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## SOME NEW ASPECTS OF PLANT NUTRITION

By Dr. R. W. THATCHER

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FOR many years I have been keenly interested in the biochemistry of plant life. My interest in this field was first aroused when I first learned of the antithetical but complementary relationships of plant and animal life as shown by the so-called "cycles" of life, such as the "carbon cycle," the "nitrogen cycle," etc., in which plants take from and restore to the atmosphere or soil the elements which are given to and withdrawn from these same ultimate sources of supply by the processes of animal life. This led to a further interest in the biochemical processes and exchanges of energy in syntheses by plants and in metabolism by animals. Soon it became apparent to me that while these processes are generally antithetical in direction and final results, the route along which they travel and the conditions which determine their velocities are strikingly similar.

For example, the pigments which are associated with the rate, and in a sense the regulators of, energy

changes in plant and animal growth, namely, haemoglobin and chlorophyl, respectively, were shown to be strikingly similar in chemical constitution, being made up of the same pyrrol units linked together in the same general relationships, the only essential difference being in the metallic element through which the linkage occurs, namely, iron in haemoglobin and magnesium in chlorophyl. Moreover, within the past two or three years, it has been shown, as will be discussed later in this paper, that the element copper has apparently the same relation to the production of chlorophyl in chlorotic plants that it has to the regeneration of haemoglobin in anemic animals.

Again, enzymes, or organic catalysts, once they were discovered and the nature and method of their action studied, showed remarkable similarities in the plant and the animal biochemical processes which they initiate or regulate. In fact, the reversibility of the reaction which is accelerated by a particular enzyme

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