ABSTRACT

Signal Transduction Pathways in Cyanobacteria - Role of the DNA-Binding Response Regulators Slr1584 and Sll1330.

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Signal transduction is one of the major bacterial sensing and response processes. This system employs two component systems which consist of a sensor and a response regulator protein. The purpose of this study was to determine the function of Slr1584 and Sll1330 in *Synechocystis* sp. PCC6803.

Deletion mutants of the response regulator genes were generated by insertional inactivation. The DNA binding domains of the response regulators expressed in the vector pTYB12 were used to isolate the gene targets from the *Synechocystis* 6803 gene library. Gene targets (including *sll*0374, *slr*1697, *sll*0405, *and sll1582* for Slr1584 and *slr*0862, *slr*1592, *sll*0846 for Sll1330) were confirmed by gel retardation, and sequenced and identified using CyanoBase. The authenticity of target gene *sll*0374, which encodes a component of a urea transporter, was tested using wild type and mutant cells in growth, Northern blots and gel retardation studies to identify the conditions in which the pathway operates and to deduce the function of Slr1584.

The results conclusively demonstrated the role of Slr1584 as regulating the expression of *sll*0374 involved in urea transport. This is the first report of this role. The importance of the signalling pathway involving *sll*0374 was identified as

transporting urea in nitrogen limiting conditions particularly where low concentrations of urea are present. The findings suggested involvement of Sll0374 in urea transport from the external medium and internally. One of the target genes of Sll1330, *slr0862*, which encodes a probable sugar kinase, correlated well its recently identified role of regulating glycolytic genes.

Keywords: Shirley E.M.Budall, cyanobacteria, signal transduction, *Synechocystis*, response regulator, slr1584, urea transporter, *sll0374,* sll1330, *slr*0862