**University of Leicester**

**Department of Respiratory Sciences**

**PhD Project information**

**Funding Source:** There is no funding available for this project. Self-funded applications can be considered.

**Fees:** International Fees £33,500 (2022/2023 entry) or £34,850 (2023/2024 entry)

**Eligibility:** International students only

**Supervisors:** Natalie Garton (njg17@le.ac.uk); Dr Helen O’Hare (hmo8@le.ac.uk)

**Project Title: *Rhodococcus equi* lipid bodies: Targeting the pathogen’s fat reserves for infection control**

**Project Description**

The bacterium Rhodococcus equi is endemic in horse studs worldwide and causes potentially fatal pneumonia in foals. Foals that survive, may have reduced athletic ability as adults. Currently, there is no R. equi vaccine. Costs to the equine breeding industry are great, from stock losses, lengthy antimicrobial treatment and surveillance for early infection. R. equi is transmitted by airborne particles and potentially directly by foal respiratory aerosols. The bacterium persists in the soil, is shed in infected foal faeces and is present in the air within stables, making infection control a significant challenge. Furthermore, *R. equi* can infect immunocompromised humans.

R. equi shares many features of its infection biology with closely related Mycobacterium tuberculosis, the agent of tuberculosis. Intracellular triacylglycerol lipid bodies (TAG LBs) are a significant feature of M. tuberculosis during infection. M. tuberculosis accumulates TAG LBs as it enters a state of dormancy. The presence of TAG LBs is linked to antibiotic tolerance impacting treatment and potentially, a transmission adapted phenotype impacting infectivity. Saphrophytic Rhodococci accumulate significant amounts of TAG and assimilation of this has been shown to support survival of stresses associated with environmental persistence, e.g. desiccation.

Within this project *R. equi* LBs, conditions resulting in LB accumulation, assimilation and the related biosynthetic pathways will be characterised. Phenotypes of LB-rich *R. equi* preparations will then be assessed. As R. equi is both soil-dwelling saprophyte and intracellular pathogen, studying R. equi. LB biology to determine its roles in infection and environmental survival will identify new opportunities for infection control such as new vaccine and treatment strategies, or biocides for eliminating the environmental reservoir.

**References:**

Bequer-Urbano, S. *et al.* Lipid storage in high-altitude Andean Lakes extremophiles and its mobilization under stress conditions in Rhodococcus sp.A5, a UV-resistant actinobacterium. Extremophiles 2013. 17:p217–227

Garton, N.J. et al Intracellular lipophilic inclusions of mycobacteria in vitro and in sputum. Microbiology, 2002. 148(Pt 10): p. 2951-8.

Garton, N.J. et al Cytological and transcript analyses reveal fat and lazy persister-like bacilli in tuberculous sputum. PLoS Med, 2008. 5(4): p. e75.

**Entry requirements:**

Applicants are required to hold/or expect to obtain a UK Bachelor Degree 2:1 or better in a relevant subject or overseas equivalent.

The University of Leicester [English language](https://le.ac.uk/study/research-degrees/entry-reqs/eng-lang-reqs/ielts-65) requirements apply

**Application advice:**

To apply please use the application link at the bottom of the web page <https://le.ac.uk/study/research-degrees/research-subjects/respiratory-sciences>

With your application, please include:

* CV
* Personal statement explaining your interest in the project, any relevant research experience and why we should consider you
* Degree Certificates and Transcripts of study already completed or a transcript to the current date of study currently being undertaken
* Evidence of English language proficiency if applicable
* In the reference section please enter the contact details of your two academic referees in the boxes provided or upload letters of reference if already available.

In the funding section please specify that you are able to fund your study

In the proposal section please provide the name of the supervisors and project title (a research proposal is not required)

**Project / Funding Enquiries:** **RespSci-PGR@le.ac.uk**

**Application enquiries to** **pgradmissions@le.ac.uk**

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