How do organelles communicate? Deciphering the relationship between reactive oxygen species and organelle dynamics

Supervisory team:
**Main supervisor:** Dr Imogen Sparkes (University of Bristol)
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**Host institution:** University of Bristol

**Project description:**
At the subcellular level, a defining feature of eukaryotic life is compartmentalisation into organelles. Considering that organelles carry out critical biochemical reactions which can span multiple organelles, raises the following important questions;

- How do organelles ‘communicate’ with one another?
- How do they move and do they need to physically sit next to one another to allow communication?
- Is organelle movement and positioning important?

Organelles are highly dynamic and can move at speeds of up to 10 microns / s. Whilst movement can appear erratic, changes in speed directly impacts on plant growth; increased movement increases growth, decreased movement decreases growth. Movement is also affected by external stimuli including pathogens (where organelles tend to cluster at sites of infection) and light (chloroplast movement). Organelle movement therefore is an important process which affects physiological responses.

Using fluorescent probes and high end imaging microscopes (including confocal, TIRF, spinning disc and optical tweezers), Dr Sparkes’ group study how organelles move and interact with one another in plant cells and the mechanisms that govern these processes (Sparkes I Front Cell Dev Biol 2016; Griffing et al. Protoplasma 2017; Gao et al. Plant Physiol 2016). The PhD project will tackle the first two questions posed, ‘communication’ and interaction of organelles. The project will provide training in molecular cell biology, live cell imaging (including confocal microscopy), plant physiology and signalling. Dr Sparkes is the primary supervisor with Prof Hetherington and Prof Smirnoff co-supervising the project. The project will be based at the University of Bristol within the plant group, which comprises multiple groups working on diverse topics ranging from cereal genomics to how plants respond to external stimuli (http://www.bristol.ac.uk/biology/research/plant/).

For further enquiries please contact Imogen Sparkes (is17145@bristol.ac.uk). To apply, please follow the instructions for the SwBio DTP application process.