

PhD Project Advertisement

Project title: *Antimicrobial Resistant Genes (ARG) & Pollutants – from Seabed to Seafood Platter*

Project No: FBS25-21-Troisi-bs

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Co-supervisors:

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Project description: Municipal discharges and antibiotic use in aquaculture can lead to the enrichment of antimicrobial resistance genes (ARG) in aquatic ecosystems leading to contaminated fish entering the human food chain. However, Industrial discharges contain pollutants known to exert even greater selective pressure than antibiotics in driving the evolution of antimicrobial resistance (AMR). Decades of municipal and industrial discharging have rendered coastal sediments for decades as “pollution sinks” for antibiotics, heavy metals and organic pollutants. Persistent bioavailable pollutants in sediments bio-magnify in the marine food chain with highest concentrations reaching apex predators. Our preliminary studies have revealed a higher proportion of clinically-important ARGs in wild seals from the more industrialised polluted Tees Estuary compared with seals from control areas and this may explain increased AMR septicaemia mortality in seals from more polluted areas. Similarly, in humans, ARG *E coli* infections were prevalent in surfers using more contaminated than cleaner beaches around the UK. Exposure to toxic pollutants from fish consumption, can lead to toxic effects, including immunosuppression in Humans, also immunosuppression occurred in seals induced by feeding them contaminated baltic herring dose-dependent with fish PCB concentration. Little is known regards ARG transfer from the environment into and through the human food chain, and even less about concomitant immuno-toxic pollutant exposure which can exacerbate pathogenicity of bacterial infections in Humans and wildlife. The role of pollutants in ARG spread and its impacts on humans and wildlife clearly requires urgent attention. Seals are ideal sentinels for humans since they are long-lived apex predators with similar mammalian physiology and exposed to pollutants concomitantly with ARGs via the food chain. However, due to their exclusively fish diet, exposures are significantly greater than humans, representing a worse-case exposure scenario to both health concerns and potential impacts.

What you will do

You will investigate how ARGs in marine sediments enter the marine food chain, contaminate fish and seals feeding on them, and, how ARG proliferation spreads in more polluted marine food chains. You will do this by quantifying ARGs and pollutants in sediments, fish and seal faeces sampled from polluted Estuaries versus cleaner control sites. Field sampling will be undertaken to collect samples which will be analysed using PCR techniques and analytical chemistry methods to quantify antibiotic and chemical pollutants.

Training opportunities: Training will be provided on field sampling and laboratory techniques. Dedicated doctoral researcher and professional skills training is provided.

Project supervision style: You will have bi-weekly team & weekly supervision meetings (hybrid) with running action table (ACTION/DATE/Ownership) and recorded with transcript. Students at Brunel University have a Research Development Advisor to ensure their training and development of employability skills are up to date & who will mediate if there are issues between student and supervisors.

You will be encouraged to publish from the second year and will receive training in article preparation, lab and field skills. We will give feedback on reports within 1-2weeks, or less if urgently needed. You will be a key team player and your engagement in the development of the research will be invited and encouraged.

Student profile: Knowledge of environmental chemistry and/or microbial ecology with genomics are required. Knowledge of real-time PCR, ELISA methods, HPLC and GC-MS are a bonus

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2024/25 this is £19,237 (£21,237 at Brunel University) and it will increase slightly each year at rate set by UKRI.

Equity Diversity and Inclusion:

The FoodBioSystems DTP is committed to equity, 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](#) and include:

- Offering reasonable adjustments at interview for shortlisted candidates who have disclosed a disability or specific learning difference.
- [Guaranteed interview](#) and [applicant mentoring](#) schemes for applicants, with UK home fees status, from eligible under-represented ethnic groups.

These are opt-in processes.

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.

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