The Application of Advanced Analytical Techniques to Ensuring Flavour Sustainability and Optimisation in Scotch Whisky Distillery Fermentations

Supervisors: Prof Dušan Uhrín, Dr Nicholle Bell and Dr Ian Goodall. Contact: dusan.uhrin@ed.ac.uk
http://uhringroup.wixsite.com/nmrgroup

Funding: This 4-year PhD project is part of a competition funded by EASTBIO BBSRC Doctoral Training Partnership. This opportunity is open to UK and International students and provides funding to cover stipend and UK level tuition. Please refer to UKRI website and Annex B of the UKRI Training Grant Terms and Conditions for full eligibility criteria.

Closing date for applications: 16th December 2021

Project Details

Scotch Whisky is integral to the UK economy, with annual exports worth approximately £5 bn. Its production is well understood and tightly regulated. Nevertheless, the chemical identity of many of the aromas that contribute to Scotch Whisky flavour, and their full relationship to the particulars of the production process, are unknown. Understanding how certain flavour compounds can be regulated within the fermentation process is of commercial importance in ensuring flavour sustainability, particularly when the industry is investigating process changes to align with its environmental sustainability aspirations.

This project builds on techniques developed during two previous collaborative PhD studentships with the Edinburgh-based Scotch Whisky Research Institute (SWRI). SWRI are recognised experts in the analysis of Scotch Whisky and are funded by the distilling industry to carry out strategic research on all aspects of Scotch Whisky production. The cutting-edge analytical instrumentation (600-800 MHz liquid-state NMR, 12T Fourier Transform Ion Cyclotron Resonance Mass spectrometry and an ion mobility capable Q-ToF with nanoESI, ESI and LC interfaces), based in the School of Chemistry, was previously applied to study Scotch Whisky maturation and authentication[1]. Both techniques also showed a much greater complexity to new make spirit than previously realised by low resolution studies.

These techniques will now be used to explore the impact of distillery fermentation on distillate composition and flavour by controlling the fermentation conditions such as yeast type, bacterial composition, fermentation time, water utilisation, temperature control or wort cloudiness.

[1] Kew, W. et al, *J. Am. Soc. Mass. Spectrom*. 28, 200-213 (**2017**); Kew, W. et al, *Food Chemistry* 298, 125052 (**2019**); Stockwell, M. et al, *Anal Sci Adv*. 1, 132–140 (**2020**)

The project will provide a high-quality training opportunity (http://www.chem.ed.ac.uk/studying/phd/graduate-school-overview) for a successful candidate at a world class University as well as offer excellent employment prospects. A six-month industrial placement at SWRI will provide experience in fermentation and flavour analysis using their dedicated facilities.

Eligibility

Applicants must have an undergraduate degree in chemistry or biochemistry (> 2.1 or equivalent) and fulfil the eligibility criteria: https://www.ukri.org/wp-content/uploads/2020/10/UKRI-291020-guidance-to-training-grant-terms-and-conditions.pdf Knowledge of programming languages such as Python is desirable.

Application Process

To apply for an EASTBIO PhD studentship, follow the instructions below:

1) Informal enquiries should be addressed to Professor Dušan Uhrín. To apply, please send a cover letter outlining your previous research experience and reasons for applying, alongside an up-to-date CV to dusan.uhrin@ed.ac.uk

2) After you have discussed the project with Professor Dušan Uhrín, download and complete our Equality, Diversity and Inclusion survey and then fill in the EASTBIO Application Form and submit as per the instructions in the project advert.

3) Send the EASTBIO Reference Form to your two academic/professional referees, and ask them to submit as specified on the project adverts.

4) If you are nominated by the supervisor(s) of the EASTBIO PhD project you wish to apply for, they will provide a Supervisor Support Statement.

We anticipate that our first set of interviews will be held **7th – 11th February 2022** with awards made in the following week.

Please ask your referees to submit your references directly to Professor Dušan Uhrín dusan.uhrin@ed.ac.uk

If you have further queries about the application/recruitment process please contact EASTBIO

The School of Chemistry holds a Silver Athena SWAN award in recognition of our commitment to advance gender equality in higher education. The University is a member of the Race Equality Charter and is a Stonewall Scotland Diversity Champion, actively promoting LGBT equality. The University has a range of initiatives to support a family friendly working environment. See our University Initiatives website for further information. University Initiatives website: https://www.ed.ac.uk/equality-diversity/help-advice/family-friendly