Conference report

Biotransformations: From Science to Industrial Application

19th December 2017

RSC Chemistry Centre, Burlington House, Piccadilly, London, UK.

Organised by the RSC Biotechnology Group
Sponsored by BioCatNet

This was the 4th in a series of conferences devoted to biotransformation, following on from highly successful conferences in 2009, 2013 and 2014.

This one-day Meeting featured eleven speakers, including four early career speakers chosen from submitted abstracts, one of whom was from Canada, and one (Alex Brogan) was a previous poster prize winner from 2014. The total attendance was 63. The delegates, a mix from Academia and Industry, clearly enjoyed the Conference, since there were lively Question and Answer Sessions after most of the lectures and the informal feedback to the Conference Committee on the day was excellent. The range of speakers was particularly noted by delegates as this covered a fully multidisciplinary range of topics from industrial examples in practice, commercial and economic drivers, emerging advances in biocatalysis, enzyme discovery, bioreactor engineering, enzyme engineering, metabolic engineering, natural product biosynthesis, and computational modelling of enzymes.

The poster & lunch buffet session provided an excellent opportunity for lively networking. The winners of the three poster prizes of £50 were Lidia Delgado (University of Nottingham), Lawrence Maschio (University of Bristol) and Toby Nash (University of Bath).

The organisers are grateful to BioCatNet for their generous sponsorship of £1000 which was used towards the travel and accommodation expenses of the speakers, and thank the RSC Chemistry Centre, Burlington House for their hospitality and assistance.

The Names of the Speakers and the Titles of their presentations and those of the Poster Presenters, are listed in the attached sheet.

The Conference Committee

Prof Paul Dalby (Chair) Biochemical Engineering Department, UCL and Biotechnology Group
Dr Colin Bedford Chemistry Department, UCL and Biotechnology Group
Dr Paul Race, Biochemistry Department, University of Bristol
Dr Steve Wrigley Hypha Discovery Ltd

January 2018
The RSC Biotechnology Group welcome you to this exciting one-day symposium. This meeting will highlight recent achievements, future challenges and current trends in the use of biotransformations and biocatalysis in the industrial biotechnology sector. The focus is on the discovery, modification and industrial application of novel enzymes for biocatalysis. Analytical and process engineering, synthetic biology, computational biology, biochemistry, microbiology, and chemistry, are being harnessed to deliver new biocatalysts for the synthesis of chemical products.

09.30 Coffee & Registration.
10.00 Opening Remarks, Paul Dalby
Session I: New advances in biocatalysis and biotransformation. (Chair: Paul Dalby)

10.10 Florian Hollfelder: Cambridge University, UK
Microfluidic Droplets as Tools for High-throughput Biology: Enzyme Evolution, Recruitment and Discovery Based on Catalytic Promiscuity

10.40 Nigel Scrutton: University of Manchester, UK
Metabolic engineering with terpene cyclases

11.10 Dom Campopiano: Edinburgh University, Scotland, UK
Overcoming evolution to generate a designer biocatalyst

11.40 Kieran Hudson: University of British Columbia, Vancouver, Canada. (Early career presentation)
Engineering fucose-transferring enzymes from fucosidases

12.00 Alex Brogan: Imperial College London, UK. (Early career presentation)
Protein-polymer surfactant nanoconjugates for anhydrous biocatalysis

12.20 Danai Gkotsi: St Andrews University, Scotland, UK. (Early career presentation)
Biocatalytic Access to Halogenated Compounds

12.40 Lunch & Poster Session.
Session II: Industrial perspectives. (Chair: Colin Bedford)

14.00 Jonathan Steele: Hypha Discovery Ltd.
Biotransformation in drug development: solutions for chemists

14.30 Ingo Hartung: Bayer AG.
Exploring Nature’s Toolbox for Drug Discovery

15.00 Dmitriy Berillo: Brighton University, UK. (Early career presentation)
Cryogel-based bioreactor for biotechnological and environmental applications

15.20 Tea, Posters & Networking.
Session III: Horizon scanning. (Chair: Paul Race)

15.40 Marc van der Kamp: University of Bristol, UK.
Simulation of biocatalysts and their reactions: insights and in silico assays

16.10 RSC 2017 Organic Stereochemistry Award Lecture
Nicholas Turner: University of Manchester, UK
Biocatalytic reductive amination

16.50 Closing Remarks - Paul Dalby

Biotransformations: From Science to Industrial Application - POSTERS

1 Performance of an extremo-adapted glycosyl hydrolase (GH1) from Halothermothrix orenii in wine-like environment.
Lidia Delgado and Francesca Paradisi
School of Chemistry, University of Nottingham University Park, Nottingham NG7 2RD

2 Short and sweet: Structural and Mechanistic Insight into the Biogenesis of the 3’-Deoxy Nucleoside of Pacidamycins.
University of St Andrews, North Haugh, St Andrews KY16 9ST, UK

