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**MICROBIOLOGY & MOLECULAR GENETICS**

**Departmental Journal Club**

**MICR 6120**

**Monday**

**September 26th, 2016**

11:30am-12:20pm

RM 215 LSE.

Presented by

Neil Miller  
PHD Student

Title:    THE RESPONSE REGULATOR NPUN\_F1278 IS ESSENTIAL FOR SCYTONEMIN

BIOSYNTHESIS IN THE CYANOBACTERIUM NOSTOC PUNCTIFORME ATCC 29133

Authors: Sejuti Naurin, Janine Bennett, Patrick Videau, Benjamin Philmus, & Tanya Soule

Following exposure to long-wavelength ultraviolet radiation (UVA), some cyanobacteria produce the indole-alkaloid sunscreen scytonemin. The genomic region associated with scytonemin biosynthesis in the cyanobacterium Nostoc punctiforme includes 18 cotranscribed genes. A two-component regulatory system (Npun\_F1277/Npun\_F1278) directly upstream from the biosynthetic genes was identified through comparative genomics and is likely involved in scytonemin regulation. In this study, the response regulator (RR), Npun\_F1278, was evaluated for its ability to regulate scytonemin biosynthesis using a mutant strain of N. punctiforme deficient in this gene, hereafter strain D1278. Following UVA radiation, the typical stimulus to initiate scytonemin biosynthesis, D1278 was incapable of producing scytonemin. A phenotypic characterization of D1278 suggests that aside from the ability to produce scytonemin, the deletion of the Npun\_F1278 gene does not affect the cellular morphology, cellular differentiation capability, or lipid-soluble pigment complement of D1278 compared to the wildtype. The mutant, however, had a slower specific growth rate under white light and produced ~2.5-fold more phycocyanin per cell under UVA than the wildtype. Since D1278 does not produce scytonemin, this study demonstrates that the RR gene, Npun\_F1278, is essential for scytonemin biosynthesis in N. punctiforme. While most of the evaluated effects of this gene appear to be specific for scytonemin, this regulator may also influence the overall health of the cell and phycobiliprotein synthesis, directly or indirectly. This is the first study to identify a regulatory gene involved in the biosynthesis of the sunscreen scytonemin and posits a link between cell growth, pigment synthesis, and sunscreen production.