MONASH University

A/Professor John Boyce

Head, Bacterial Pathogenesis Laboratory

Monash Biomedicine Discovery Institute
Infection and Immunity Program

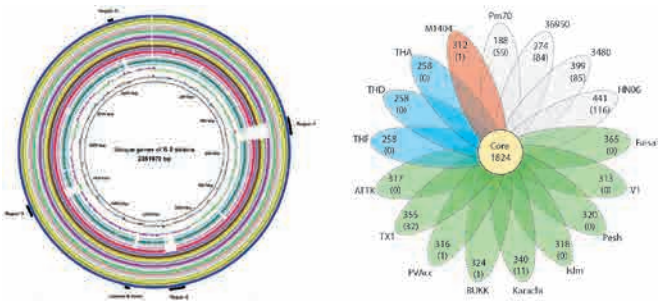
EMAIL	john.boyce@monash.edu
TELEPHONE	+61 3 9902 9179
WEB	med.monash.edu/microbiology/staff/boyce.html

A. Understanding mechanisms of colistin resistance in *Acinetobacter baumannii.* *Acinetobacter baumannii* has been identified as one of the top three dangerous Gram-negative hospital pathogens as it can cause a range of life-threatening infections and many strains are now resistant to almost all current antibiotics. Colistin is used as a last-line therapy against MDR A. baumannii, but infections caused by colistin-resistant strains are an emerging problem.

B. Defining the mechanisms of *Pasteurella multocida* pathogenesis and identifying novel virulence regulators. *Pasteurella multocida* is a Gram-negative bacterial pathogen that causes a number of different diseases in cattle, pigs and poultry, resulting in serious economic losses worldwide in food production industries. We are interested in understanding the molecular mechanisms of pathogenesis in this bacterium with an aim to developing new, more effective and widely applicable vaccines or antimicrobial drugs.

Research Projects

1. **Determine the precise mechanisms of colistin resistance**
2. **Construct an *A. baumannii hfq* mutant and characterise its phenotype**
3. **Identify important regulatory sRNA molecules and determine the genes which they control**
4. **Mutate predicted virulence regulators and assess their effect on *P. multocida* gene expression and virulence**



Schematic representation of the relatedness of various *Pasteurella multocida genomes.*

Selected significant publications:

1. Henry R, Vithanage N, Harrison P, Seemann T, Coutts S, Moffatt JH, Nation RL, Li J, Harper M, Adler B, **Boyce JD**. 2012. Colistin-resistant, lipopolysaccharide-deficient *Acinetobacter baumannii* responds to lipopolysaccharide loss through increased expression of genes involved in the synthesis and transport of lipoproteins, phospholipids, and poly-β-1,6-N-acetylglucosamine. *Antimicrob Agents Chemother.* 56, 59–69.

2. Steen JA, Steen JA, Harrison P, Seemann T, Wilkie I, Harper M, Adler B, **Boyce JD**. 2010. Fis is essential for capsule production in *Pasteurella multocida* and regulates expression of other important virulence factors. *PLoS Pathog* 6, e1000750.

3. Moffatt JH, Harper M, Harrison P, Hale JDF, Vinogradov E, Seemann T, Henry R, Crane B, St Michael F, Cox AD, Adler B, Nation RL, Li J, **Boyce JD**. 2010. Colistin resistance in *Acinetobacter baumannii* is mediated by complete loss of lipopolysaccharide production. *Antimicrob Agents Chemother.* 54, 4971–4977.

4. Keyburn AL, **Boyce JD**, Vaz P, Bannam TL, Ford ME, Parker D, Di Rubbo A, Rood JI, Moore RJ. 2008. NetB, a new toxin that is associated with avian necrotic enteritis caused by *Clostridium perfringens*. *PLoS Pathog.* 4, e26.

5. Myers GSA, Parker D, Al-Hasani K, Kennan RM, Seemann T, Ren Q, Badger JH, Selengut JD, Deboy RT, Tettelin H, **Boyce JD**, McCarl VP, Han X, Nelson WC, Madupu R, Mohamoud Y, Holley T, Fedorova N, Khouri H, Bottomley SP, Whittington RJ, Adler B, Songer JG, Rood JI, Paulsen IT. 2007. Genome sequence and identification of candidate vaccine antigens from the animal pathogen Dichelobacter nodosus. *Nat Biotechnol.* 25, 569–575.