

Biological activities of bacterial volatiles

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Many bacteria emit volatile compounds, which with few exceptions have been largely neglected by natural product chemists. We have investigated volatiles emitted by various strains of different bacterial classes, using headspace analysis [1]. Five major classes of compounds, belonging to different biosynthetic groups, are produced by these bacteria, including fatty acid derivatives, aromatic compounds, pyrazines, (sesqui)terpenes, and sulfur compounds. The ecological reasons why these compounds are produced are mostly unknown, but chemical defense and communication come immediately to mind.

In a first step the activities of several bacterial volatiles were evaluated in different bioassays. Agar diffusion inhibitory assays were performed using 10 different microorganisms. In a second experiment, activities against a tumor cell line was investigated. Finally, the activities of the volatiles in chemical communication systems was investigated, using a bacterial “quorum-sensing” reporter system expressed in two different bacteria.

The results are reported on the poster. Surprisingly, some of the volatiles were strongly active against almost all of the microorganisms tested in diffusion assays, while selected ones showed inhibitory influence on the “quorum-sensing” system. Activities on the cancer cell line was generally weak, but individual components showed a high activity given the small size of the molecule.

[1] Schulz, S.; Fuhlendorff, J.; Reichenbach, H. *Tetrahedron* **2004**, *60*, 3863-3872; Dickschat, J.S.; Wagner-Döbler, I.; Schulz, S. *J. Chem. Ecol.* **2005**, *31*, 925-947; Dickschat, J.S.; Wenzel, S.C.; Bode, H.B.; Müller, R.; Schulz, S. *ChemBioChem* **2005**, *5*, 778-787; Dickschat, J.S.; Helmke, E.; Schulz, S. *Chem. Biodiver.* **2005**, *2*, 318-353; Dickschat, J.S.; Martens, T.; Brinkhoff, T.; Simon, M.; Schulz, S. *Chem. Biodiver.* **2005**, *2*, 837-865; Dickschat, J.S.; Reichenbach, H.; Wagner-Döbler, I.; Schulz, S. *Eur. J. Org. Chem.* **2005**, 4141-4153; Dickschat, J.S.; Bode, H.B.; Wenzel, S.C.; Müller, R.; Schulz, S. *ChemBioChem* **2005**, *6*, 2023-2033; Schulz, S., Dickschat, J.S. *Nat. Prod. Rep.* **2007**, in press.