

## PREAMBLE TO CHAPTER 5

Whereas the ultimate source of carbon for all biological processes is the relatively small concentration of carbon dioxide of the atmosphere, most plants fail to use for their needs even the abundant supplies of elementary nitrogen in the atmosphere but must needs draw this essential element from the usually scanty concentration of nitrate in the aqueous media with which they are in contact. Nevertheless, modern technology does make available to crop plants relatively large amounts of erstwhile atmospheric nitrogen in the form of chemically fixed products. Although the absolute amounts of nitrogen so applied are large in tonnage, they represent, nevertheless, but a small percentage of the total nitrogenous turnover in nature which in fact can only be maintained through the activities of soil microorganisms. The role of microorganisms in plant nutrition, including those that reconvert plant and animal remains to nitrate, receives consideration in Chapter 6, especially from the standpoint of the conditions which prevail in the immediate vicinity of root surfaces, i.e. in the rhizosphere. Chapter 5, however, selects for separate discussion those biological situations in which elementary nitrogen is converted to the organic form. This separate treatment is warranted alike by the impact of biological nitrogen fixation upon the cyclical turnover of nitrogen in nature and by the intrinsic interest which now attaches to the mechanism by which the living cells, or even some cell-free extracts, fix the elementary nitrogen. This chapter, then, is not only pertinent to the over-all study of inorganic plant nutrition, but it contributes also to knowledge of the subsequent fate of nitrogen in plants in general and is thus part of this major topic which will be discussed in Volume IV under nitrogen metabolism of plants.