Mapping abiotic stress on microbial systems

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Human pharmaceuticals are readily detected in waste water treatment plants, rivers and estuaries. Whilst levels are not yet high enough to cause immediate harm to aquatic life, it is widely acknowledged that there is insufficient information available to determine whether exposure to low levels of these substances over long periods of time is having an impact on the microbial ecology of these environments. In order to investigate the effect on the metabolic potential of the microbial community we have been adopting a metabolomics approach using various analytical platforms including vibrational spectroscopic approaches for generating spatial metabolic fingerprints, GC-MS for metabolic profiling and DIMS for lipid profiling. Analysis of environmentally relevant microbes and algae will be presented. We shall show that Propanol had significant effects on the lipid components of *Pseudomonas putida* cells [1], and in particular large changes in phospholipid head groups occurred within one hour of exposure [2]. In order to investigate this further, FT-IR microspectroscopy was used to generate detailed metabolic fingerprinting maps from the alga *Micrasterias hardyi* [3]. These chemical maps revealed dramatic effects on the distribution of various chemical species throughout the algae. This illustrates the additional power of spatial metabolic fingerprinting for investigating abiotic stresses on complex biological species.

References:

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[3] Patel, S. A., Currie, F., Thakker, N. & Goodacre, R. Spatial metabolic fingerprinting using FT-IR spectroscopy: investigating abiotic stresses on *Micrasterias hardyi*. *Analyst* 133, 1707-1713 (2008).