BBSRC iCASE PhD: The Mechanism of Cell Cycle Repression in Tubers

PIs: Prof Andrew Fleming; Dr Lisa Smith

Application Deadline: 4th January 2017

Project Description

To allow potato storage and supply throughout the year, sprouting of tubers post-harvest must be suppressed. Sprouting is controlled predominantly through application of chloropropham (CIPC), however despite its commercial use for over fifty years remarkably little is known about how CIPC actually works. Disruption of the cell cycle is thought to result in abnormal placement of new cell walls, therefore stopping growth of the sprouts. Although cell division in plants and animals clearly share commonalities, a portion of the accessory machinery is kingdom specific. CIPC presumably targets some aspect of plant-specific cytokinesis (since CIPC effects on animal cells are minimal).

Identification of these target processes will provide an insight into the plant cell cycle and how CIPC works, as well as identifying the part of the plant cell division machinery that is amenable to targeting for novel sprout suppressors. The use of CIPC is becoming seriously restricted as a result of new government guidelines. Consequently, the characterisation of alternative sprouting inhibitors is of existential importance for this industry. This project aims to provide fundamental knowledge on the mechanism of how CIPC influences the plant cell cycle and, as a result, identify potential new targets for controlling tuber sprouting.

The project will combine targeted RNAseq analysis of meristems (van Campen et al (2016) Plant Physiology 170:1655-1674) with the use of a functional screen to identify mutants with abnormal cellular responses to CIPC. Target validation will involve both analysis of tubers with known differential response to sprout suppressors and the testing of gene function in tubers.

The iCase partner, AHDB Potatoes, is a division of the Agriculture & Horticulture Development Board and is committed to making the potato industry (which has UK farm gate value c £1bn, c £4bn consumer value) more competitive and sustainable through factual, evidence-based advice, information and activity (http://potatoes.ahdb.org.uk/). The student will undergo training with AHDB during the studentship, gaining an insight into the research and advisory role that the body plays in supporting a key sector of the UK food industry. In addition, the student will have access to the broad scope of training possibilities of the BBSRC White Rose DTP (http://www.whiterose-mechanisticbiology-dtp.ac.uk/), providing a fantastic opportunity to complement the specific skills developed in the research project.

The successful candidate will have a strong background in plant molecular, cell and developmental biology, preferably combined with an interest in the translation of this knowledge to agriculture. Sheffield provides an outstanding environment for the project (ranked in top 5 for Biological Sciences in REF2014), with one of the largest and most vibrant university-based plant science research communities in the UK. You will join an integrated group working on various aspects of cell division, growth and development with a supervisory team consisting of Andrew Fleming and Lisa Smith.

See our lab pages for an overview of what we do:
http://fleminglab.group.shef.ac.uk/
https://lisasmithlab.wordpress.com/

For further information, contact Andrew Fleming (a.fleming@sheffield.ac.uk) or Lisa Smith (lisa.m.smith@sheffield.ac.uk).

Funding Notes

This iCASE PhD project has been approved for funding by the BBSRC-White Rose Doctoral Training Program on “Mechanistic Biology”. It is a 4 yr PhD studentship with full funding for UK students and those who fulfill residency requirements, with part-funding possible for other EU nationals. Candidates will be invited for interview on a rolling basis until the position is filled.