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BOOK REVIEW

BOTHE, H., TREBST A. (ed.): BIOLOGY OF INORGANIC NITROGEN AND SULFUR. — Springer Verlag, Berlin—Heidelberg—New York, 1981. 384 pp., 144 figs. Cloth DM 89.—; approx. US $ 46.80.

The book contains all the contributions to the Conference held in May, 1981, in Bochum (Federal Republic of Germany), where all aspects of both the nitrogen and the sulfur cycles were discussed. In addition, important data were communicated by German scientists of the National Program on the Metabolism of Inorganic Nitrogen and Sulfur Compounds.

Both the nitrogen and the sulfur cycles are interconnected with the biological cycles of matter, with the production of biomass by plants and bacteria, as well as with the routes of mineralization.

In the majority of plants, the inorganic nitrogen requirement is met by uptake of ammonium and/or nitrate from the soil solutions. Besides these forms of nitrogen, certain plants, in symbiotic association with various microorganisms, are able to use atmospheric nitrogen to indirectly fulfill the need of nitrogen. In all these symbiotic associations nitrogen fixation is apparently mediated by the enzyme nitrogenase.

Nitrate taken up by plants must be reduced to ammonia before the nitrogen can be assimilated into organic form. Nitrate reduction to ammonium depends on the activities of enzymes. These topics have been discussed in the presentation of Losada *et al.* in this volume.

Ammonium taken up from the soil solutions or produced as a result of nitrate reduction or symbiotic nitrogen fixation is incorporated into organic form in plants. Formerly it was considered that this conversion occurs through the activities of the enzyme glutamic acid dehydrogenase which in the presence of α-ketoglutarate and reduced pyridine nucleotide and ammonium, catalyzes the synthesis of glutamate. It is now generally considered that under most physiological conditions the initial incorporation of ammonium is into glutamine through the activity of glutamine synthetase and a subsequent conversion of glutamine to glutamate. This problem is widely discussed by Beevers.

The genetics of dinitrogen fixation, some aspects of the physiology of dinitrogen fixation, its biochemistry, pathways and regulatory aspects of N_2 and NH_4^+ assimilation in N_2-fixing bacteria have been summarized in contributions of Brill, Neumann, Postgate *et al.*, Zumft, Kleiner and Both, in a special chapter.

The roles of sulfur and nitrogen in cell nutrition show many similarities. Both must be reduced by living systems to form proteins and other macromolecules enriched by macroelements required by plants and plant-like microorganisms. Nutritional interaction between the two elements has been described and both of them show a rather uniform distribution throughout the tissues and organs of higher plants and among cells of microorganisms. The present state of knowledge of the assimilatory sulfate reduction is presented in a special chapter which also contains data on enzymatic reactions which may connect sulfur and nitrogen metabolism. There are also included papers dealing with the role of thioredoxins in enzyme regulation in cyanobacteria, which are involved in assimilatory sulfate reduction in higher plants.

Aspects of S- and N-metabolism in tobacco cell suspension cultures have been described by Bergmann.

Each chapter is finished by the list of references.

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