitrogen fixation. Excellent historical information is given in the introductory chapter by P. W. Wilson. Two chap-
ters, one by G. L. Leigh and another by L. Chatt and R. L. Richards, cover the known properties of dinitrogen and how this molecule reacts with certain metallic and organic-metallic compounds to form various dinitrogen complexes. These chapters treat some very interesting but complex chemistry, and readers should expect some difficult but rewarding study of them. The authors of the last three chapters conclude by discussing the most likely coordinated complex that may be involved in nitrogen fixation in natural systems. Because both iron and molybdenum are believed to be involved in natural nitrogenase systems, they speculate that the most likely coordinated dinitrogen complex would be with molybdenum. Whether iron or molybdenum, or perhaps both, are involved in the initial capture of dinitrogen is not clear, but both chapters suggest that iron functions in some way in the reduction of the dinitrogen complex.

Great strides have been made in isolating the enzyme, nitrogenase, and in uncovering the processes of its reduction. How these exciting chapters outline the progress that has been made in the extraction and purification of nitrogenase. These chapters also cover the properties and biochemical reactions of this enzyme, explaining cofactors, inhibitors, and the possible pathways for electron flow. Even though these chapters by R. H. Burris, J. Postgate, H. J. Evans, and S. A. Russell show the extent of progress in elucidating the biochemistry of N₂ fixation in natural systems, they also illustrate that knowledge is far from complete. For example, the following are a few of the pertinent questions Evans and Russell asked at the conclusion of their chapter: What is the role of ATP in the N₂ reduction reaction? What are the roles of iron and molybdenum in binding and reducing N₂? What controls the synthesis of bacteroid nitrogenase in the relative anaerobic environment of the nodule? Dr. Postgate points out that there is an element of irony in the fact that one of the earliest striking features of N₂ fixation was the inhibition of N₂ fixation by hydrogen. All N₂-fixing systems, including the symbiotic ones, possess hydrogenase, yet the function of hydrogenase in the N₂-fixing system is still unresolved.

One of the exciting developments in N₂ fixation in the last decade was the discovery that nitrogenase reduces CH₂ to CH₄ and that gas chromatography detection of CH₄ permits a sensitive technique for detecting and estimating the extent of N₂ fixation in natural habitats. In the appendix, J. Postgate briefly describes the acetylene technique, but the chapter is far too brief to give the reader even a glimpse of how this technique is being used in field applications.

Investigators of N₂ fixation will find this volume a must in their reading—LYNN K. POUSK, Soil Scientist, ARS/USDA, Nitrogen Laboratory, Ft. Collins, Colorado.

Erosion and Sediment Pollution Control

As stated by the author, this book is designed as a textbook and a source of information for vocational agriculture teachers, extension and Soil Conservation Service personnel, and others concerned with agricultural or urban erosion control. According to the preface, the primary objective of this book is to help conservationists develop the ability to analyze a given situation, determine the practices necessary for effective erosion control, and put these practices into effect on land.

The content of this book is an outgrowth of two previous books by Prof. Beasley on soil and water management. The first five chapters of the book contain background information and theory on the causes and effects of soil erosion. Chapter 1, entitled "Man and the Land," gives an interesting background and historical perspective to the effects of soil erosion on the civilization of man throughout history, and, vice versa, the effects of civilization on soil erosion around the world. Chapter 2, "Water Erosion," and Chapter 3, "Wind Erosion," discuss the causes and effects of soil erosion and the soil detachment, transportation, and deposition. Interesting simi-