Project proposal

Project title	Comparative molecular genomics of Campylobacter jejuni
First Supervisor	Professor — Andrey Karlyshev
Second Supervisor	tbc
School	Life Sciences
Other member of supervisory team (no more than three KU supervisors in total)	
Specific requirements beyond 2:1 degree	

Project summary

(max 4,000 characters)

MSc by Research Project

Despite recent progress in understanding of biology of *Campylobacter jejuni*, it remains the major bacterial causative agent of gastrointestinal diseases worldwide. One remarkable feature of this pathogen is its adaptability to changing conditions both *in vivo* and *in vitro* due to 'genome fluidity' (GF) detected during genome sequencing. GF is revealed by gene rearrangements resulting in increased bacterial fitness in particular conditions. In case of 'contingency' genes the changes can be seen as variation in lengths of homopolymeric tracts leading to reversible changes in gene expression. The aim of the project is to detect genetic changes in *C. jejuni* using tissue culture cells as a model of infection. Genomes of bacteria before and after invasion of host cells will be sequenced using an automatic Personal Genome Sequencing Machine (IonTorrent). All required training will be provided by the supervisor (please see selected publications below), although an applicant is expected to have some background in microbiology and/or molecular biology and have keen interest in this exciting area of research. On completion of this training a student will learn:

State of the art methods of molecular biology/bacteriology

Methods of generation (IonTorrent PGM) and analysis (bioinformatics) of genome sequencing data

References

1. **Karlyshev A. V.**, Wren, B. W. and Moran A. P. (2008) *Campylobacter jejuni* Capsular Polysaccharide. In: *Campylobacter* 3rd Edition, Edited by: I. Nachamkin C. M. Szymanski and M. J. Blaser, pp. 505-521.
2. **Karlyshev A. V.**, Champion O. L., Szymanski C. M., Churcher C., Brisson J.-R., Jarrell H. C., Gilbert M., Brochu D., St. Michael F., Goodhead I., Sanders M., Stevens K., White B., Parkhill J. and Wren B. W. (2005) Analysis of *Campylobacter jejuni* capsular loci reveals multiple mechanisms for the generation of structural diversity and the ability to form complex heptoses. Molecular Microbiology, 55:90-103.
3. **Karlyshev, A. V.**, Champion, O. L., Joshua, G. W. P. and Wren, B. W. (2005) The polysaccharide capsule of *Campylobacter jejuni.* In: *Campylobacter.* Molecular and Cellular Biology: 249-258 (Horizon Bioscience).
4. **Karlyshev A. V**., McCrossan M. V. and Wren, B. W. (2001) Demonstration of polysaccharide capsule in *Campylobacter* using electron microscopy. Infection and Immunity, 69:5921-5924.
5. **Karlyshev A. V.** and Wren B. W. (2001) Detection and initial characterisation of novel capsular polysaccharide among diverse *Campylobacter jejuni* strains using alcian blue. J. Clinical Microbiology, 39:279-284.
6. **Karlyshev A. V.**, Linton D., Gregson N. A., Lastovica A. J. and Wren B. W. (2000) Genetic and biochemical evidence of a *Campylobacter jejuni* capsular polysaccharide that accounts for Penner serotype specificity. Molecular Microbiology 35:529-541.
7. **Karlyshev A. V.** and Wren B. W. (2005) Development and application of an insertional system for gene delivery and expression in *Campylobacter.* Applied and Environmental Microbiology 71:4004-13.