



YCCSA Seminar Series Autumn 2018

An interdisciplinary seminar series hosted by the York Cross-disciplinary Centre for Systems Analysis aimed at researchers from all disciplines

The Impact of Microbial Community Interactions on the Evolution of Virulence and Antibiotic Resistance

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**Friday, 05 October 2018
Ron Cooke Hub, RCH/204 at 13:30**

Abstract:

Existing theory, empirical, clinical and field research all predict that reducing the virulence of individuals within a pathogen population will reduce the overall virulence, rendering disease less severe. Here, we show that this seemingly successful disease management strategy can fail with devastating consequences for infected hosts. We deploy cooperation theory and a novel synthetic system involving the rice blast fungus *Magnaporthe oryzae*. In vivo infections of rice demonstrate that *M. oryzae* virulence is enhanced, quite paradoxically, when a public good mutant with low virulence is present in a population of high-virulence pathogens. We reason that during infection, the fungus engages in multiple cooperative acts to exploit host resources. We establish a multi-trait cooperation model which suggests that the observed failure of the virulence reduction strategy is caused by the interference between different social traits. In addition we show that interactions between multiple traits such as resource consumption and antibiotic resistance play a critical role in determining pathogen community composition during drug treatment. In particular we demonstrate that single species antibiotic dose response is a poor predictor of multispecies community dynamics because it cannot foresee the tipping points that cause irreversible changes in resistance that persist, even when treatment stops.

The seminar includes a refreshment break to fuel interdisciplinary discussion

**Ron Cooke Hub is on Heslington East Campus – accessible by free bus services
Nos. 66 and UB1 running at frequent intervals from Heslington West.**

The YCCSA Seminar room is on the second floor