



Look4Grail

Looking for Glutathione Transferase substrates and Ligands

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Summary —

Due to their immobility, terrestrial plants are subjected to various environmental stresses that alter cellular redox homeostasis. Various antioxidant molecules such as glutathione or ascorbate and other specialised metabolites are produced to overcome the possible toxic effects of reactive species produced under these conditions. Paradoxically, specialised metabolites can also be toxic for the plants themselves. Plants have therefore developed a powerful enzymatic arsenal that carries out and regulates the synthesis, transport and storage of these molecules. Among these enzymes, glutathione transferases (GSTs) constitute a multigenic family highly developed in plants, notably involved in the detoxification of exogenous toxic compounds such as herbicides, but also in the synthesis or transport of specialised metabolites. Thus, several GSTs interact with or modify flavonoids, fatty acids and porphyrins. These functions rely either on catalytic transformation, mainly through glutathione conjugation reactions, or on their non-catalytic property known as "ligandin" dedicated to the transport or storage of these molecules. However, the substrates or ligands and thus the precise physiological functions of most GSTs are still unknown.

The objectives of this project will concern to identify ligands and substrates of poplar GSTs using *in vivo* and *in vitro* fishing approaches for these molecules and to characterise the molecular interactions identified. In particular, the project will use a new method based on "click chemistry" to efficiently trap glutathionylated molecules, improving the identification of the substrates of GST catalysing glutathione conjugation reactions. The approaches that will be developed have the potential to determine precisely the roles and functions of GST *in planta*, to understand how certain specialised metabolites are synthesised and transported or stored and to identify new classes of valuable natural products.