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Investigating the role of a fungal oxidase-peroxidase tandem in plant pathogenicity

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New members of the Copper-Radical Oxidases (CROs), from the Auxiliary Activity family 5_2 of the Carbohydrate-Active enZymes classification (CAZy – AA5_2, www.cazy.org), were recently found to catalyze the oxidation of aliphatic and aromatic alcohols to their corresponding aldehydes (Yin et al. 2015). Strikingly, these enzymes (named "AlcOx") are almost exclusively found in phytopathogenic ascomycete fungi and their biological function remains unknown. To tackle this question, using biochemical and biological approaches, we investigated the function of the AlcOx from different *Colletotrichum* species. At the transcriptomic level, analyses of *C. orbiculare*, *C. fructicola and C. graminicola* during infection revealed co-regulation of a pair of adjacent genes coding for an AlcOx and a putative peroxidase, only during the *appressorium* phase. At the enzyme level, work done on other CROs families point at an activating role of peroxidases on AlcOx, *via* a mechanism that remains to be elucidated. Recombinant production of AlcOx and peroxidases from *Colletotrichum* species is in progress to biochemically characterize their substrate preference and degree of synergism *in vitro*. At the biological level, the function of the AlcOx and peroxidase from the cucumber anthracnose fungus *C. orbiculare* is currently investigated *in vivo*. Preliminary results show that the pathogenicity of knock-out mutants decreased compared to the wild type strain, suggesting a role of the AlcOx and the peroxidase in the cucumber infection process by *C. orbiculare*.

Yin, D., Urresti, S., Lafond, M., Johnston, E.M., Derikvand, F., Ciano, L., Berrin, J.-G., Henrissat, B., Walton, P.H., Davies, G.J., Brumer, H., 2015. Structure–function characterization reveals new catalytic diversity in the galactose oxidase and glyoxal oxidase family. *Nature Communications* 6. https://doi.org/10.1038/ncomms10197

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