



'Quantitative reactivity profiling of the cytochrome P450 superfamily'

PhD position in Plant Chemical Biology with Syngenta at University of Oxford

Aim of this project: establish quantitative activity profiling of cytochrome P450 enzymes in plants and apply this technology to organisms that Syngenta uses to study the fate of agrochemicals. P450s are interesting to study globally because of their frequently unknown substrates, their elusive post-translational regulation and the large number of highly diversified P450s per organism. Arabidopsis has 255 P450 enzymes that play non-redundant roles in the biosynthesis of e.g. phytohormones, cell wall precursors and defence compounds [1]. P450s are also key enzymes in the detoxification of agrochemicals, such as herbicides, insecticides and fungicides. P450 enzymes are mostly cytoplasmic enzymes anchored in the ER membrane that mono-oxygenate their specific substrates using NADPH as a cofactor. Various broad range and specific activity-based probes for P450s have been validated in mammals and are based on 'suicide substrates' that become reactive upon mono-oxygenation and react with nucleophiles in the substrate binding pocket of P450s [2,3]. Preliminary experiments indicate that these probes also label P450s in plants. These proteins will be identified during this project and different probe(cocktail)s will be tested to establish broad-range P450 profiling. Quantitative broad-range P450 profiling will be used to identify P450s involved in agrochemical modification and plant-pathogen interactions. The project offers an exciting mix of synthetic chemistry, chemical proteomics, analytics and plant science.

Starting date and length: The PhD position is for 3-4 years, and should start in 2016.

Location: The project will be mostly based in Oxford in the Plant Chemetics Lab (Department of Plant Sciences), in close collaboration with scientists at Syngenta (Jealotts Hill, near London). There is a placement of 3 months in the 3rd year at Syngenta to implement the technology there. The Plant Chemetics Lab pioneers activity-based protein profiling in plant science [4], and consists of an interdisciplinary research team where biologists and chemists closely collaborate to develop and apply novel chemical tools to study biology, with a focus on understanding the battlefield at the plant-pathogen interface.

Funding: The PhD position is funded for three years by the Industrial Partnership Studentship Collaborative Awards in Science and Engineering (IPS-CASE).

Applicant profile: Applicants should be from UK/EU and have a university degree in biology or chemistry, and highly motivated to do a PhD in an interdisciplinary research team. The candidate should be intellectually independent, experimentally accurate and have very good communication skills in English. Experience in working with plants and/or protein biochemistry is desired, but not essential.

Application: You can submit your application to Professor Renier van der Hoorn before September 15, 2016. Please send a strong motivation letter stating why this is an interesting topic and why you have the right attitude and expertise to make progress in this field. Also send your CV and names of three references.

More information: Please see www.plantchemetics.org for more information and contact renier.vanderhoorn@plants.ox.ac.uk for more details.

References: [1] The Arabidopsis Book e0144 (2012); [2] Chem. Biol. 14:1043-51 (2007); [3] JACS 131:10692-700 (2009); [4] Plant Cell Physiol. 57, 446-461 (2016).

