



ABSTRACT

“Versatility and fast evolution of the cytochrome P450 enzymes in the metabolism of monoterpenols”

Dr Danièle Werck

Institute of Plant Molecular Biology

CNRS UPR 2357

Strasbourg

FRANCE

The sequencing of plant genomes has revealed that cytochromes P450 (CYPs) form the largest family of plant enzymes in secondary metabolism and that most of their functions were still unknown. This pointed to a very poor understanding of the plant metabolism. We therefore designed complementary strategies to track the overlooked aspects of the secondary metabolism in the model plant *Arabidopsis thaliana*. One of them is a predictive map of P450 functions in plant metabolism, based on the analysis of gene (co)-expression in publicly available Affymetrix ATH1 microarray data (<http://www-ibmp.u-strasbg.fr/~CYPedia/>). Based on CYPedia predictions, a group of co-expressed terpene synthases (TPSs) and CYPs were predicted to be involved in common floral terpenoid metabolism. All four genes were found mainly expressed upon anthesis in the stamen and petal. Investigation of the encoded enzymes in recombinant systems (yeast and *Nicotiana benthamiana*) and analysis of null and overexpressor mutants revealed new functions of TPS and P450 enzymes in the metabolism of linalool and derived compounds. This work was extended to a more systematic exploration of the family of CYP76 enzymes in *Arabidopsis* and *Catharanthus roseus* (in the latter case in connexion with the metabolism of secoiridoïds), which revealed functional versatility, redundancy, specialisation and fast evolution of monoterpenol oxydases, as well as their role in herbicide metabolism.