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THE SPONTANEOUS HEATING AND IGNITION OF HAY AND OTHER AGRICULTURAL PRODUCTS¹

By Dr. C. A. BROWNE

U. S. BUREAU OF CHEMISTRY AND SOILS

THE production of heat, as a manifestation of vital activities, was associated at first almost entirely with the processes of animal life. This is not surprising when we consider the effect of the transpiration of large quantities of water from the immense leaf surfaces of growing plants which tends to keep their temperatures below that of the surrounding air.

The original observation of Lamarck² in 1777 that the fleshy spike or spadix of the flowers of *Arum maculatum* at a certain stage of growth was perceptibly warm to the touch first called the attention of scientific men to the heat-producing power of growing plants. Senebier³ in 1800 confirmed this observation

¹ Address of the vice-president and retiring chairman of Section C—Chemistry, American Association for the Advancement of Science, Atlantic City, December, 1932.

² Lamarck, "Flora française," 1777.

³ Senebier, "Physiol. végétale," III, 314. 1800.

of Lamarck and at the same time noted the additional fact that this production of heat was especially pronounced in the presence of oxygen. The connection of this observation with the familiar oxygen respiration of animals was indicated later by the experiments of Saussure⁴ in 1822, since which time the validity of a true respiration process by plants, in which oxygen is consumed and carbon dioxide evolved, has been universally recognized.

The intensity of this heat production by plants and its relation to oxygen consumption were examined by other investigators in succeeding years. In experiments by Kraus⁵ in 1882 upon the spadix of flowers of *Arum italicum* a maximum temperature of 44.7° C.

⁴ Saussure, *Ann. Sci. Nat.*, 21, 285, 1822; *Ann. Chim. et Phys.* (2), 21, 279, 1822.

⁵ Kraus, *Abhandl. Naturf. Gesell. Halle*, 16, 1882.

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