(*9*) has confirmed these results and has shown in detail that the action spectrum for controlling the expansion of etiolated leaves on intact bean plants is identical to that for the other afore-mentioned morphological responses.

These results, then, add another morphological response to the ever-increasing list of responses that appear to be controlled through some primary photoreaction. However, one can only conjecture about the nature of the reactions that follow this primary light reaction and that eventually lead to the manifestation of the various responses.

References and Notes

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7 December 1954.

Communications

Prior Publication

This laboratory recently reported the production of cellotetraose during enzymatic hydrolysis of cellulose [*Science* **120**, 1033 (1954)]. Through *Chemical Abstracts* [**48**, 13746^h, (1954] we later became aware of related work by Kooiman *et al.* in a journal not available on this campus [*Enzymologia* **16**, 237 (1953)]. Since the abstract did not indicate that either the tetraose or other intermediate dextrins had been observed, we did not cite the Dutch paper.

When a reprint arrived from Kooiman, however, it became obvious that the tetraose and several other dextrins had been recognized. Our report, then, must be viewed as simply corroborating Kooiman's excellent initial observation. We have written to Kooiman apologizing for our error and would like to correct immediately the erroneous statement in our report that intermediate dextrins had not previously been observed in enzymatic cellulose hydrolysates.

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Spectral Absorption of Turbid Systems Using Diffuse Light

For a long time, absorption spectroscopy has found successful and even spectacular application to the measurement of the chemical composition and reaction kinetics of living cells. The effects of the turbidity of biological materials, which if ignored can lead to quantitative errors and even to qualitatively fallacious conclusions, have been widely realized in these researches, and artifices have usually been introduced in order to reduce turbidity, or to include much of the scattered light in the transmitted beam, or to insure that important changes of turbidity do not occur during the course of the reaction under investigation. Nevertheless, a method of general applicability has not emerged. In this paper we refer to preliminary experiments which suggest that such a general solution to the problem might be possible.

It is convenient to introduce the subject by referring to recent experiments by Burk (*1*) and Warburg and Krippahl (*2*), although our work was done without knowledge of theirs. In their experiments the vessel containing a turbid colored cell suspension was surrounded by a large spherical diffuse reflector. A measurement of the amount of light not absorbed by the cells when exposed to an incident monochromatic beam was obtained by measuring the light intensity at some point on the periphery of the globe, taking advantage of the fact (*3*) that the intensity at the wall of a diffusing sphere containing a source of radiation (the cell suspension in this case) is the same at all points even when the source does not emit equally in all directions.

In the other experiments (*1, 2*) the turbid absorber occupied only a very small fraction of the volume of the diffusing globe, so that the effect of double or multiple passage of diffusely reflected radiation through the absorber resulted in only a small correction term. In our own work the absorbers filled the globe, so that the process of diffuse reflection which gives the globe its essential "integrating" character for scattered radiation also has the effect of exaggerating the absorbing properties of the contents in a manner that may be expressed by comparing a globe of diameter d to a conventional absorption cell of thickness nd, where n is often much greater than unity.

The absorbing sphere with diffusely reflecting walls ("diffuse light absorption vessel," DLAV) was real-