**University of Leicester**

**MIBTP studentship project 2026**

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**Section 2 – *Project Information***

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| **Project Title** | Slowing the Clock: How Diet and Metabolism Reprogram Epigenetic Ageing |
| **Project Summary**  |
| Can diet and metabolism really slow down the pace of ageing? This project givesyou the chance to tackle this question by exploring epigenetic clocks, the mostaccurate biomarker of biological age, and uncovering how metabolic pathwaysinfluence the ageing process.Recent work shows that supplements such as calorie restriction mimetics, α-ketoglutarate, and NAD boosters can extend lifespan in mice and may even slowtheir epigenetic clocks. Yet the precise mechanisms remain unresolved: do thesecompounds work by reprogramming the epigenome, or through alternativemetabolic pathways? Answering this question requires powerful models wherelifespan and epigenetic change can be tracked rapidly and at scale.You will use the jewel wasp Nasonia vitripennis, a unique insect model thatcombines the short lifespan of invertebrates with mammalian-like DNAmethylation, making it ideal for studying epigenetic ageing. Using high-throughputbehavioural monitoring, lifespan and healthspan assays, and cutting-edgesequencing technologies (Oxford Nanopore for DNA methylation, CUT&Tagfor histone marks), you will test whether interventions such as α-ketoglutarate,AICAR, and histone demethylase inhibitors alter both lifespan and the rate ofepigenetic ageing. Advanced statistical and machine learning approaches will beused to refine and apply epigenetic clocks to these experiments.This is a project at the frontier of ageing biology, offering you the opportunity togenerate data with real translational relevance. You will gain expertise inmolecular biology, epigenomics, bioinformatics, and quantitative analysis, whilealso contributing to a broader effort to establish new models for drug discoveryin ageing research.If you are motivated by big questions, excited by state-of-the-art genomics, andwant to make discoveries that could shape the future of healthy ageing, thisproject will give you the tools and training to do it.Techniques that will be undertaken during the projectLifespan and healthspan assays in NasoniaHigh-throughput behavioural tracking (ethoscopes)DNA methylation profiling with Oxford Nanopore sequencingHistone modification profiling using CUT&TagRNAi and small-molecule inhibitor treatmentsBioinformatics and genomic data analysis (R, Python)Machine learning for epigenetic clock constructionAdvanced statistical modelling of ageing data |
| **References** |
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