

PhD Project Advertisement

Project title: Determining the function and diagnostic potential of EV proteins in liver fluke

Project No: FBS2024-090-Chalmers-aq

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Project description:

Infections caused by parasitic worms (helminths) are responsible for >55% of livestock diseases and are a major concern for farmers/producers worldwide. Whilst it is well known that helminths secrete proteins which ensure their long-term survival and reproduction, the function of many key parasitic proteins is not known.

Recent work from the supervisory team has identified a range of novel proteins present on/in Extracellular Vesicles of the liver fluke, *Fasciola hepatica*. The function of these proteins within helminths is unknown, however helminth EVs have become recognised as an important route for molecular communication and therefore the proteins present in helminth EVs are likely to have a significant impact on the outcome of infection.

Therefore, this project aims to determine the role of novel EV proteins in *F. hepatica* and investigate their potential in diagnostics and potential novel treatments.

Specifically, we aim to:

1. Recombinantly express specific novel *F. hepatica* EV proteins and use anti-sera and proteomics to study their location on the parasite and presence within extracellular vesicles.
2. Investigate the role of these EV proteins in *F. hepatica* by using functional genomic techniques such as RNA interference.
3. Determine whether EV proteins are immunogenic and immunostimulatory during fasciola infections and their potential for diagnostic usage using flow cytometry and ELISA-based methods.

We envisage that determining the role of these proteins in parasitic worms will have broad implications for animal health, immunity, diagnostics and protein biology.

This 4-year project provides an exciting opportunity to work with an internationally recognised scientific team from leading UK Institutions to gain expertise in parasitology research.

Training opportunities:

The student will gain experience and training in a wide range of molecular parasitological, immunological and microbiological methods including molecular biology, functional genomics and protein expression. This is expected to include advanced training in techniques such as: RNA interference, heterologous protein expression and purification techniques, purification and analysis of extracellular vesicles, immunological assays (such as flow cytometry) and advanced microscopy techniques. In addition, training will be provided in proteomic technologies and supporting bioinformatics analyses. The student will have the opportunity to perform research at both the Department of Life Sciences Aberystwyth University (where the project will be based) and Queens University Belfast and will be trained in presentation of data in preparation of national/international conference presentations.

Student profile:

We are looking to appoint a student who has obtained (or is predicted to obtain) at least a upper 2nd class degree in a course relevant to the proposal (biochemistry, zoology, molecular sciences, animal sciences, veterinary sciences, etc.) with evidence of significant laboratory experience. The student should have a passion for infectious diseases, with advanced technical/practical training (through unpaid internships, dissertation research projects or employed work) in parasitology being desirable.

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2023/24 this is £18,622 and it will increase slightly each year at rate set by UKRI.

Equality Diversity and Inclusion:

The FoodBioSystems DTP is committed to equality, diversity and inclusion (EDI), to building a doctoral researcher(DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the [FoodBioSystems DTP website](#).

In accordance with UKRI guidelines, our studentships are offered on a part time basis in addition to full time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

References:

Davey, S. D., Chalmers, I. W., Fernandez-Fuentes, N., Swain, M. T., Smith, D., Abbas Abidi, S. M., Saifullah, M. K., Raman, M., Ravikumar, G., McVeigh, P., Maule, A. G., Brophy, P. M., & Morpew, R. M. (2022). In silico characterisation of the complete Ly6 protein family in *Fasciola gigantica* supported through transcriptomics of the newly-excysted juveniles. *Molecular omics*, 18(1), 45–56. <https://doi.org/10.1039/d1mo00254f>

Davis, C. N., Phillips, H., Tomes, J. J., Swain, M. T., Wilkinson, T. J., Brophy, P. M., & Morpew, R. M. (2019). The importance of extracellular vesicle purification for downstream analysis: A comparison of differential centrifugation and size exclusion chromatography for helminth pathogens. *PLoS neglected tropical diseases*, 13(2), e0007191. <https://doi.org/10.1371/journal.pntd.0007191>

For up to date information on funding eligibility, studentship rates and part time registration, please visit the [FoodBioSystems website](#).