3 Immobilisations of Industrially Relevant Biocatalysts on Synthetic Polymers
Elizabeth Watton, Liam Evans, Benjamin Summers and Simona Serban
Purolite Ltd., Unit D, Llantrisant Business Park, Llantrisant, Rhondda Cynon Taff, CF72 8LF

4 Towards a molecular understanding of starch synthesis
Michael Rugen¹, Eeshan Kalita², Stephen Bornemann¹ and Robert Field¹
¹Department of Biological Chemistry, John Innes Centre, Norwich, NR4 7UH, UK
²Department of Molecular Biology and Biotechnology, Tezpur University, Napaam, Tezpur, Assam - 784028, India

5 Exploring carbohydrate active enzyme capabilities in Euglena gracilis
Irina M. Ivanova, Sergey A. Nepogodiev, Gerhard Saalbach, Ellis C. O’Neill, Michael D. Urbaniak, Michael A. J. Ferguson, Sudagar S. Gurcha, Gurdyal S. Besra and Robert A. Field
Department of Biological Chemistry, John Innes Centre, Norwich Research Park, Norwich NR4 7UH, UK
6 BioWF: A Natural Fusion of Biotin Biosynthesis Genes in *Corynebacterium amycolatum*

**Peter J. Harrison***, Menglu Wang†, Rebecca Verez†, James H. Naismith‡ and Dominic J. Campopiano†

†School of Chemistry, University of Edinburgh, EH9 3FJ
‡School of Chemistry, University of St Andrews, KY16 9ST

7 Identification of a laminaridextrin phosphorylase from *Euglena gracilis* for β-1,3-glucan production

**Sakonwan Kuhaudomlarp**, Nicola J. Patronb, Bernard Henrissatc,d,e, Martin Rejkeka, Gerhard Saalbacha and Robert A. Fielda,†

aDepartment of Biological Chemistry, John Innes Centre, Norwich Research Park, Norwich NR4 7UH, UK

8 Biocatalytic Hydrogenation in Batch and Flow

**Lisa A. Thompson**, Justin R. Weeks, Xu Zhao, Holly A. Reeve and Kylie A. Vincent

Department of Chemistry, University of Oxford, South Parks Road, Oxford, OX1 3QR

9 Hydrogenase and NAD⁺ reductase: a case study for the modular coupling of enzymes on conductive carbon supports

**Miguel A. Ramirez** and Jack S. Rowbotham,

Department of Chemistry, University of Oxford, South Parks Road, Oxford, OX1 3QR

10 Engineering the BZDO enzyme and its use in the synthesis of enantiopure small molecules

**Toby J. Nash**a, Scott Wharryb, Derek Quinnc, Thomas S. Moodyb and Simon E. Lewis*a

aDepartment of Chemistry, University of Bath, Claverton Down, Bath, BA2 7AY
bAlmac House, 20 Seagoe Industrial Estate, Craigavon, BT63 5QD

11 BrisSynBio 700 MHz 1.7mm MicroCryoCoil NMR Facility

**Christopher Williams and Matthew P. Crump**

School of Chemistry, University of Bristol, Bristol, BS8 1TS, UK

12 Protein Engineering of Transketolase for Improved Thermostability

**Haoran Yu** and Paul A. Dalby

Department of Biochemical Engineering, University College London, Gordon Street, London, WC1H OAH
13 Novel insights into transketolase activation by cofactor binding and heat shock

Henry Wilkinson, Jayesh Gor, Stephen Perkins and Paul A. Dalby

University College London, Bernard Katz Building, Gower Street, London, WC1E 6BT

14 Cunninghamella elegans and its mechanism for xenobiotic metabolism

William Palmer-Brown, Claire Tynan, Kevin Byrne, Kenneth H. Wolfe, Raul Miranda Caso Luengo, and Cormac D. Murphy*1

1School of Biomolecular and Biomedical Science
2School of Medicine, University College Dublin, Belfield, Dublin 4, Ireland

15 A highly stable natural Diels-Alder Biocatalyst enables efficient [4+2] cycloaddition under harsh reaction conditions

Laurence Maschio, Carl Marsh, Nick Lees, Li-Chen Han, Andy Scott, Chris Willis and Paul Race

1School of Biochemistry, University of Bristol, BS8 1TD
2School of Chemistry, University of Bristol, BS8 1TS
3Defense Science and Technology Laboratory, Porton Down, SP4 0JQ

16 Engineering 2’O-mRNA methyltransferases for industrial biocatalysis

Pierre-Yves Colin, Mary Stahley, Jared Davis and Paul A. Dalby

1Department of Biochemical Engineering, University College London, Gordon Street, London, WC1H 0AH, UK
2Alexion Pharmaceuticals, 100 College St, New Haven, CT 06510, USA