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Glucose Sensing by a Glucokinase of Cyanobacterium *Synechocystis* sp. PCC 6803 in *Arabidopsis*

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Glucokinases belong to the hexokinase (HK) subgroup which includes eukaryotic hexokinases like Arabidopsis HXK1 are known to have dual role of glucose sensing in addition to their catalytic function. However, glucokinase (sll0593) in the cyanobacterium *Synechocystis* sp. PCC 6803 is not likely to be involved in the glucose-induced differential expression of certain genes relating to photosynthesis, carbon metabolism, respiration, and energy metabolism. This difference could either be due to inability of cyanobacterial glucokinase to function as a sensor or due to absence of glucokinase interacting factor(s) that are present in the *Arabidopsis* but not in the *Synechocystis*. To test this hypothesis, we overexpressed cyanobacterial glucokinase (sll0593) in *Arabidopsis thaliana*. Sll0593 was found to be localized in the cytosol irrespective of presence or absence of glucose. When sll0593 was expressed in the *gin2-1* mutant that lacks the glucose sensing role due to HK inactivation, its insensitivity to growth, photosynthesis and gene expression to glucose was fully recovered. Based on these results, we suggest that the sensing role of glucokinase seen in *Arabidopsis* is not an acquired trait *per se*, but might involve certain interacting factor(s) that coevoled during the course of evolution.