FoodBioSystems DTP - PhD Project Advertisement

Project title:

FBS2021-60-Vasudevan: Development of a novel platform for targeting animal parasites

Lead supervisor:

Dr. Nandini Vasudevan
School of Biological Sciences
University of Reading

Email:

n.vasudevan@reading.ac.uk

Co-supervisors:

Dr. Martha Betson, University of Surrey
Dr. Eva Kevei, University of Reading
Professor Liam McGuffin, University of Reading

Project description:

We are seeking a highly motivated individual to carry out PhD research on the development of new anthelminthics to increase the quality of animal welfare n the UK, combining molecular biological, parasitological and bioinformatics techniques.

Infections by intestinal parasites is a global problem that decreases animal health and food production. For example, in the UK, the cost of "wormer" or anthelminthic treatments and the loss of animal productivity for the sheep industry costs £84 million/year. In addition, resistance to most classes of anthelmintics is a growing problem. Therefore, sustainable control of these parasites would involve discovering new classes of anthelmintics. However, identification of drug targets and validation of these drug targets is difficult in parasites because they are difficult to culture due to their need for a host and their complex life cycles.

This project will develop an alternative worm model where we can identify novel classes of drug targets using a mix of data-mining and phenotypic screening of potential candidate proteins. The project will utilize two models: the simple nematode, Caenorhabditis elegans as a "stand-in" for parasitic worms to identify and "pre-screen" nuclear hormone receptor drug targets and a parasitic worm model to test these proteins in related cattle and sheep parasites for their ability to stop proliferation. We will attempt to validate a new class of putative drug candidates - namely the nuclear hormone receptors, which are a large class of proteins in *C.elegans* responsible for reproduction and metabolic regulation. In human, related nuclear hormone receptors are valuable drug targets for diseases such as cancer and metabolic disorders, suggesting that this conserved group of proteins may be good targets for modeling anti-proliferative drugs.   Apart from validation of selected nuclear hormone receptors, this project will also give us insight into the functions of these proteins in the worm, where these are largely unknown.

This project represents a uniquely diverse training opportunity as the successful applicant will experience and learn various complimentary research techniques including a blend of in-silico analyses and biological experimentation, will use multiple model systems and be exposed to different research environments by joining on this project led by four research groups (Drs Kevei, Vasudevan, Betson and McGuffin) at two locations (University of Reading and University of Surrey). Students will use genetic, molecular, cell biology, bioinformatics and behavioural techniques in their study. The student will be part of a vibrant endocrine, bioinformatics, veterinary network and food science group at the University of Reading and University of

Surrey, with an opportunity to get training in teaching pedagogy. Apart from benefiting from a highly collaborative scheme, the student will also have an opportunity to network with potential overseas collaborators.

The University of Reading (UoR) and the University of Surrey (UoS) are committed to inclusion and diversity; UoR is a top 100 Stonewall Employer and the School of Biological Sciences at UoR holds a Athena Swan Silver award while UoS holds a Athena Swan Bronze award. We welcome PhD candidates with alternative career paths; we have experience mentoring candidates who have disabilities and/or carer responsibilities. This project is offered as a full time or part-time project (minimum 50% of full time equivalent) in line with UKRI principles. Flexible working arrangements are possible; UoR has childcare facilities and information about relocation with families is given here: https://www.reading.ac.uk/graduateschool/how-we-support-you/gs-bringing-your-family.aspx (https://student.reading.ac.uk/essentials/campus-and-local-area/nursery-and-pre-school.aspx
 The University of Surrey also has tailored support for students from different backgrounds, life experiences and family situations here: (https://www.surrey.ac.uk/student-support/student-communities) along with specialist neurodiversity and disability support (https://www.surrey.ac.uk/student-support/study/disability-and-neurodiversity)

Students will be given the choice of peer mentors and will be able to access pastoral support at both institutions. Supervisors will help students apply for bursary funding for career and networking events at appropriate points in their PhD period. Supervisors will also provide grant training opportunities. Information about additional support available to students at the University of Reading is at:
https://www.reading.ac.uk/graduateschool/how-we-support-you/gs-additional-support.aspx

