Title: Conditions Promoting Natural Competency in Xylella fastidiosa  
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Abstract: Xylella fastidiosa (XF) is a plant pathogenic bacterium that causes a variety of diseases in a wide range of host plants, including grape, blueberry, pecan, and citrus. XF inhabits the xylem vessels of plants where it forms biofilm, which restricts the movement of water and nutrients, resulting in disease. Recently, it has been shown in vitro that XF efficiently undergo natural transformation, a process during which XF acquire DNA from the environment, indicating that this bacterium is naturally competent. This ability to modify its own genomic makeup may be allowing the bacterium to adapt to new environments such as host plant species. To fully understand the competency of XF, including potential for competency in planta, the ideal conditions for this process must be determined. Here, it is shown that natural transformation in XF does occur on solid agar plates, confirming previous results from other research groups. To determine whether natural transformation potentially occurs in planta, experimental conditions which better replicate the natural xylem vessel environment of the bacterium are being examined. To do this, transformation of antibiotic resistant mutants was tested in microfluidic flow devices, which contain thin channels and media flow conditions that mimic xylem vessels. Initial trials in microfluidic flow devices yielded inconsistent bacterial attachment results, leading to studies of the attachment of mutants to different surface types. Differences were observed in the attachment of both wild-type and mutant XF to polystyrene and glass surfaces. These differences in attachment may play a role in the transformation process in microfluidic devices. Currently the experimental conditions are being optimized to determine the efficiency of natural transformation in XF under flow conditions.