Title: Selection and development of aptamers for pyoverdine

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Abstract:

The rhizosphere is a small region surrounding plant roots that is enriched in biochemicals from root exudates and populated with fungi, nematode, and bacteria. Interaction of rhizosphere organisms with plants is mainly promoted by exudates from the roots. Root exudates contain biochemicals that come from primary and secondary metabolisms of plants. These biochemicals attract microbes, which influence plant nutrition. The rhizosphere bacteria (microbiome) are vital to plant nutrient uptake and influence biotic and abiotic stress and pathogenesis. Pseudomonas is a genus of gammaproteobacteria known for its ubiquitous presence in natural habitats and its striking ecological, metabolic, and biochemical diversity. Within the genus, members of the *Pseudomonas fluorescens* group are common inhabitants of soil and plant surfaces, and certain strains function in the biological control of plant disease, protecting plants from infection by soilborne and aerial plant pathogens. The soil bacterium *Pseudomonas protegens* Pf-5 (also known as *Pseudomonas fluorescens* Pf-5) is a well-characterized biological strain, which is distinguished by its prolific production of the secondary metabolite, pyoverdine. Knowledge of the distribution of *P. fluorescens* secretory activity around plant roots is very important for understanding the interaction between *P. fluorescens* and plants and can be achieved by real time tracking of pyoverdine. To achieve the capability of real-time tracking in soil, we have used a structure-switching SELEX strategy to select high affinity ssDNA and 2' F-Y-RNA aptamers with specificity for pyoverdine over other siderophores. Pyoverdines from various strains possess a conserved chromophore along with strain-specific peptide chain. Some of the isolated aptamers bind to chromophore of pyoverdine. These will identify pyoverdines from a variety of pseudomonads. Identification of aptamers that selectively bind the peptide portion of pyoverdine Pf-5 is underway. The identified aptamers that are broadly and narrowly specific for pyoverdines or Pf-5 will be optimized for integration into an electrochemical biosensor to track, in real time, *P fluorescens* activity and other pseudomonads in and around the rhizosphere.