

Dr Stephen Wallace MChem DPhil CChem MRSC

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Highly motivated chemistry and biotechnology researcher with excellent communication and leadership skills

Research Experience

2020-present

UKRI Future Leaders Fellow and Senior Lecturer in Biotechnology, University of Edinburgh

2017-2020

Lecturer in Biotechnology, University of Edinburgh

Principle investigator conducting independent research at the interface of synthetic biology and synthetic chemistry. Interfacing transition metal catalysts with engineered microbial metabolism. Developing designer whole-cell biocatalysts. Metabolic engineering in bacteria and yeast. Direct supervision and line-management of PDRA researchers (x3), PhD (x6), MRes (x1) and BSc/MSc project students.

2019 (6-months)

Visiting Associate (faculty level), California Institute of Technology

Visiting faculty hosted by Prof. Frances Arnold (Nobel – 2018) investigating the directed evolution of cytochrome P450 enzymes to perform new-to-nature reactions.

2014-2017

Marie Curie Postdoctoral Research Fellow, Harvard University (outgoing phase) and University of Cambridge (return phase)

Developing biocompatible chemical reactions. Interfacing an Fe-catalyzed cyclopropanation reaction with engineered styrene biosynthesis in *E. coli*. Developing membrane-associated micellar nano-reactors for synthetic biotechnology. Genome engineering in *E. coli* for alkaloid production. *Advisors: Prof. Emily Balskus, Prof. Kristala Prather (MIT) and Prof. Steve Ley CBE FRS FMedSci (Cambridge)*

2012-2014

MRC Postdoctoral Research Fellow, MRC Laboratory of Molecular Biology, UK

Design of new bioorthogonal reactions. Genetic encoding of unnatural amino acids in *E. coli* via AMBER codon suppression. Photo-crosslinking of recombinant proteins *in vivo*. Computational design and synthesis of super-reactive dienophiles for strain-promoted click chemistry. *Advisor: Prof. Jason Chin FMedSci*

Qualifications

2008-2012

DPhil. Organic Chemistry, University College, University of Oxford

PhD in natural product total synthesis. Thesis title: *A Cascade Approach Towards the Gephyrotoxins*. *Advisor: Prof. Martin Smith*

2004-2008

MChem. Medicinal and Biological Chemistry with Industrial Experience, University of Edinburgh (first class, first in year)

Undergraduate integrated masters degree including a 1-year placement in medicinal chemistry at GlaxoSmithKline (Stevenage, UK).

Research Funding

- ◆ Feasibility Grant, Industrial Biotechnology Innovation Centre (IBioIC), **2021** (with Impact Solutions).
- ◆ PDRA grant, UK Catalysis Hub, **2021** (with Dr A. Jarvis, Johnson Matthey, Evonik, Ingenta).
- ◆ HVC Business Interaction Voucher, BBSRC, **2021** (with NCIMB).
- ◆ Principles Innovation Award, University of Edinburgh, **2021**.
- ◆ Feasibility Grant, Industrial Biotechnology Innovation Centre (IBioIC), **2020** (with Argent Energy).
- ◆ PhD Studentship, Industrial Biotechnology Innovation Centre (IBioIC), **2020** (with MiAlgae).
- ◆ Future Leaders Fellowship, UKRI, **2020**.
- ◆ CASE PhD Studentship, EaSi-Cat, **2020** (with Dr S. Thomas, Lubrizol).

- ◆ iCASE PhD Studentship, AstraZeneca, **2019**.
 - ◆ PhD Studentship, IBioIC-BBSRC, **2019** (with Prof. C. French, Leucite, Ingenza).
 - ◆ Technology SEED Grant, SULSA, **2019**.
 - ◆ Discovery Fellowship, BBSRC, **2019** (host to Dr J. Sadler).
 - ◆ International Exchange Award, Royal Society, **2019** (with Prof. F. Arnold, Caltech).
 - ◆ Researcher Mobility Grant, Royal Society of Chemistry, **2019**.
 - ◆ Vacation Scholarship, Carnegie Trust, **2019**.
 - ◆ PhD Studentship, Carnegie Trust, **2018**.
 - ◆ PhD Studentship, CRITICAT CDT, **2018**.
 - ◆ SULSA Early Career Researcher Exchange Fellowship, **2019**.
 - ◆ Research Incentive Grant, Carnegie Trust, **2017** (with Dr H. Burdett, Lyell Centre).
 - ◆ Eric Reid Fund for Methodology, Biochemical Society UK, **2017**.
 - ◆ Wellcome Trust ISSF Grant, **2017**.
 - ◆ Marie Curie International Fellowship for Career Development, **2014**.
 - ◆ MRC Career Development Fellowship, **2012**.
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Prizes and Awards

