Identification of Mutations in *nmpR* that Restore Type-IV Pili Dependent Motility in *Myxococcus xanthus*

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*Myxococcus xanthus* is a Gram-negative bacterium that displays several social behaviors such as motility, fruiting body formation, and predation. Social motility of this bacterium is dependent on the production of type-IV pili, which is regulated by the two-component system (TCS) PilSR. A strain of *M. xanthus* in which *pilR* has been deleted is non-motile, however after extended incubation, restored motility was observed. Previous experiments have shown that these strains with restored motility have suppressor mutations in a TCS different than that of PilSR, a TCS that has been designated NmpRSTU. Specifically, these mutations were found in the response regulator (RR) *nmpR* that restored motility by causing NmpR to be in a constitutively active, or “ON” state. In this study, we sought to increase the number of known mutations in *nmpR* that would lead to this “ON” state of the protein. To find mutations in *nmpR*, a non-motile Δ*pilR* strain with a plasmid encoding for high expression of *nmpR* was grown, plated onto motility agar, and monitored for restored motility. Mutants that displayed restored motility were isolated, and each strains genomic DNA was purified followed by PCR amplification of *nmpR* and sequencing. This screen has identified 19 unique mutations in *nmpR*. It is hypothesized that these mutants induce a conformational change of NmpR that mimics or promotes the phosphorylated “ON” state of the protein. Due to the well-conserved sequences of RR across many bacterial species, this mutational analysis gives broad insight into the structure and function of RRs.