

# Development of *Sinorhizobium meliloti* ABC transporters as environmental biosensors



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**Introduction** - Genome analysis of *rhizobia* reveals an explosion in the number of ABC (ATP binding cassette) uptake systems (Fig. 1), with around 160 systems present in *S. meliloti*, *Mesorhizobium loti* and *Rhizobium leguminosarum*. The binding proteins of these transporters are highly solute specific and tightly induced in response to appropriate conditions, and as such they offer great potential for use as biosensors.

**Methods** - We have successfully created a set of 264 *gfp* promoter probes of putative promoter regions of the solute-binding component of these operons in a custom-made directionally TOPO-adapted vector (Fig. 2).

Fig. 1 Uptake ABC transporter

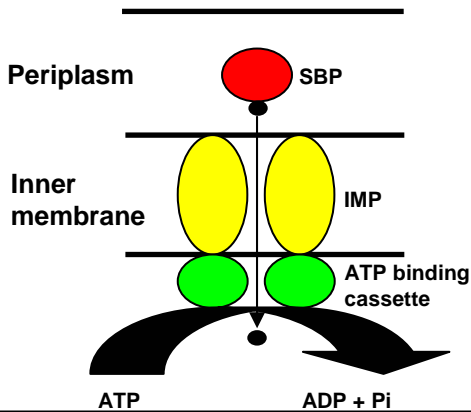


Fig. 2 pRU1097/D-TOPO

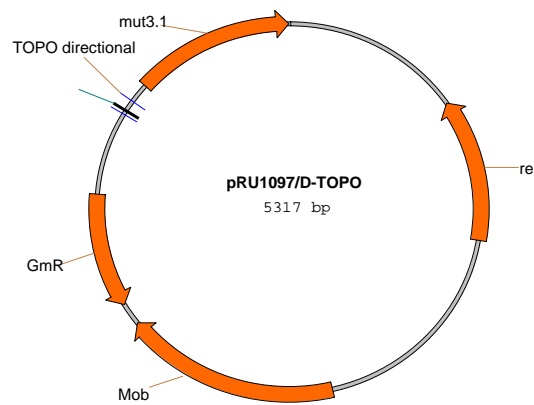


Fig. 3 Typical GeneSpring data set



**Results** - The *in vitro* inducing conditions of the fusion library are currently being investigated by screening individual fusions against multiple substrates using microtitre plates and a fluorescence plate reader. In addition, we would be happy to test anyone's favourite compound against our fusion library. Data is then analysed using GeneSpring (Fig. 3). We have identified approximately 10 sugar and 30 amino acid specific systems. Once the screening is completed, fusions will be introduced into the rhizosphere and used as environmental biosensors. This will provide important temporal and spatial information about the factors that govern competition for growth in the plant rhizosphere and during nodulation, as well as providing a real-time map of root exudation chemistry.