

### **FoodBioSystems DTP - PhD Project Advertisement Text**

**Project Title:** FOODBIOSYSTEMS - The impact of food transmitted endocrine disruptors on animal and human health

**Lead Supervisor:** Dr Eva Kevei, School of Biological Sciences, University of Reading

**Email:** [e.g.kevei@reading.ac.uk](mailto:e.g.kevei@reading.ac.uk)

**Co-Supervisors:**

Dr Lisa Connolly, School of Biological Sciences, Queen's University Belfast

Dr Nandini Vasudevan, School of Biological Sciences, University of Reading

Dr Gareth Arnott, School of Biological Sciences, Queen's University Belfast

**Research Group:** FOODBIOSYSTEMS BBSRC DTP

**Application Deadline:** 6 March 2020

**Project Description:** We are seeking a highly motivated individual to carry out PhD research on the biomedical impact of microplastic pollution in the environment and in the Agrifood sector to determine its effect on human health.

Microplastics are becoming a global problem in providing safe and healthy food for everyone. Microplastics do not biodegrade, and can absorb bioactive chemicals, which enter and persist throughout the food chain. The level of microplastics contamination in the environment has grown exponentially in recent decades, and now it is recognized as a harmful agent, representing a potential yet unexplained risk to human health. Microplastics can carry various contaminants, such as endocrine-disrupting chemicals (EDCs), which interfere with growth, development and reproduction of animals, can alter behaviour and can even interfere with higher level brain functions, such as cognition. While there is evidence for toxic effects of microplastics on animals of aquatic ecosystems, the consequences of microplastic contamination for food safety and human health is unknown. This project will investigate how food-delivered microplastics and their carried bioactive compounds alters biology and health of terrestrial animals in order to determine the underlying molecular mechanisms. The project focuses on determining the impact of microplastics and Endocrine-disrupting chemicals (EDCs) on cognitive and social behaviours as well as longevity by modifying signalling through conserved nuclear hormone receptors (NR), such as estrogen and testosterone receptors. The project will utilize two models: an established mammalian cell culture system to identify cellular targets of the endocrine disruptors and the simple Nematode, *Caenorhabditis elegans* model to obtain insight into whole-animal defects upon exposure, such as behaviour, cognition and aging. Results of this project will be used to gain insight on the impact of microplastics and their contaminants on human health and disease. This study will provide crucial evidence on the level and types of health risks that exposure to microplastic particles could pose and will provide insight into the molecular mechanisms involved.

This project represents a uniquely diverse training opportunity as the successful applicant will experience and learn various complimentary research techniques, will use multiple model systems and be exposed to different research environments by joining on this project led by four research groups (Drs Kevei, Connolly, Vasudevan and Arnott) at two locations (University of Reading and Queen's University Belfast).

Students will use genetic, molecular, cell biology and behavioural techniques in their study. The student will be part of a vibrant endocrine and food science group at the University of Reading and Queens University Belfast, 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 Queens University Belfast (QUB) and in particular the School of Biological Sciences (SBS) at both universities are committed to inclusion and diversity; UoR is a top 100 Stonewall Employer while SBS at QUB has an Athena Swan Gold 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>

QUB also has childcare facilities and support for students:

<https://www.qub.ac.uk/directorates/StudentPlus/ChildcareatQueens/>  
<https://www.qub.ac.uk/directorates/sgc/wellbeing/InformationforStudents/SupportAvailable/#>

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>

**Funding Notes:** 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. Due to restrictions on the funding, this studentship is only open to UK students and EU students who have lived in the UK for the past three years.

The FoodBioSystems DTP is a collaboration between the University of Reading, Cranfield University, Queen's University Belfast, Aberystwyth University, Surrey University and Brunel University London. Our vision is to develop the next generation of highly skilled UK Agri-Food bioscientists with expertise spanning the entire food value chain. We have over 60 Associate and Affiliate partners. To find out more about us and the training programme we offer all our postgraduate researchers please visit

<https://research.reading.ac.uk/foodbiosystems/>.

**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 cell toxicity assays in the Connolly lab and will be introduced to other invertebrate models in the Arnott laboratory. To develop the student's communication skills, they will take part in regular journal clubs and seminar series in the School of Biological Science. The student will be enrolled in the Graduate School mandatory 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. The student will be introduced to the importance of the '3R' principles and to the need for removing/decreasing animal numbers 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, nutrition, food science or a closely related science. Students with basic skills in molecular biology, and cell biology techniques are eligible. Experience working with *C. elegans* or mammalian cell cultures is an asset but not essential. This proposal is of interest to students who would pursue research into cellular signaling to understand the physiological significance of environmental toxins or who are interested in nuclear receptor biology and the way they modulate social behaviours and aging processes. Students who are interested in implications of food packaging on human health or feed contaminations on animal welfare could also find this project interesting as my students with a behavioural/psychology background who are interested in external stimuli that impact behaviours. Students with interests in developing tools for pharmacological/toxicology platforms may also find this interesting.

#### References:

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- McComb, J., Mills, I., Berntsen, H. F., Ropstad, E., Verhaegen, S., & Connolly, L. (2019). Human-Based Exposure Levels of Perfluoroalkyl Acids May Induce Harmful Effects to Health by Disrupting Major Components of Androgen Receptor Signalling In Vitro. Exposure and Health. <https://doi.org/10.1007/s12403-019-00318-8>.
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