- ◆ AstraZeneca Symposium Prize, Department of Chemistry, University of Oxford, **2011**.
 - ◆ SCI Regional Postgraduate Symposium Prize, Department of Chemistry, University of Bath, **2011**.
 - ◆ Pfizer Poster Competition Prize, Royal Society of Chemistry, **2010**.
 - ◆ Younger Members' Poster Prize, Royal Society of Chemistry, **2010**.
 - ◆ National Postgraduate Prize in Organic Chemistry, Eli Lilly Research Centre, UK, **2010**.
 - ◆ Eli Lilly Prize in Organic Chemistry, Department of Chemistry, University of Oxford, **2009**.
 - ◆ Lang Scholarship, School of Chemistry, University of Edinburgh, **2008**.
 - ◆ Bronze Award in Medicinal Chemistry, GlaxoSmithKline, **2007**.
 - ◆ Bronze Award in Synthetic Chemistry, GlaxoSmithKline, **2007**.
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Selected Invited Presentations (since 2015)

- ◆ 6th Annual Science and Policy Workshop, International Institute for Environmental Studies, **2021**.
 - ◆ Strathclyde Institute of Pharmacy and Biomedical Science, University of Strathclyde, **2020**.
 - ◆ EXPLORE - Science for Sustainability, Edinburgh Innovations, **2020**.
 - ◆ KTN, "Biomass to Chemicals" Symposium, **2020**.
 - ◆ High-Value Biorenewables Symposium, **2020**.
 - ◆ ScotCHEM Early Career Symposium, **2020**.
 - ◆ School of Biological Sciences, University of Edinburgh, **2020**.
 - ◆ Department of Chemistry, King's College London, **2020**.
 - ◆ Department of Chemistry, University of Southampton, **2019**.
 - ◆ Department of Chemical Engineering, California Institute of Technology, **2019**.
 - ◆ RSC Chemical Biology and Bioorganic Chemistry Conference, Firthush (Scotland), **2019**.
 - ◆ Café Synthétique, Edinburgh, **2018**.
 - ◆ Institute for Academic Development, University of Edinburgh, **2017**.
 - ◆ Synthetic Biology Society, University of Edinburgh, **2017**.
 - ◆ Centre for Synthetic and Systems Biology Symposium, University of Edinburgh, **2017**.
 - ◆ Department of Pure & Applied Chemistry, University of Strathclyde, **2016**.
 - ◆ Department of Chemistry, University of Oxford, **2016**.
 - ◆ Boston Symposium on Organic and Biological Chemistry, Merck Research Laboratories, Boston, MA, USA, **2016**.
 - ◆ BIOTRANS, Vienna University of Technology, Vienna, Austria, **2015**.
 - ◆ Synthetic Biology: Engineering, Evolution and Design (SEED), Boston, MA, USA, **2015**.
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Teaching (2021)

- ◆ Course Contributor: Biotechnology 3 (BSc), Synthetic Biology and Biotechnology (MSc), Biotechnology (MSc), Biochemistry (MSc) and Research Project Proposal (MSc).
 - ◆ Personal Tutor: Biotechnology (MSc). 12 students.
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Additional Experience, Awards and Professional Affiliations

- ◆ Chartered Chemist. Royal Society of Chemistry. **2019**-present.
 - ◆ Member. Royal Society of Chemistry. **2012**-present.
 - ◆ Early Career Member. Biochemical Society UK. **2018**-present.
 - ◆ Member. American Chemical Society. **2019**-present.
 - ◆ Elected Member. Chemistry Biology Interface Division Council. Royal Society of Chemistry. **2020**-present.
 - ◆ Committee Member. Chemical Biology and Bioorganic Interest Group. Royal Society of Chemistry. **2018**-present.
 - ◆ Peer Review College Member. UK Research and Innovation. **2020**-present.
 - ◆ Expert Reviewer supporting the Scientific Advisory Panel. Industrial Biotechnology Innovation Centre (IBIIC). **2019**-present.
 - ◆ Committee Member. Scottish Natural Products Group. Scottish Universities Life Sciences Alliance (SULSA). **2020**-present.
 - ◆ Internationalisation Committee. School of Biological Sciences. University of Edinburgh. **2019**-present.
 - ◆ Advisory Panel Member. High-Value Biorenewables NIBB. **2020**.
 - ◆ Visiting Associate. Rosen Bioengineering Centre, Caltech. **2019**.
 - ◆ Scottish Crucible Leadership Program. Royal Society of Edinburgh. **2017**.
 - ◆ Visiting Research Associate. Darwin College, University of Cambridge. **2016-2017**.
 - ◆ Visiting Research Associate. Department of Chemical Engineering, MIT. **2016**.
 - ◆ Organiser and Demonstrator. EXPLORATIONS Science Day. Harvard University. **2014-16**.
 - ◆ Writer (articles and podcasts). ChemistryWorld – *Chemistry in its Element Series*. Royal Society of Chemistry. **2011-12**.
 - ◆ Science Outreach Team Member. Department of Chemistry, University of Oxford. **2009-11**.
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Publications (*corresponding author)

