New catalytic strategies for late-stage diversification of crop protection compounds

The trifluoromethyl group (-CF_3) is privileged in both drugs and agrochemicals, being found in more than 30% of crop-protection compounds. However, evolving legislation on PFAS and related 'forever chemicals' has created an urgent need for effective alternatives to CF_3 that can be installed easily on complex substrates.

In collaboration with Syngenta and Dr Michael Tilby (University of Bristol), this project will develop a library of novel 'plug and play' reagents than be used to introduce CF_3 isosteres onto highly functionalised molecules. This ambitious goal requires us to develop methods to (a) design and synthesise the isostere library, and (b) install them on the target molecules. The novel molecules that we prepare will be tested biologically and assessed computationally to inform further rounds of library development.

Training: The successful applicant will receive high level training in organic synthesis, transition metal catalysis, and compound purification / characterisation (e.g., NMR spectroscopy). You will gain experience of high throughput experimentation and – for interested candidates – AI, machine learning, and computational methods. You will also have the opportunity to further your knowledge of theory / mechanism, and to gain strong transferable skills (e.g., presentations and report writing).

Candidate Requirements

Applicants must have obtained, or be about to obtain, a First or Upper Second Class UK first degree, or the equivalent qualifications gained outside the UK, in chemistry or in a related discipline (biochemistry, biogeochemistry, environmental sciences).

How to Apply

Please make an online application for this project at the following page How to apply | Study at Bristol | University of Bristol, and please also email Liam Ball directly with a copy of your CV, cover letter, and the details of two referees.

Funding

A full studentship will cover UK tuition fees, a training support fee and a stipend (£20,780 p.a. in 2025/26, updated each year) for 3.5 years.

The project is fully-funded for 3.5 years starting from Autumn 2026, and offers a 3-month placement at Syngenta. Due to funding restrictions the project is only available to UK candidates.

Getting in Contact

For informal enquiries, please email your CV and cover letter to Professor Liam Ball. Further information about the Ball group's research can be found here: https://www.theballgroup.co.uk/