Natalie Grefenstette, PhD

Address: 186 Peregrine House, Hall Street - London, EC1V 7PS - UK
E-mail: natalie.grefenstette@ucl.ac.uk - Phone: (+44)7784397718
Nationality: French & American

Education

University College London (UCL) – London, UK 2013-2017
PhD Chemistry

Research with Matthew Powner, Chemistry Department, UCL
'Studies towards the prebiotic synthesis and phosphorylation of ribonucleotides'

- Studied the prebiotic synthesis of 5'-phosphate ribonucleotides through nucleophilic aqueous phosphorylation and systems chemistry
- Developed a new oxidative approach in order to successfully phosphorylate ribonucleotide precursors nucleophilically and regiospecifically
- Discovered a generational node in the network of prebiotic chemistry that links the syntheses of amino acids with nucleotides 5'-phosphates
  Grefenstette et al. Chem. Comm. 2017; Fernández-García et al. Chem. Comm. 2018

University College London (UCL) – London, UK 2008-2012
BSc Biochemistry, First class Honours

- Graduated top 5% – Dean's list

BSc thesis with Helene Plun-Favreau, Institute of Neurology, UCL
'Unravelling molecular pathways implicated in Parkinson's Disease: Alpha-synuclein phosphorylation and localisation to the mitochondria'

- Studied the role of phosphorylated alpha-synuclein translocation to the mitochondria in tissue culture cells and patient brain samples using biochemical methods
- Identified that phosphorylated alpha-synuclein is the main species in the mitochondria and that translocation is independent from its phosphorylation state

Centre National Recherche Spatial – Paris, France 2009-2010
ABCnet course on astrobiology, in collaboration with the European Space Agency

- Studied theories on the origin of life and prebiotic chemistry, planet formation and astrobiology space missions; and habitability and astrobiology of terrestrial planets in the solar system

Lycée J.P. Vernand – Sèvres, France 2005-2008
2008: French Baccalaureate with OIB (scientific section), "*mention bien" with 15.6/20* (A)

Peer-reviewed publications

Fernández-García, C., **Grefenstette, N.M**. and Powner, M.W., 2018. *Selective aqueous acetylation controls the photoanomerization of α-cytidine-5'-phosphate*. **Chemical Communications**, 54(38), pp.4850-4853.

Grefenstette N.M., Fernández-García, C., N. M. Grefenstette, and Powner, M.W., 2017. *Prebiotic synthesis of aminooxazoline-5'-phosphates in water by oxidative phosphorylation*. **Chemical Communications** 53(36), pp.4919-4921.

Grefenstette, N.M., 2017. Studies towards the prebiotic synthesis and phosphorylation of ribonucleotides (Doctoral dissertation, UCL (University College London)).

Bose R., Cleaves H.J., Freeland S., **Grefenstette N.M.**, Ilardo M., Meringer M., Rasulev B. and Stephenson J. *A cheminformatic exploration of possible trajectories for the expansion of the genetic code.* ***in preparation***

Research Experience

Earth and Life Science Institute – Tokyo, Japan **2017**
Five week project, **ELSI Origins Network**, supervised by Chris Butch and Jim Cleaves

- Studied the incorporation of amino acids in the genetic code using cheminformatics
- Developed a program to analyse hypothetical earlier sets of canonical amino acids compared to potentially available non-canonical alpha amino acids
  Bose et al. ***in preparation***

University of New South Wales – Sydney, Australia **2011**
Five week internship, **Astrobiology laboratory**, supervised by Brett Neilan and Jason Woodhouse

- Studied the bacterial diversity in the cyanobacterium "Lynbya" summer blooms in Moreton Bay (Northern Australia) using genetic identifiers

Research skills

Experimental:

Organic chemistry: NMR, synthetic organic chemistry, aqueous organic chemistry, column chromatography
Cell and molecular biology: mammalian cell culture, Western blot, DNA extraction, PCR
Analytical techniques: 1D and 2D NMR, column chromatography, fluorescent microscopy, confocal microscopy

Computational:

Online courses: Programming with Python, R, statistics and probability, web design
Cheminformatic programs: JChem, GenerateMD, Dragon, Cxcalc

Talks and posters

Towards the prebiotic synthesis and phosphorylation of ribonucleotides – ELSI, talk **2017**
Towards a one-pot prebiotic synthesis of ribonucleotides – UCL, talk **2016**

Simons Foundation SCOL Symposium - New York, USA; presented a poster **2015**

Industry Experience

Encelo laboratories– London, UK **2017-2018**
CEO and co-founder

- Studied the use of kidney-on-a-chip organoids in the stratification of patients during drug development and in precision medicine
- Developed a deep understanding of the drug development process and its pitfalls
- Made strong contacts in pharmaceutical companies and wrote a white paper alongside a business plan and fundraising materials

Deep Science Ventures– London, UK **2017**
Four month entrepreneur in residence

- Developed a deep understanding of the biotech ecosystem

- Worked on multidisciplinary projects while developing a strong understanding of dozens of biotech research areas
- Learned about building a business from a position of fulfilling a need/problem observed in the world 2

Soft skills

Languages: English and French: fluent; Spanish: conversational level

Other: Event management, Language teaching (high school level), Jazz singing

References

Matthew Powner, PhD
PhD Supervisor
Reader in Organic Chemistry
Department of Chemistry
University College London, UK

Tel: +44 (0)20 7679 4542
Email: **matthew.powner@ucl.ac.uk**

Brett Neilan, PhD
Internship supervisor
Professor and Head of School
School of Environmental and Life Sciences
University of Newcastle, Australia

Tel: +61 2 4921 5084
Email: **brett.neilan@newcastle.edu.au**

James Cleaves, PhD
Project supervisor
Associate professor
Department of Geochemistry
Earth-Life Science Institute, JP

Tel: +18583663049
Email: **hcleaves@elsi.jp**