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P011 NtcA activates the nblA gene of the cyanobacterium Synechococcus sp.

Ignacio Luque¹,², Asunción Contreras², Gérald Zabulon¹ and Jean Houmard¹

¹Unité des Membranes Végétales, Ecole Normale Superieure, UMR8543, Paris, France and ²División de Genética, Universidad de Alicante, Alicante, Spain

Non-diazotrophic cyanobacteria degrade their light-harvesting antennae, the phycobilisomes, when exposed to a variety of stress conditions, including nitrogen starvation. This phenomenon, termed chlorosis or bleaching has been shown to be dependent of the response regulator NblIR in Synechococcus sp. PCC 7942. The expression of nblA, a key gene in degradation of phycobilisomes is induced during nitrogen starvation, although previous work failed to show the direct involvement of NtcA, the global regulator for nitrogen control, on nblA expression.

To throw some light on the molecular mechanism by which the nblA gene responds to nitrogen, we performed structural and functional analysis of the 5’ region of nblA in Synechococcus sp. PCC 7942 and a derivative strain in which the ntcA gene has been inactivated. Our results indicate that nblA transcription can initiate at several promoters and that the most active one, PnblA-2, is indeed directly regulated by NtcA under nitrogen starvation conditions. We report the binding of purified NtcA to DNA fragments including the nblA regulatory region and discuss possible implications of the particular promoter structure found at the non-canonical NtcA regulated promoter PnblA-2.