

SEMINAR

School of Biological Sciences

Wednesday 21 November 2018

2:00pm Harborne Lecture Theatre

‘Spontaneous combustion: a glimpse into how the fire blight pathogen *Erwinia amylovora* uses cycled di-GMP and small RNAs to regulate virulence’

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Erwinia amylovora is the causal agent of the devastating disease fire blight of apple and pear, and pathogenesis includes primary infection of flowers and shoots followed by further systemic spread through host trees. We have shown that cyclic di-GMP (c-di-GMP) plays a critical role in regulating transitions between type III secretion and biofilm formation during *E. amylovora* pathogenesis. Intracellular levels of c-di-GMP are modulated by diguanylate cyclase (DGC) enzymes that synthesize c-di-GMP and phosphodiesterase (PDE) enzymes that degrade c-di-GMP. The *E. amylovora* genome encodes five diguanylate cyclase (DGC) enzymes that synthesize c-di-GMP and three phosphodiesterase (PDE) enzymes that degrade c-di-GMP. We have demonstrated that *pdeA* and *pdeC* are the two most active phosphodiesterases in virulence regulation in *E. amylovora* Ea1189, and that either *pdeA* or *pdeC* exert a strong regulatory effect on amylovoran exopolysaccharide synthesis and biofilm formation. In contrast, the deletion of two or more *pde* genes was required to affect motility. When all three *pde* genes were deleted, an autoaggregation phenotype and filamentous growth habit was observed. Results of a suppressor screen demonstrated that *eagA*, encoding a peptidoglycan hydrolase, suppressed the autoaggregation phenotype. *EagA* was also shown to regulate the Znu zinc uptake system in response to c-di-GMP, and we are currently studying the role of zinc in *E. amylovora* virulence. Hfq-dependent small RNAs including *ArcZ* and *RprA* also regulate specific virulence determinants in *E. amylovora*, and we have recently shown that *ArcZ* is a direct post-transcriptional regulator of the *flhDC* operon. Two other small RNAs, *OmrAB* and *RmaA*, also regulate flagellar motility by acting primarily on the master regulator, *FlhD*, but also through additional factors.

ALL WELCOME