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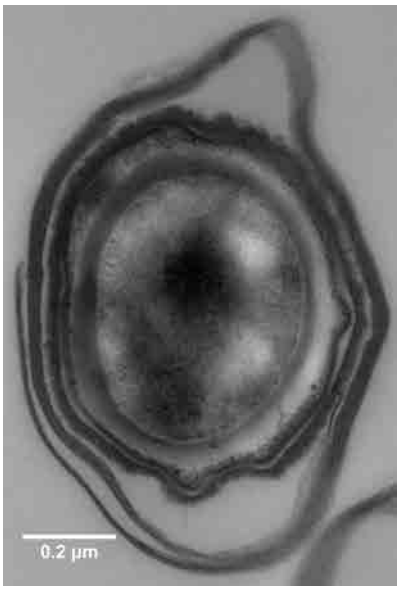
Our laboratory uses novel ways to genetically modify the bacterial pathogens *Clostridium difficile*, *Clostridium sordellii* and *Clostridium perfringens* of both human and animal origin. We are using this approach to understand how these micro-organisms harness regulatory and virulence factors to cause disease and how they interact with the infected host, using animal infection models. We are also developing immunotherapeutics to prevent and treat infections by the hospital superbug *Clostridium difficile*. Our studies also encompass the study of lateral DNA transfer between clostridial pathogens, particularly associated with antibiotic resistance or virulence gene transfer.

Research Projects

1. **Understanding the host immune response to Clostridium difficile infection**
2. **Genetic analysis of pathogens in antibiotic-associated diarrhoeal disease**
3. **Analysis of toxin secretion in the large clostridial toxin (LCT) producing clostridia**



Transmission electron microscopy on spore section of *Clostridium sordellii* strain ATCC9714.

Selected significant publications:

1. Larcombe S, Hutton ML, **Lyras D**. 2016. Involvement of Bacteria Other Than *Clostridium difficile* in Antibiotic-Associated Diarrhoea. *Trends Microbiol* 24(6):463-76.
2. Carter G, Chakravorty A, Pham Nguyen TA, Mileto S, Schreiber F, Li L, Howarth P, Clare S, Cunningham B, Sambol SP, Cheknis A, Figueroa I, Johnson S, Gerding D, Rood J, Dougan G, Lawley TD, and **Lyras D**. 2015. Defining the Roles of TcdA and TcdB in localized gastrointestinal disease, systemic organ damage, and the host response during Clostridium difficile infections. *MBio* 6(3):e00551.
3. Hutton ML, Mackin KE, Chakravorty A and **Lyras D**. 2014. Small animal models for the study of *Clostridium difficile* disease pathogenesis. *FEMS Microbiol Lett* 352(2):140-9.
4. Carter GP, Douce GR, Govind R, Howarth P, Mackin K, Spencer J, Buckley A, Antunes A, De Kotsanas, Jenkin G, Dupuy B, Rood J and **Lyras D**. 2011. The anti-sigma factor TcdC modulates hypervirulence in an epidemic BI/NAP1/027 clinical isolate of *Clostridium difficile*. *PLoS Pathogens* 7(10), e1002317.
5. **Lyras D**, O'Connor J, Sambol S, Howarth P, Carter G, Phumoonna T, Poon R, Adams V, Vedantam G, Johnson S, Gerding G and Rood J. 2009. Toxin B is essential for virulence of *Clostridium difficile*. *Nature* 458: 1176-9.