XCVIII. THE ULTRA-VIOLET ABSORPTION SPECTRUM OF CHLOROPHYLL IN ALCOHOLIC SOLUTION.

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ATTENTION was drawn to the ultra-violet absorption spectrum of chlorophyll as a corollary to the spectrographic examination of olive oil [Lewkowitsch, 1927]. The latter gave distinct indications of selective absorption with a maximum at a wave-length 2670 Å.U., and the question arose whether this band was caused by chlorophyll, which in the visible range displays its own characteristic bands strongly marked in the absorption spectrum of olive (and some other vegetable) oils [Marcille, 1910].

The ultra-violet absorption spectrum of chlorophyll is unrecorded in the list of absorption spectra of organic compounds issued by the British Association in 1916, and the only account in the literature is a paper by Dhéré and Rogowski [1912]. These workers examined α - and β -“natural chlorophyll” from *Taxus baccata* and crystalline chlorophyll (from *Galeopsis tetrahit* by the combined methods of Monteverde and Willstätter) in solution in anhydrous ether; they obtained evidence of absorption maxima at λ 4300 and λ 3000–3100 Å.U. The method employed was to photograph the spectra transmitted through increasing thicknesses of solution.

Vlès [1919] calculated the anticipated spectrum in the ultra-violet of chlorophyll from an expression of the type $X = X_0 + An + Bn^2 + Cn^3$ from which he deduced the absorption band at 4320 Å.U.; his formula, however, did not provide for the band found by Dhéré at 3000 Å.U.

For the purposes of the present investigation a solution of chlorophyll extracted in the cold from dry powdered nettle leaves by alcohol was used. The solvent was purified for spectrographic purposes from absolute alcohol by distillation over iodine followed by distillation from excess of zinc dust. The solvent so prepared had practically no absorption down to a wave-length of about 2500 Å.U.; below this point the general absorption of the alcohol hindered examination of the chlorophyll.

The concentrated chlorophyll solution, stored in the dark, was used as a stock from which the more dilute solutions actually examined in the spectrophotometer were prepared immediately before use. Such a diluted solution was examined within one day, and the portion exposed to the light in the test-tube of the photometer was frequently renewed; these precautions were found necessary as the dilute solutions became rapidly decolorised, especially under the influence of the light of the spark.

The spectra were recorded by means of a Bellingham and Stanley spectrophotometer [Prideaux, 1926; Stanley, 1927] in conjunction with a quartz spectrograph. A condensed spark between iron electrodes was used as a source of ultra-violet light.

The spectrum obtained is shown in Fig. 1, in which "density," $\log$. (incident light/transmitted light), is plotted against wave-length in Å.U. As the solutions examined were necessarily of arbitrary concentration, the figures for density are only relative values.

Fig. 1. Absorption spectrum of nettle chlorophyll in alcoholic solution.

Absorption maxima are shown at 4200 and 3250 Å.U., figures which agree reasonably with those of Dhéré; the slight difference in position of the maxima might be due to the effect of the different solvent used [Vogel, 1877; Van Gulik, 1915]. No trace could be found of any further minimum or descent of the curve which rose steeply below a wave-length of 2400 Å.U.

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