Training opportunities:
The student will undergo practical training in *C. elegans* laboratory techniques such as cultivation, experimental manipulation and genomic engineering in the Kevei laboratory and behavioural scoring and analyses in the Vasudevan laboratory. The student will receive training in parasite development assays in the Betson laboratory and will train in bioinformatics skills in the McGuffin laboratory. In addition, the student will collaborate with the Meade and Johnson laboratories for phylogenetic analyses at UoR . To develop the student's communication skills, they will take part in regular seminar series in the SBS in UoR and in UoS . The student will be enrolled in the mandatory Graduate School Reading Research Development Programme, which provides a tailored, structured and supported programme of development covering core scientific, some teaching and other professional skills. We will encourage, with suitable training, the student to develop their teaching and presenting skills through laboratory demonstration on the BSc courses.
All supervisors involved in this project are involved in public engagement since we believe that learning to engage beyond academia is an essential skill for graduate students. Depending on the student, we will encourage and mentor the student in public engagement activities designed to communicate their research and its importance to younger students in schools or to the public in events such as Soapbox Science or Pint of Science. The student will be introduced to the importance of the '3R' principles and to the need for removing/decreasing animal number from research in our laboratories and will publicize this as well in public engagement efforts.

Student profile:
This project would be suitable for students with a degree in biology, bioinformatics, animal sciences, parasitology or food science or a closely related science. Students with basic skills in molecular biology, cell biology techniques are eligible; experience in working with C. elegans or bioinformatics is an asset but not essential. This proposal is of interest to students who are interested in the evolution of proteins, protein folding, or how nuclear hormone receptors modulate reproduction or behaviours that subserve reproduction. Students who are interested in parasite biology or veterinary science may also find this project interesting as might students with interests in developing tools for pharmacological/toxicology/drug discovery platforms.

Students who would like to discover how external environments affect parasite spread may also be interested in the role of nuclear hormone receptors in this process.

Funding Note
This project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants.
The studentship is open to UK and international students (including EU countries) however due to funding rules, no more than 30% of the projects can be allocated to international students.
The funding will include a tax free stipend (minimum £15, 285 per year), support for tuition fees at the standard UK rate (currently £4,407 per year) and a contribution towards research costs. **Please note** that the host universities have not yet confirmed the level of fees charged to international students funded by the DTP. Fee levels may vary across the institutions. This information will be shared on the FoodBioSystems DTP website as soon as it becomes available.

To apply
Please go to FoodBioSystems DTP website for information on how to apply for this studentship. The closing date for applications will be 8 February 2021.

References:
Ogawa, S., Tsukahara, S., Choleris, E. and Vasudevan, N. (2018) Estrogenic regulation of social behavior and sexually dimorphic brain formation. Neuroscience and Biobehavioral Reviews. ISSN 0149-7634
doi: https://doi.org/10.1016/j.neubiorev.2018.10.012

Kevei É, Pokrzywa W, Hoppe T. (2017) Repair or destruction-an intimate liaison between ubiquitin ligases and molecular chaperones in proteostasis. FEBS Lett. 2017 Sep;591(17):2616-2635. doi: 10.1002/1873-3468.12750.

Jones Bryony A., Betson Martha, Pfeiffer Dirk U. (2016) Eco-social processes influencing infectious disease emergence and spread. Parasitology (Cambridge) 114 (1) pp. 26-36 Cambridge University Press. DOI: 10.1017/S0031182016001414

McGuffin, L. J., Adiyaman, R., Maghrabi, A. H. A., Shuid, A. N., Brackenridge, D. A., Nealon, J. O. and Philomina, L. S. (2019) IntFOLD: an integrated web resource for high performance protein structure and function prediction. Nucleic Acids Research. gkz322. ISSN 1362-4962 doi: https://doi.org/10.1093/nar/gkz322