these sugars are in fact intermediate products, then it would appear that the block in the mechanism of cellulose synthesis, in all the mutant cultures examined, occurred at a stage prior to the formation of cellobiose. Cultures of mutant organisms did not produce cellulose when grown in a medium containing cellobiose.

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ROBERT STEEL
THOMAS K. WALKER

College of Science and Technology,
University of Manchester.
April 1.

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Phototropism of *Phycomyces* Sporangiophores

In a recent communication, Curry and Gruen[1] reported that sporangiophores of *Phycomyces blakesleeanus* showed strong negative phototropism when exposed to wave-lengths shorter than 300 mμ in addition to the positive phototropism in visible light known to earlier workers. They also showed that this negative response was due to a temporary increase in growth-rate on the side of the sporangiophore nearest the source of light, as they were able to demonstrate a 'light-growth reaction'.

Blaauw[2] demonstrated a 'light-growth reaction' in sporangiophores exposed to visible light, and therefore concluded that positive phototropism must be due to a temporary increase in growth-rate on the far side of the sporangiophore. Castle[3] showed geometrically that the path-length for light was greater in the far half than in the near half of the sporangiophore, owing to a 'lens-effect'. Therefore, provided that the absorption coefficient of the sporangiophore did not exceed a critical value, greater photochemical action could occur in the far half of the sporangiophore than in the near half. Banbury[4] achieved a virtually complete proof of the hypothesis by showing that if one side only of the sporangiophore was illuminated by a grazing beam of light, a temporary increase in growth-rate occurred on that side.

It is therefore clear that radiation of wave-length less than 300 mμ produces a 'light-growth reaction' on the near side and that longer wave-lengths produce a 'light-growth' reaction on the far side. It is suggested that the reason is that at 300 mμ the absorption coefficient of the cell reaches Castles's critical value, and that at shorter wave-lengths the 'lens effect' does not succeed in bringing about greater photochemical activity in the far side of the cell than in the near side. This suggestion is plausible, since a number of the constituents of protoplasm absorb strongly only at wave-lengths less than 300 mμ. A critical test would appear to be the illumination of sporangiophores with light of 302 mμ wave-length, which does not cause any phototropic response, and to find whether a 'light-growth reaction' occurred. A positive result would confirm the theory.

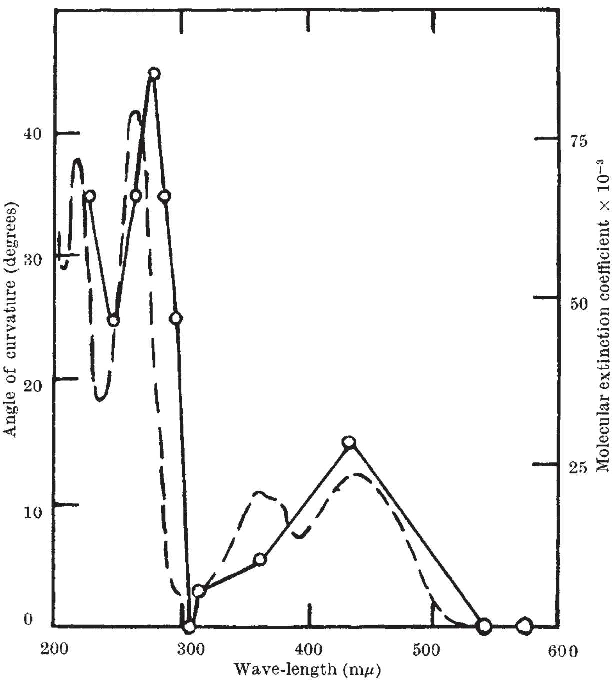

Fig. 1. Action spectrum of phototropic response, —○—. The means of Curry and Gruen's values for angle of curvature of sporangiophore are taken. Absorption spectrum of riboflavin, - - -

Provisionally assuming the correctness of the theory, the results of Curry and Gruen can be plotted as an action spectrum (Fig. 1), the sign of the phototropic response being ignored. It will be seen that the curve agrees closely with the absorption spectrum given for lactoflavin[5], now known to be identical with riboflavin. The major peak of the action spectrum is, however, at 280 mμ while the corresponding riboflavin maximum is at 265 mμ. This would be explicable if the riboflavin is the prosthetic group of a protein, as this, by analogy with flavin adenine dinucleotide[6], would be likely to shift the spectrum about 15 mμ towards the red.

Brauner[7] summarizes the reasons for regarding phototropism as being due to a riboflavin-sensitized destruction of indolyl acetic acid. In higher plants the destruction of indolyl acetic acid leads to reduced growth-rate, whereas in fungi, he suggests, the concentration of indolyl acetic acid is already supra-optimal and its destruction leads to an increased growth-rate. The above discussion shows that the results of Curry and Gruen may be interpreted as showing that both positive and negative phototropism in *Phycomyces* is due to a single riboflavin-mediated response.

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M. J. CARLILE

Department of Botany,
University of Bristol.

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