



ABSTRACT

"How plants survive the night"

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Although plants make sugars from atmospheric carbon dioxide in the process of photosynthesis, they face problems of carbohydrate supply on a daily basis. First, most of the cells in a plant are heterotrophic – dependent for their carbon supply on carbohydrate (in the form of sucrose) imported from the relatively small number of photosynthetic cells in the leaves. Second, plants can photosynthesise only during the day - every night all of the cells of the plant become dependent upon the mobilisation of carbohydrate (in the form of starch) synthesised and stored during the day. Mutant plants that cannot synthesise starch during the day or cannot degrade it at night usually have reduced growth rates.

My lab is trying to understand the diurnal control of starch storage and mobilisation in leaves of the model plant *Arabidopsis*, using forward and reverse genetic approaches. I will present our progress in defining the surprisingly complex pathway of starch degradation at night, and discuss how flux through this pathway is controlled to ensure that supplies of carbohydrate last until dawn. Our recent work shows that the circadian clock plays a central role in controlling carbohydrate availability at night, and this in turn determines the overall productivity of the plant. Finally I will describe unexpected findings about the ways in which non-photosynthetic cells mobilise the sucrose they receive from the leaves.