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Poster #51: The role of the phage encoded auxiliary metabolic gene pebS during the infection of marine cyanobacteria

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Some viruses infecting cyanobacteria carry auxiliary metabolic genes (AMGs) acquired from their hosts via horizontal gene transfer. They are thought to alter or supplement host metabolism, although their activity in the virocell during infection was not shown yet. Some AMGs in cyanophages (phages that infect cyanobacteria) exhibit notable similarities to host genes that function in the photosynthesis of cyanobacteria [1,2].
One such AMG frequently observed in cyanophages infecting Prochlorococcus and Synechococcus species is the gene encoding for the ferredoxin-dependent bilin reductase (FDBR) PebS. As demonstrated in vitro, PebS facilitates the four-electron reduction of biliverdin IXα to phycoerythrobilin (PEB) [3]. To date, no cyanobacteria have been identified to possess the *pebS* gene. Instead, they perform two subsequent two-electron reductions by the ferredoxin-dependent bilin reductases PebA and PebB. PEB is the major bilin found in the light-harvesting phycobilisomes of green light specialized cyanobacteria from the marine environment, like Synechococcus sp. WH8109. Interestingly, the majority of phages that carry pebS infect Prochlorococcus species that lack classical phycobilisomes.
The objective of this study is to examine the influence of the AMG pebS on the metabolism of Synechococcus sp. WH8109 and virus replication during the infection of the pebS-carrying cyanophage S-SSM7. Therefore, a knockout phage, lacking the pebS will be generated and the infection parameters of the wildtype and knockout phage will be compared under varying conditions.

Reference #1

Rower, F., Nat. 459, 207-212 (2009)

Reference #2

Breitbart, M., Nat. Microbiol.3, 754-766 (2018)

Reference #3

Dammeyer, T., Curr. Biol. 18, 442-448 (2008)

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