Jerry Schnoor

Title: Plant Degradation of Airborne PCB Congeners

Abstract: Phytoremediation, or the use of higher plants to mitigate environmental pollution, constitutes a promising technology for the in situ treatment of xenobiotic chemicals like PCB-contaminated soils and groundwater. Laboratory experiments have showed that plants take up PCBs from the hydroponic solution and transform them to hydroxyl-metabolites and dechlorinated PCBs. The green liver model describes the fate of organic contaminants inside plant tissues. In the case of PCBs, it involves typically the following steps: Oxidation of PCB molecules by a cytochrome P-450 monooxygenase (phase I), transferase-catalyzed conjugation of hydroxyl-metabolites with reduced glutathione or other molecules (phase II), sequestration of conjugates in cell vacuoles or into plant biopolymers (phase III).

In order to investigate further the metabolism of PCBs inside plant tissues, the expression of putative PCB-detoxification genes are analyzed by reverse-transcriptase (RT) real-time. Target Populus genes are retrieved from the JGI Poplar Genome Project based on homolog genes involved in detoxification reactions in other model organisms, such as Arabidopsis thaliana. Selected genes involve cytochrome P-450 monooxygenases (CYPs), glutathione S-transferases (GSTs), NADPH-dependent reductases, and peroxidases. 18S ribosomal DNA (rDNA) is used as an internal standard. Future work will include a proteomics-based approach with 2-D gel electrophoresis, isolation of protein bands, digestion with trypsin and peptide analysis by MALDI-TOF mass spectrometry.