

Bacterium *Pseudomonas aeruginosa* propagates as a ring to result in efficient colonization of surfaces

Dr. Huijing Du

Department of Mathematics, University of Notre Dame

Abstract: We observed that *P. aeruginosa* often forms branched tendrils during swarming and this phenomena occurs only when bacteria produce rhamnolipid, regulated by quorum sensing. We also observed that *P. aeruginosa* cells and rhamnolipid propagate as rings within swarms towards the extending tendrils. We developed a cell-based multi-scale model to study this phenomenon. Our simulations suggest that the ring propagation as well as branched tendril formation at the edge of the population depends upon competition between the changing viscosity of the bacterial liquid suspension and the liquid film boundary expansion caused by Marangoni forces. We therefore suggest that *P. aeruginosa* efficiently colonizes surfaces by controlling the physical forces responsible for expansion of thin liquid films and by propagating towards the tendril tips.