

How bacterial pathogens enter and colonise plant vasculature?

Project ID: 3724

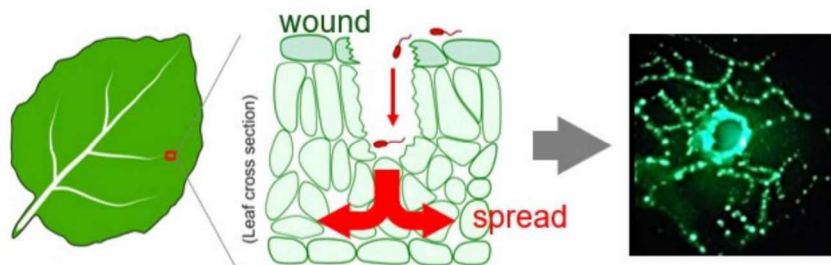
Supervisory team

Main supervisor: Dr Pierre Buscaill (University of Bristol)

Second supervisor: Prof Gorochowski (University of Bristol)

Host institution: University of Bristol

Project description: What do bacteria need to breach a plant's defences? Plants are frequently damaged by weather, farming and herbivory, creating wounds that can provide bacteria with access to internal tissues. *Pseudomonas*



syringae can exploit these entry points and spread systemically through plants, but we do not yet understand which bacterial functions allow it to establish and spread from a wound. This project will ask what bacteria need to exploit the wound-entry state and establish systemic colonisation. The student will combine unbiased genetic screening with targeted experiments to identify and understand the bacterial components involved. First, transposon mutant libraries and high-throughput sequencing will be used to identify bacterial functions whose contribution to fitness changes between wound-associated and established populations. This unbiased approach will allow unexpected determinants of colonisation to be discovered rather than restricting the project to predefined candidates. Candidate functions will then be investigated using targeted bacterial genome engineering, including deletion and complementation of genes encoding candidate proteins and pathways. Quantitative fitness assays will distinguish general growth defects from functions specifically important during plant infection. Microscopy, bacterial load measurements and plant phenotyping will determine where and when mutants fail, linking bacterial function to spatial colonisation and systemic spread. Comparative genomics will provide an additional route to identify candidate functions associated with contrasting colonisation behaviours in closely related pathogens, which can then be tested experimentally. The project integrates plant-microbe biology, bacterial genetics, genome engineering, protein function, quantitative imaging and computational analysis. The student will work across the Bristol Plant Immunity Lab and Biocompute Lab, gaining complementary training in experimental infection biology and engineering biology. The project is suited to applicants interested in microbiology, molecular genetics, protein function and plant-pathogen interactions.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.