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### *Francisella* Sec secretion contributes to attachment during biofilm formation and chitin colonization

J. J. Margolis[1], S. El-Etr[2], L.-M. Joubert[3], E. Moore[4], R. Robison[4], A. Rasley[2], A. Spormann[5], D. M. Monack[1]
[1]Stanford University, Department of Microbiology & Immunology, Stanford, United States, [2]Lawrence Livermore National Lab, Biosciences and Biotechnology Division, Livermore, United States, [3]Stanford University, Cell Sciences Imaging Facility, Stanford, United States, [4]Brigham Young University, Department of Microbiology and Molecular Biology, Provo, United States, [5]Stanford University, Department of Civil & Environmental Engineering, Stanford, United States

*Francisella tularensis*, the etiologic agent of tularemia, can infect numerous small mammals and arthropod vectors in nature, and may persist in non-host environments. Although *F. tularensis* pathogenesis is essential to comprehending the infection state of this bacterium, it is notable that mammalian infection is just one step in the ecology of *Francisella* species and mammals are most likely not the environmental reservoir for this pathogen. Since *F. tularensis* may be associated with chitin-based surfaces in nature, a substrate conducive for biofilm formation, we tested the ability of *Francisella* species to form these bacterial communities. *F. tularensis* subsp. *tularensis*, the most virulent subspecies, *F. tularenisis* subsp. *novicida,* and *F. tularenis* subsp. *holarctica* live-vaccine strain (LVS) all formed these surface-associated bacterial populations on abiotic surfaces. We also observed *F. novicida* biofilms on chitin-containing crab shells and synthetic chitin indicating that biofilms represent a potential mechanism of environmental persistence for *F. tularensis*. A forward genetic screen for biofilm mutants identified 88 genes that contribute to biofilm formation; including the Sec translocon apparatus, as well as 14 putative secreted proteins. We mutated two chaperone genes (*secB1* and *secB2*) involved in Sec-dependent secretion and 4 genes that encode for putative secreted proteins. All mutants were deficient for attachment to both polystyrene and chitin surfaces and for biofilm formation compared to wild-type *F. novicida*. Furthermore, these mutants were virulent in macrophages and mice. These data suggest that biofilm formation may be a non-host survival mechanism for *F. tularensis* and indicates that *Francisella* species likely utilize a different set of genes to colonize environmental surfaces and persist as biofilms in nature compared to those needed for infecting a mammalian host.