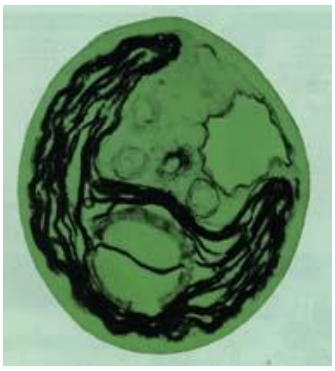

Chlorella sp.

Are you what you eat?

Page 3: The Dark Side of Plants

Case Study Problem No. 1
C-643 Intermediary Metabolism

It seemed so obvious, but Rose had not previously thought about how plants survive at night or why they store starch. Clearly, plants, like animals, respire. What fascinated her now was how quickly a simple single-celled algae could switch from photosynthesis to respiration and back. Many of the enzymes were the same but the flow of carbon was reversed. It wasn't just respiration. Other pathways also switched on and off. For example, the oxidative pentose phosphate pathway functioned in plants in the dark while it shut down in the light. (See Figure 2 below.) Clearly something regulated the pathways, but what or how?

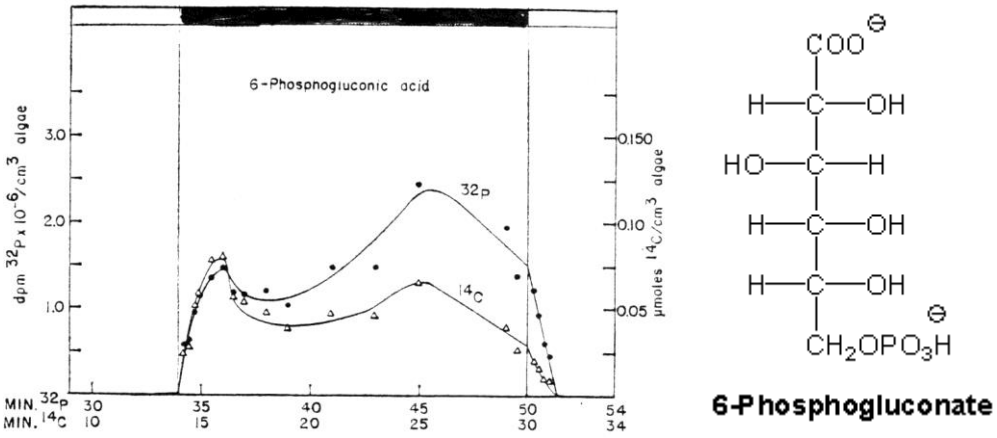

Figure 2. The effect of light and dark on the amount of labeled 6-phosphogluconate in algal cells. Conditions as described in Figure 1.

Considering the Calvin Cycle, glycolysis, and the pentose phosphate pathways, what reactions (enzymes) would be likely targets for regulation?

Considering the process of photosynthesis, what metabolic cues might provide effective intracellular communication of regulatory signals?

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