**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 gives  you the chance to tackle this question by exploring epigenetic clocks, the most  accurate biomarker of biological age, and uncovering how metabolic pathways  influence 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 slow  their epigenetic clocks. Yet the precise mechanisms remain unresolved: do these  compounds work by reprogramming the epigenome, or through alternative  metabolic pathways? Answering this question requires powerful models where  lifespan and epigenetic change can be tracked rapidly and at scale.  You will use the jewel wasp Nasonia vitripennis, a unique insect model that  combines the short lifespan of invertebrates with mammalian-like DNA  methylation, making it ideal for studying epigenetic ageing. Using high-throughput  behavioural monitoring, lifespan and healthspan assays, and cutting-edge  sequencing technologies (Oxford Nanopore for DNA methylation, CUT&Tag  for histone marks), you will test whether interventions such as α-ketoglutarate,  AICAR, and histone demethylase inhibitors alter both lifespan and the rate of  epigenetic ageing. Advanced statistical and machine learning approaches will be  used to refine and apply epigenetic clocks to these experiments.  This is a project at the frontier of ageing biology, offering you the opportunity to  generate data with real translational relevance. You will gain expertise in  molecular biology, epigenomics, bioinformatics, and quantitative analysis, while  also contributing to a broader effort to establish new models for drug discovery  in ageing research.  If you are motivated by big questions, excited by state-of-the-art genomics, and  want to make discoveries that could shape the future of healthy ageing, this  project will give you the tools and training to do it.  Techniques that will be undertaken during the project  Lifespan and healthspan assays in Nasonia  High-throughput behavioural tracking (ethoscopes)  DNA methylation profiling with Oxford Nanopore sequencing  Histone modification profiling using CUT&Tag  RNAi and small-molecule inhibitor treatments  Bioinformatics and genomic data analysis (R, Python)  Machine learning for epigenetic clock construction  Advanced statistical modelling of ageing data | |
| **References** | |
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