18. Optimizing the biosynthesis of oxygenated and acylated taxol precursors in *Saccharomyces cerevisiae* using advanced bioprocessing strategies. L. E. Walls, K. Malci, B. Nowrouzi, R. A. Li, L. d-Espaux, J. Wong, J.A. Dennis, A.J.C. Semiao, **S. Wallace**, J.L. Martinez, J.D. Keasling, L. Rios-Solis, *Biotechnol. Bioeng.* **2020**, *118*, 279-293.
17. One-pot synthesis of adipic acid from guaiacol in *Escherichia coli*. J.T. Sutor, S. Varzandeh, **S. Wallace*** *ACS Synth. Biol.* **2020**, *9*, 2472-2476 (press release: UoE and STV, Dec 2020).
16. Transition metal-free reduction of activated alkenes using a living microorganism. R.C. Brewster, J.T. Sutor, A.W. Bennett, **S. Wallace*** *Angew. Chem. Int. Ed.* **2019**, *58*, 12409-12414.
15. Synthetic methodologies in chemical biology. *In book: Biomolecular and Bioanalytical Techniques: Theory, Methodology and Applications*. R.C. Brewster, **S. Wallace***, John Wiley & Sons, Inc. Editor: V. Ramesh, **2019**, ISBN: 9781119483977.
14. U.S. Patent WO/2017/106253, filed 06/**2017** (US), 07/**2018** (Europe), 08/**2018** (China) (*co-inventor*)
13. Computationally guided discovery of a reactive, hydrophilic *trans*-5-oxocene dienophile for bioorthogonal labelling. W.D. Lambert, S.L. Scinto, O. Dmittrenko, S.J. Boyd, R.A. Mehl, J.W. Chin, J.M. Fox, **S. Wallace***, *Org. Biomol. Chem.* **2017**, *15*, 6640-6644.
12. Interfacing biocompatible reactions with engineered *Escherichia coli*. **S. Wallace**, E.P. Balskus. *Methods Mol. Biol.* **2017**, *1586*, 409.
11. Protein modification via alkyne hydrosilylation using a substoichiometric amount of ruthenium(II) catalyst. T.T.-L Kwan, O. Boutureira, E.C. Frye, S.J. Walsh, M.K. Gupta, **S. Wallace**, Y. Wu, F. Zhang, H.F. Sore,

- W.R.J.D. Galloway, J.W. Chin, M. Welch, G.J.L. Bernardes, D.R. Spring. *Chem. Sci.* **2017**, 8, 3871.
10. Designer micelles accelerate flux through engineered metabolism in *E. coli* and support biocompatible chemistry. **S. Wallace**, E.P. Balskus. *Angew. Chem. Int. Ed.* **2016**, 55, 6023.
 9. Interfacing microbial styrene production with a biocompatible cyclopropanation reaction. **S. Wallace**, E.P. Balskus. *Angew. Chem. Int. Ed.* **2015**, 54, 7106.
 8. Using non-enzymatic chemistry to influence microbial metabolism. **S. Wallace**, E.E. Shultz, E.P. Balskus. *Curr. Opin. Chem. Biol.* **2015**, 25, 71.
 7. Strain-promoted sydnone bicyclo-[6.1.0]-nonyne cycloaddition. **S. Wallace**, J.W. Chin. *Chem. Sci.* **2014**, 5, 1742 (featured on the inside front cover: *Chem. Sci.* **2014**, 5, 1664, cover artwork by **S. Wallace** and P. Margiotta).
 6. Opportunities for merging chemical and biological synthesis. **S. Wallace**, E.P. Balskus. *Curr. Opin. Biotechnol.* **2014**, 30, 1.
 5. A cascade strategy enables a total synthesis of (–)-Gephyrotoxin. S. Chu, **S. Wallace**, M.D. Smith. *Angew. Chem. Int. Ed.* **2014**, 53, 1 (featured as a “Hot Paper”).
 4. Conformationally strained *trans*-cyclooctene with improved stability and excellent reactivity in tetrazine ligation. A. Darko, **S. Wallace**, O. Dmitrenko, M.M. Machovina, R.A. Mehl, J.W. Chin, J.M. Fox. *Chem. Sci.* **2014**, 5, 3370.
 3. Optimized orthogonal translation of unnatural amino acids enables spontaneous protein double-labelling and FRET. K. Wang, A. Sachdeva, D.J. Cox, N.W. Wilf, **S. Wallace**, R.A. Mehl, J.W. Chin. *Nat. Chem.* **2014**, 6, 393.
 2. Genetic encoding of bicyclononynes and *trans*-cyclooctenes for site-specific protein labelling *in vitro* and in live mammalian cells via fluorogenic Diels-Alder reactions. K. Lang, L. Davis, **S. Wallace**, M. Mahesh, D.J. Cox, M.L. Blackman, J.M. Fox, J.W. Chin. *J. Am. Chem. Soc.* **2012**, 134, 10317.
 1. Rapid synthesis and zebrafish evaluation of a phenanthridine-based small molecule library. L.R. Donaldson, **S. Wallace**, D. Haigh, E.E. Paton, A.N. Hulme. *Org. Biomol. Chem.* **2011**, 9, 2233.
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References available on request