Secondary Metabolites from *Pseudomonas fluorescens* and *Microcystis aeruginosa*: Isolation, Structure Elucidation, and Quantification

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ABSTRACT

This study focused on two separate topics. First, potentially beneficial products from the bacterium *Pseudomonas fluorescens* were investigated and in the second, methods were developed for the detection of toxins produced by the blue-green alga *Microcystis aeruginosa*. In both studies, a variety of separation techniques in conjunction with spectroscopic analytical detection methods were utilized.

Three secondary metabolites were isolated from cultured broth of *Pseudomonas fluorescens* NCIB 10586. From these studies the structures of these compounds were found to correlated with those for tryptophol, indole-3-aldehyde, and indole-3-carboxylic acid. These compounds were all found to be quorum-sensing compounds, and have the potential to interfere with quorum sensing processes in other bacteria. The quorum sensing properties displayed by these compounds may account for the auxin-like characteristics common among this group of molecules. A fourth unrelated compound, that displayed no quorum sensing activity was also isolated, but the structure of this compound could not be determined based on the spectroscopic data obtained.

A new sample preparation strategy and quantification method has been established to improve the detection of microcystins, potent hepatotoxins produced by the cyanobacteria *Microcystis aeruginosa*, in natural waters. Both C_{18} column and hydrophilic liquid interaction (HILIC) chromatography methods were developed using several common microcystin standards. Based on the HILIC system, quantification curves for microcystin LR (MCLR), microcystin RR (MCRR), and microcystin YR (MCYR) were produced using LC/MS detection. Based on this study the LOD for each

of these microcystins was found to be 0.08 μg/L, below the current maximum allowable level for microcystins in drinking water supplies.

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