

- **Project Title:** Controlling Bacterial Population Development With Cell Signals

**Investigator:** Robert McLean

**Department:** Biology

**Project Summary:**

We observed that some bacterial species were able to colonize a surface in response to cell density (quorum) signal molecules (McLean et al., 2005). In the current study, we investigated whether this could be attributed to a specific chemical attraction (chemotaxis) and whether it could be disrupted by other compounds (quorum signal interference) or enzyme-based degradation (quorum quenching) of the signal. To this end, I had two graduate student thesis projects (Maria Jimenez and William Boswell) assigned to examine each one. In addition, I had one student (Veronica Huerta) who worked on quorum signal inhibiting dietary compounds in collaboration with Dhiraj Vattem (Family and Consumer Science dept). Of the two MS thesis projects, the quorum quenching investigation was completed - the second one is in progress. The net finding was that quorum quenching alone does not make a weakly competitive organism such as *E. coli*, more competitive in an aquatic environment. The student involved (William Boswell) completed his thesis and presented at an international-level meeting (American Society for Microbiology, Cell-Cell Signaling Meeting in Austin). The undergraduate (V Huerta) published a paper on her work on quorum inhibition. I also co-authored a paper on quorum inhibition with a Korean group. A manuscript is in preparation on that. As well, some work from this grant lead to the successful funding of a THECB (ARP) grant in 2008.

**Publications:**

- 1.) Vattem, DA, K Mihalik, SH Crixell, and RJC McLean. 2007. Dietary phytochemicals as quorum sensing inhibitors. *Fitoterapia* 78: 302-310.
- 2.) Kim C, J Kim, HY Park, RJC McLean, CK Kim, J Jeon, SS Yi, YG Kim, YS Lee, and J Yoon. 2007. Molecular modeling, synthesis, and screening of new bacterial quorum-sensing antagonists. *J Microbiol. Biotechnol.* 1598 1606.

**Presentations:**

- 1.) V Huerta, RJC McLean and D Vattem. 2006. Green tea and yerba mate effects on biofilms. Texas Branch ASM, Fall meeting, Galveston TX.

2.) WT Boswell, W Fast, and RJC McLean. 2007. Ecological influence of quorum quenching lactonase on bacterial biofilms. 3rd ASM Conference on Cell Cell Communication in Bacteria, Austin TX, abstract 101B

3.) V Huera, K Mihalik, S Crixell, R McLean, and DA Vatter. 2007. Herbs, spices and medicinal plants used in hispanic traditional medicine can inhibit quorum sensing in Pseudomonas aeruginosa. 3rd ASM Conference on Cell Cell Communication in Bacteria, Austin TX, abstract 51B

**External Grants Applied:**

THECB ARP application 003615-0037-2007 "Profiling Bacterial Species' Interactions in Mixed Cultures" RJC McLean (PI), M Whiteley (co-PI, University of Texas)

**External Grants Awarded:**

THECB ARP application 003615-0037-2007 "Profiling Bacterial Species' Interactions in Mixed Cultures" RJC McLean (PI), M Whiteley (co-PI, University of Texas) \$150,000 (Texas State portion \$100,000)

**Student Number: 3**