[PL-1]

Bacterial Solutions to Global Health

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Bacteria are essential for the maintenance of the health of both the human population and the planet Earth. Understanding microbial processes is essential for the successful management of global issues including clean energy production, remediation of polluted environments and understanding carbon fluxes in the environment. In addition, emergent anthropogenic agents, including pharmaceuticals and manufactured nanoparticles, may have microbial toxicological effects which are not yet understood. Our research has focused on the impact of such pollutants within the environment using interacting microbial consortia. For example, we have reported the degradation/uptake of the most toxic fractions of petroleum hydrocarbons (alkyltetralins) and persistent agricultural herbicides (e.g. phenoxyalkanoic acids) by bacterial consortia and monocultures. Similarly, the degradation of many chlorinated agrichemicals has been further characterised by us via functional gene expression quantification *in situ* in soil and the degradative plasmid flow within *in vitro* biofilms assessed.

Newly emerging environmental challenges include the persistence of pharmaceutical compounds and a range of manufactured metal nanoparticles. The potential for microbial degradation of the anti inflammatory compounds diclofenac and ketoprofen by monocultures and sewage consortia has been investigated, the bacterial toxicity recalcitrance of these compounds has been undertaken by our research group. The methodology challenges for the study of the rate and effect of uptake of gold and silver nanoparticles by individual bacterial cells and cultures have been overcome, prior to our research into the effect of nanoparticles on functional gene expression within natural populations.