

427p Motility Quorum Sensing Locus (Mqsa, B3022) Links Autoinducer 2 and Biofilm Formation in *Escherichia Coli* K12

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Previously, the cross-species, quorum-sensing signal AI-2 has been found to induce biofilm formation 30-fold in *E. coli* K12 (unpublished) by increasing expression of 67 genes, primarily those associated with chemotaxis, motility, and flagellar synthesis (*Biotechnol. Bioeng.* 88: 630, 2004), including the specific motility loci *qseBC* and *flhD* (*Mol. Microbiol.* 43: 809, 2002). Differential gene expression has also been used to show *b3022* is induced 8-fold in biofilms relative to planktonic cells (*Appl. Microbiol. Biotechnol.* 64: 515, 2004). In this report we show the *b3022* locus, which we have re-named motility quorum sensing (*mqsA*), regulates motility through the two-component motility regulatory system QseBC. Deletion of *mqsA* decreased biofilm formation in complex media (74%), minimal media (46%), and complex media supplemented with 0.4% glucose (78%) as well as decreased biomass, substratum coverage, and thickness by 9-, 19-, and 4-fold, respectively, in continuous flow cells. By deleting *mqsA*, wild-type biofilm architecture was altered from a 54- μ m-thick structure with macrocolonies to only a few colonies as visualized by confocal microscopy. MqsA positively regulates expression of *qseBC*, *fliA*, and *motA* since deleting *mqsA* decreased their transcription by 61-, 2.4-, and 18-fold, respectively, in minimal medium. Biofilm formation was not increased upon the addition of 6.4 μ M AI-2 for the isogenic deletions of *mqsA*, *qseBC*, *fliA*, and *motA* indicating AI-2 induces biofilm formation in *E. coli* with MqsA as the mediator which regulates QseBC.