Uncovering novel regulators of Fusarium Head Blight and targets for disease control

This project is one of a number that are in competition for funding from the South West Biosciences Doctoral Training Partnership (SWBio DTP) which is a BBSRC-funded PhD training programme in the biosciences, delivered by a consortium comprising the Universities of Bath, Bristol, Cardiff and Exeter, along with the Rothamsted Research Institute. The partnership has a strong track record in advancing knowledge through high quality research and teaching, in collaboration with industry and government.

Studentships are available for entry in September/October 2019.

All SWBio DTP projects will be supervised by an interdisciplinary team of academic staff and follow a structured 4-year PhD model, combining traditional project-focussed studies with a taught first year which includes directed rotation projects.

Lead supervisor: Dr Neil Brown, Department of Biology & Biochemistry, University of Bath, email n.a.brown@bath.ac.uk

Co-supervisors: Prof Sam Sheppard (University of Bath), Prof Kim Hammond-Kosack (Rothamsted Research)

Project description

Fungal pathogens destroy our crops and contaminate our food with toxins, threatening global food security. Nonetheless, we only have a few fungicide classes with dwindling efficacy. New ways to fight fungal diseases are needed to improve sustainable agriculture. Fusarium Head Blight is the most damaging floral disease of wheat worldwide and a serious health hazard, due to contamination of the grain with harmful toxins, and is intrinsically resistant to our current fungicides.

This project will use an unbiased approach to discover novel Fusarium graminearum genes important for disease and toxin production by combining the bioinformatic power of population studies and genomics with fungal genetics and molecular biology.

Genome-wide studies of >50 natural Fusarium isolates will identify genetic elements associated with differences in virulence and toxin production. A mutagenised fungal population will be created and screened for defects in invasive growth and toxin production, while the associated mutations will be identified by genome resequencing and a suite of computational analyses. Novel genes will be selected through comparisons of the array of natural and induced mutations, which associate with altered virulence and toxin production. Fungal transformation will re-create and complement these mutations, confirming the role of novel genes in the regulation of disease formation. The putative function of the identified genes will be assigned by comparative bioinformatics and interrogated using fluorescence microscopy and biochemistry.

This project will create a genomic and genetic resource to continue to explore how increasingly aggressive fungal pathogens adapt to their plant hosts, environmental changes and disease control strategies.

The student will gain multidisciplinary expertise in bioinformatics, genomics, fungal genetics, molecular biology and bioimaging, providing an excellent foundation for a successful career in microbiology and crop protection, within academic or industrial biosciences.

Funding

Studentships provide funding for a stipend at the standard UKRI rate (currently £14,777 per annum, 2018/19 rate), research and training costs and UK/EU tuition fees for 4 years.

UK and EU applicants who have been residing in the UK since September 2016 will be eligible for a full award; a limited number of studentships may be available to EU applicants who do not meet the residency requirement. Applicants who are classed as Overseas for tuition fee purposes are not eligible for funding.

Applications

Applicants must have obtained, or be about to obtain, a First or Upper Second Class UK Honours degree, or the equivalent qualifications gained outside the UK, in an appropriate area of science or technology.

Applications should be submitted on the University of Bath's online application form for a PhD in Biosciences. Please ensure that you quote the supervisor's name and project title in the 'Your research interests' section. You may apply for more than one project if you wish but you should submit a separate personal statement relevant to each one.

The deadline for the receipt of applications is Monday 3 December 2018.