

PhD Opportunity on “Tracking the fate of plastic biodegradation under environmentally relevant conditions”

Reference number EPS2021/26

Application deadline: Sunday 14th February 2021

This project aims to identify the biological and geochemical/physical processes involved in controlling the fate of plastics (of different polymer types) under different environmental settings. It will utilise sophisticated techniques in microbial ecology, such as DNA-based stable-isotope probing (DNA-SIP), to trace the fate of isotopically-labelled plastics through biological systems; a focus will be on the microorganisms participating in this process as they are commonly protagonists in the fate of pollutants, like plastics, in the environment. A major benefit in applying SIP-based methods is in the ability to link phylogenetic identity with a specific metabolic function, in which respect this is the biodegradation of plastics.

Around the world, and especially in South East (SE) Asian region, we are facing one of the most important marine plastic pollution crises on our planet, threatening the biodiversity of marine ecosystems, coastal tourism, fisheries and aquaculture. Plastics debris are persistent in the marine environment and are dominated by the smaller abundant plastic particles (<5 mm) defined as microplastics (MPs) that are of increasing concern. The toxicity of marine MPs vary with their abundance, size, shape, chemical properties, and composition of the microbial biofilm. The surface of MP particles, referred to as the plastisphere, serves as a support for the colonisation of microorganisms where they may be protected area with limited predation. Microbial biofilms inhabiting the plastisphere are specific to this habitat. The microbial community colonising MPs, presents a wide range of metabolic functions, is composed of different trophic levels (e.g. phototrophs, (photo)heterotrophs, symbionts), and can include both plastic degraders and/or harmful pathogens. Determining the microbial composition of the plastisphere and the environmental conditions favouring the degradation of the plastic polymer is of critical and immediate importance. This project will uncover the microbial processes involved using sophisticated microbiological and biomolecular techniques, with a focus on marine and soil systems.

The student will conduct their PhD with Dr. Tony Gutierrez, Associate Professor of Environmental Microbiology & Biotechnology at Heriot-Watt, who leads a research group in microbial ecology and biotechnology focusing on the response and evolution of microbial systems to anthropogenic perturbations, and the development of biotechnologies using microbes and their products to combat pollution and for commercial applications.

Supervisor and contact: Dr. Tony Gutierrez. E: tony.gutierrez@hw.ac.uk

Subject areas: Microbiology, Molecular Biology, Environmental Science

Requirements

All applicants must have or expect to have a 1st class MSc degree in a relevant field by Autumn 2021. Selection will be based on academic excellence and research potential, and all short-listed applicants will be interviewed (in person or via Microsoft Teams). The scholarship is only open to UK/EU applicants and for students who meet residency requirements set out by EPSRC:

<https://epsrc.ukri.org/skills/students/guidance-on-epsrc-studentships/eligibility/>

For some projects, applications may be accepted for exceptional overseas applicants.

Level of Award

There are a number of scholarships available. Generally these offer an annual stipend payment of approx. £15,000 per year and cover fees for between 3 and 3.5 years. This project will be funded by a scholarship to the student in the School of Engineering & Physical Sciences at Heriot-Watt University.

How to Apply

1. Important Information before you Apply

When applying through the Heriot-Watt on-line system please ensure you provide the following information:

(a) in 'Study Option'

You will need to select 'Edinburgh' and 'Postgraduate Research'. 'Programme' presents you with a drop-down menu. Choose Bio-science & Bio-Engineering PhD and select September 2020 or 2021 for study option (this can be updated at a later date if required)

(b) in 'Research Project Information'

You will be provided with a free text box for details of your research project. Enter Title and Reference number of the project for which you are applying and also enter the supervisor's name (Tony Gutierrez).

This information will greatly assist us in tracking your application.

Please note that once you have submitted your application, it will not be considered until you have uploaded your CV and transcripts.

2. Applications

Applications must be made through the Heriot-Watt on-line application system, <https://www.hw.ac.uk/study/apply/uk/postgraduate.htm>

3. Closing Date

All applications must be received by Sunday 14th February 2021. All successful candidates will usually be expected to commence their studies in September/October 2021.