Tryptophan and sulfur metabolism in the immunity of Brassicaceae plant species

Prof. Paweł Bednarek

One of the evolutionary conserved plant immune responses involves biosynthesis of antibiotic secondary metabolites. The model plant *Arabidopsis thaliana* activates upon infection Trp-metabolic pathways leading to indole-3-carboxylic acids (I3CAs) and to the sulfur-containing phytoalexin camalexin. In addition, detection of potential pathogens triggers in this plant species metabolism of tryptophan-derived and sulfur-containing metabolites known as indole glucosinolates (IGs). As indicated by the susceptibility assays carried out with mutants defective in distinct branches of Trp- and IG-metabolism all these compounds are critical for *A. thaliana* immunity against a number of filamentous plant pathogens. Moreover, these assays revealed that particular Trp-derivatives act at different infection stages. We also investigated conservation of pathogen-inducible Trp-metabolic pathways in *A. thaliana* relatives on the genomic and metabolic level. Our survey revealed conservation of the pathogen-triggered IG metabolism between the tested plant species, suggesting an ancient and important function of this metabolic branch in Brassicaceae defense responses. In contrast, I3CA and camalexin biosynthetic pathways appeared to represent clade-specific innovations within the conserved framework of pathogen-inducible Trp metabolism. These pathways exemplify relatively recent manifestations of the plant-pathogen arms race in the Brassicaceae family.