

## PREAMBLE TO CHAPTER 4

The reasons for the essentiality of the mineral elements which are required by plants are now based on knowledge that must be mobilized from many branches of science, i.e., from physical chemistry, from enzymology, and from the study of metabolism and a knowledge of its intermediary reactions. These topics, therefore, receive special attention in Chapter 4 with reference both to the elements required in larger quantity and to those other elements which are needed only in trace amounts. Although metabolism is the main topic of Volume IV, those aspects which are essential to the discussion of the role of the mineral elements are summarized here. The purification of enzyme proteins and the recognition of the role of certain metals in metalloproteins gave a new impetus and direction to research on inorganic plant nutrition. Moreover, the newer knowledge of intermediary metabolism, particularly of the ways in which energy changes are mediated in cells, and of the role of coenzymes and of phosphorylated compounds, has pointed to many previously unexpected ways in which the inorganic elements may specifically intervene to determine steps which are essential for metabolism and for growth. It will be seen, therefore, that knowledge of a specific role for some of the essential elements (e.g. molybdenum) is now quite precise, whereas the role of others (e.g. potassium), which are equally or even more important, can only be recognized even now by their more diffuse effects upon the growth and behavior of plants.

Since the chapter deals prominently with the effects of essential elements on metabolism, the authors have found it convenient to use the following abbreviations throughout: ATP and ADP, adenosine tri- and diphosphate respectively; DPN and DPNH, oxidized and reduced diphosphopyridine nucleotide, respectively; TPN and TPNH, oxidized and reduced triphosphopyridine, nucleotide, respectively; FAD and FADH<sub>2</sub>, oxidized and reduced flavin adenine dinucleotide, respectively; FMN, flavin mononucleotide.