to exhibit phosphorescence can be understood as being due to the breakdown of this selection rule by the inhomogeneous magnetic field produced within the molecule by the paramagnetic moment of the copper. This result was also predicted from the experimental observation that the copper chlorin is not at all comparable in photochemical activity with the zinc salt, although the two compounds are otherwise very similar, especially in absorption spectrum (*1*).

The significance of this observation of the phosphorescence of chlorophyll with respect to the mechanism of photosynthesis will be discussed in detail elsewhere.

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Rate of Vaporization of Sulfur

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The rate of vaporization of elemental sulfur at different air temperatures has been studied by various investigators, including Goodwin and Martin (*3*), Tucker (*6*), Liming (*5*), Turrell (*7*), Fouretier and Boullé (*1*), and others. Such information is of particular interest in agriculture because there appears to be a correlation between rate of vaporization, fineness of sulfur particles, and insecticidal and fungicidal effectiveness. Although some of these data have been summarized in recent books (*2*, *4*), it apparently has not been recognized that the rate of vaporization (sublimation) of elemental sulfur is a logarithmic function of temperature.

Experimental data obtained by the observers named above, as determined by several different methods on various kinds of sulfur from widely different sources, are plotted on a semilogarithmic grid in Fig. 1. The linear curves illustrate the logarithmic relations between rate of vaporization and temperature and may be expressed by a logarithmic equation of the form $\log Y = \log a + X \log b$ or in normal form by the equation $Y = ab^x$.

When compared, slopes of the two curves based on relative vaporization rates are not the same nor are the two curve slopes based on absolute vaporization rates. From the magnitude of the deviations of the points from the curves, it may be surmised that sufficient observations have not been made to define the curve slopes critically. The magnitude of the deviations suggests that with sufficient precision in the determinations, or with larger numbers of observations, curves of the same slope might be found for the various sulfurs used. Juxtaposition of the curves based on Liming's relative values and on Tucker's absolute values may be obtained if the two are adjusted to a single absolute observation. Tucker's values seem unreasonably high, however. Also, the composite curve based on the absolute vaporization rates of ground sulfur, as determined by Turrell (*7*) and by Fouretier and Boullé (*1*), nearly parallels the curve based on the relative values found by Goodwin and Martin (*3*). Comparison of the positions of the curves based on absolute rates suggests that sulfur from different sources may vary in the rate of evaporation at a given temperature. Some of the more obvious causes for this appear to be: (*a*) impurities, such as oil; (*b*) differences in particle size; (*c*) form; and (*d*) technique used in making the determination.

The logarithmic characteristics of the vaporization process at

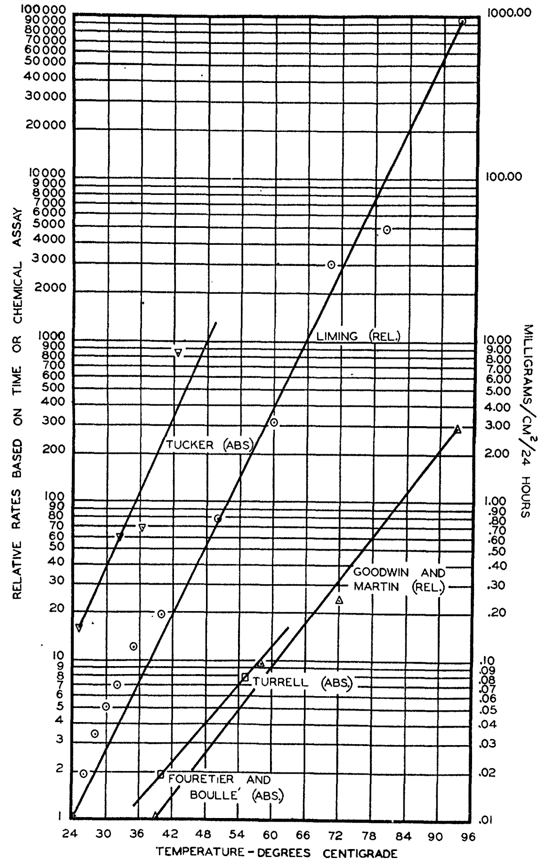

Fig. 1. Relative and absolute rates of volatilization of elemental sulfur, based on data of various observers, showing logarithmic increase of volatilization rate with increase in temperature.

different air temperatures suggest that the rate of vaporization of sulfur of varying particle sizes and from various sources may be determined readily, and that recommendations may be formulated for use in warm as well as cool seasons and climates. Adequate pest control, and reduction of loss of agricultural crops as a result of "sulfur burn," may thus be attained by recommending sulfurs having specified evaporation rates.

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