LXXIII. OXIDISING ENZYMES. VII. THE OXYGENASE OF THE HIGHER PLANTS.

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IN a recent contribution to this *Journal*, Gallagher [1923] states that there is no definite evidence for the existence, in the higher plants, of an enzyme (oxygenase) which catalyses the formation of peroxide. The quick direct blueing of guaiacum, which is characteristic of the tissues and extracts of a number of plants, is stated to be due to the presence of an autoxidisable lecithin-like substance; such a substance has been extracted from two sources, namely, the potato tuber and the mangold root.

In criticism of the above statements, it may be mentioned that the presence of a thermolabile catalyst, which catalyses the autoxidation of catechol, protocatechuic acid, protocatechuic aldehyde and other catechol derivatives with the production of peroxide, can be readily demonstrated in the potato tuber [Onslow, 1920] and in the mangold root [Robinson, 1924] as well as in many other plants. These enzymes also act on catechol derivatives present in the plant; they are, moreover, absent from plants of which the tissues show no direct blueing.

The denial of the existence of an enzyme catalysing the formation of peroxide, and the substitution of another system consisting of an autoxidisable lecithin-like substance as the cause of the rapid blueing of guaiacum is open to further criticism. First, the crude autoxidisable lecithin-like substance can be obtained equally well from the tissue of a plant, for example, the turnip root, which shows no direct blueing of guaiacum [Robinson, 1924]. Secondly, the lecithin-like substance needs a considerable time (from 5–19 days) to autoxidise before giving any blueing with guaiacum in presence of peroxidase, whereas in the plant tissues the reaction is usually almost instantaneous. Thirdly, very many substances have this power of autoxidation, and, after a longer or shorter period, are able to function as peroxides. Lecithin-like compounds are not peculiar in this respect; the property is shown, for instance, by aldehydes (formic, acetic¹, valeric, benzoic, salicylic, cinnamic), caprylic alcohol, oleic acid, pyruvic acid, many terpenes, and, in fact, by most plant extracts on standing in air for any length of time.

REFERENCES.

- Gallagher (1923). *Biochem. J.* 17, 515.
— (1924). *Biochem. J.* 18, 29.
Onslow (1920). *Biochem. J.* 14, 535.
Robinson (1924). *Biochem. J.* 18, 543.

¹ Samples of acetaldehyde (Merck, Kahlbaum) were found to function not only as peroxidases (blueing of guaiacum in presence of hydrogen peroxide) as stated by Gallagher [1924], but also at the same time as oxidases (direct blueing of guaiacum); others again as peroxides (blueing of guaiacum in presence of peroxidase).