

Bath Monash Global PhD Programme in Sustainable & Circular Technologies

Project Title:	Chirality and potency assessment of drugs and emerging commercial <i>Cannabis sativa</i> , <i>Cannabis indica</i> , and <i>Cannabis ruderalis</i> species
Supervisors at Bath:	Prof Barbara Kasprzyk-Hordern
Supervisors at Monash:	Prof Philip Marriott (lead)
Home Institution:	Monash
Indicative period at Host Institution:	12 months

Project Summary

Background: Although enantiomers essentially have the same chemical and physical properties, in living systems they elicit quite different properties. For flavours, one enantiomer may have a strong odour response; the other may be inactive due to their interaction with sensory receptors. For drugs, one enantiomer may be toxic or psychoactive; the other non-active. The (*R*)-enantiomer of ecstasy has a slower elimination half-life than the (*S*)-enantiomer. Assessment of chirality is required if the activity of enantiomers is to be quantified. Quantification of enantiomers invariably rely upon use of chiral separation media in chromatographic methods. Assessment of chirality can also be a potent method to track the source of illicit drugs, and used for identification of supply chain. Police forensic methods rarely extend to identification of chiral signature of actives. The natural abundance of actives (either high or low) in commercial crops of *Cannabis* species is commercially important, and be a useful tracking procedure for origin of the product. This project is relevant to law enforcement, the sustainability of the emerging *Cannabis* industry to profile natural product / health assessment for quality measures of actives in their production.

Project: This project will apply leading-edge separation technologies with mass spectrometry (MS) to develop new capabilities for general enantioseparations of illicit drugs such as amphetamines, street drugs (e.g. cathinones), and emerging commercial cannabis crops. Chiral GC methods will focus on novel strategies in multidimensional GC with low (Q/Q) and high-resolution MS for profiling of drugs from natural and synthetic sources. Chiral HPLC will utilise also low (Q/Q) and high-resolution Q-ToFMS technology. Pharmaceuticals will be of interest, especially to evaluate the environmental effects that may differentially attenuate enantiomers.

Facilities and Capabilities: University of Bath (BK-H) has access to HPLC and MS facilities (low resolution MS (triple QMS) for targeted and high resolution QTOFMS for non-target analysis) and capabilities in enantiomeric analysis, for e.g. assessing chiral drugs, including illicit substances. Monash University (PM) has advanced MDGC and MS facilities, used for ecstasy synthetic procedure profiling, forensic drug analysis, and to assess natural chiral signatures in essential oils, perfumes and synthetic products.

Features of the programme

- PhD researchers will be registered at both institutions and will be awarded a joint PhD degree.
- PhD researchers will be jointly supervised by academics from both Monash and Bath Universities.
- All PhD researchers in the joint programme will also undertake a bespoke advanced training plan covering a range of topics focusing on sustainability.
- Applicants can apply to either Monash University or the University of Bath as their nominated home institution.
- PhD researchers will undertake a period of no less than 12 months at the partner institution.
- Up to four scholarships/studentships will be offered. Additional and suitably qualified applicants who can access a scholarship/studentship from other sources will be also considered. Evidence of funding must be provided.
- The scholarships/studentships include:
 - a *full tuition fee sponsorship* provided by Monash or Bath for the course duration (up to a maximum 42 months). Note, however, that studentships for Bath-based projects will provide cover for UK/EU tuition fees ONLY.
 - a *living allowance (stipend)* provided by Monash or Bath Universities.

Note: Overseas Student Health Cover (OSHC) must be paid by the student, unless covered by the university.

How to apply

You MUST express interest for three projects in order of preference. Please submit your application at the Home institution of your preferred project ('Home' institution details can be found in the project summary). However, please note that you are applying for a joint PhD programme and applications will be processed as such.

The deadline to submit applications is 11th April 2021

Monash University

Expressions of interest (Eoi) can be lodged through <https://www.monash.edu/science/bath-monash-program>. The Eoi should provide the following information:

CV including details of citizenship, your Official Academic Transcripts, key to grades/grading scale of your transcripts, evidence of English language proficiency (IELTS or TOEFL, for full requirements see: <https://www.monash.edu/graduate-research/faqs-and-resources/content/chapter-two/2-2>), and two referees and contact details (optional). You must provide a link to these documents in Section 8 using Google Drive (Instructions in Section 8).

University of Bath

Please submit your application through the following link: <https://www.csct.ac.uk/bath-monash-global-phd-programme/>

Please make sure to mention in the "finance" section of your application that you are applying for funding through the joint Bath/Monash PhD programme for your specified projects.

In the "research interests" section of your application, please name the three projects you are interested in and rank them in order of preference. Please also include the names of the Bath lead supervisors.