

Research CV: Dr Tom Ellis

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Current Post

Lecturer in Synthetic Biology, Department of Bioengineering, Imperial College London

Qualifications

MBioch	(Molecular and Cellular Biochemistry)	Oxford University	2000
PhD	(Thesis on DNA-binding ligands)	University of Cambridge	2004

Previous Posts

Senior Scientist, Spirogen Ltd., London, UK	2004-2006
Postdoctoral Research Assistant, Centre for Advanced Biotechnology, Boston University	2006-2008
Postdoctoral Research Assistant, Institute of Biotechnology, University of Cambridge	2009

Journal Publications since joining ICL

Casini A, Christodoulou G, Freemont P, Baldwin GS, **Ellis T** and Macdonald JT (2013). R2oDNA Designer: Computational design of biologically neutral synthetic DNA sequences. In Review: *ACS Synthetic Biology*

Casini A, Macdonald JT, De Jonghe J, Christodoulou G, Freemont P, Baldwin GS and **Ellis T** (2013). One-pot DNA construction for synthetic biology: the Modular Overlap-Directed Assembly with Linkers (MODAL) strategy. Accepted: *Nucleic Acids Research*

Algar R, **Ellis T** and Stan GB (2013). Modelling the burden caused by gene expression: an *in silico* investigation into the interactions between synthetic gene circuits and their chassis cell. Preprint posted: *ArXiv Q-Bio*. DOI: arXiv:1309.7798

Pothoulakis G, Ceroni F, Reeve B and **Ellis T** (2013). Characterisation of genetic control elements for synthetic biology using the Spinach RNA aptamer. Advance Publication Online: *ACS Synthetic Biology*

Wu M, Su R-Q, Li X, **Ellis T**, Lai Y-C and Wang X (2013). Engineering of regulated stochastic cell fate determination. *Proceedings of the National Academy of Sciences USA* 110(26) pp 10610-10615

Brucoli F, Hawkins RM, James CH, Wells G, Jenkins TC, **Ellis T**, Kotecha M, Hartley JA, Howard PW and Thurston DE (2013). An Extended PBD-Polyamide Conjugate with Selectivity for the ICB2 Transcription Factor Binding Site. *Journal of Medicinal Chemistry* 56(16), pp 6339-6351

Wright OE, Stan GB and **Ellis T** (2013). Engineering Security Mechanisms for Synthetic Biology. *Microbiology* 159(7) pp 1221-1235

Blount BA, Weenink T and **Ellis T** (2012). Construction of synthetic regulatory networks in yeast. *FEBS Letters* 586(15) pp 2112-2121

Blount BA, Weenink T, Vasylechko S and **Ellis T** (2012). Rational Diversification of a Promoter Providing Fine-Tuned Expression and Orthogonal Regulation for Synthetic Biology. *PLOS One* 7(3):e33279.

Brucoli F, Hawkins RM, James CH, Wells G, Jenkins TC, **Ellis T**, Hartley JA, Howard PW and Thurston DE (2011) Novel C8-linked pyrrolbenzodiazepine (PBD)-heterocycle conjugates that recognize DNA sequences containing an inverted CCAAT Box. *Bioorganic & Medicinal Chemistry Letters* 21(12) pp 3780-3783

Ellis T, Adie T and Baldwin GS (2011). DNA assembly for synthetic biology: from parts to pathways and beyond. *Integrative Biology*. Vol. 3, pp 109-118

Total citations since 2008: 403

h-index: 7

i10-index: 7

Journal Publications prior to ICL

Ellis T*, Wang X* and Collins JJ (2009). Diversity-Based Design of Synthetic Gene Networks with Desired Functions. *Nature Biotechnology*. 27(5) pp 465-471

Ellis T, Wang X, Collins JJ (2008). Gene regulation: hacking the network on a sugar high. *Mol Cell*. 30 pp 1-2

Ellis T, Evans DA, Martin CR and Hartley JA (2007). A 96-well DNase I footprinting screen for drug-DNA interactions. *Nucleic Acids Res*. 35(12) e89.

Van Vliet LD*, **Ellis T***, Foley PJ, Liu L, Pfeffer FM, Russell RA, Warrener RN, Hollfelder F and Waring MJ (2007). Molecular recognition of DNA by rigid [N]-polynorborene-derived bifunctional intercalators: synthesis and evaluation of their binding properties. *J Med Chem*. 50(10) pp 2326-2340

Martin C, **Ellis T**, McGurk CJ, Jenkins TC, Hartley JA, Waring MJ and Thurston DE (2005). Sequence-selective interaction of the minor-groove interstrand cross-linking agent SJG-136 with naked and cellular DNA: footprinting and enzyme inhibition studies. *Biochemistry*. 44(11) pp 4135-4147

Waring MJ, Ben-Hadda T, Kotchevar AT, Ramdani A, Touzani R, Elkadiri S, Hakkou A, Bouakka M and **Ellis T** (2002). 2, 3-Bifunctionalized quinoxalines: synthesis, DNA interactions and evaluation of anticancer, anti-tuberculosis and antifungal activity. *Molecules*. 7(8) pp 641-656

Papers in Preparation

Algar R, Khusainov R, Ceroni F, Stan GB and **Ellis T** (2014) *In prep*. Intended journal: *Nature Biotechnology*

Pan W, Yuan Y, Dai W, **Ellis T**, Gonçalves J, Barahona M, and Stan GB (2014) Sparse Bayesian Learning for Reconstruction of Complex Dynamical Networks. *In prep*. Intended journal: *Physical Review Letters*

Books and Book Chapters

Weenink T and **Ellis T** (2013). Creation and characterization of component libraries for synthetic biology. Chapter in *Methods in Molecular Biology* 1073 pp 51-60, Springer Publications

Synthetic Biology – A Primer. Baldwin, Bayer, Dickinson, **Ellis**, Freemont, Kitney, Polizzi, Stan. ICL Press, released on 4th August 2012. Current sales of over 1000 copies worldwide.

Bailly C, Kluza J, Martin C, **Ellis T**, Waring MJ (2005). DNase I footprinting of small molecule binding sites on DNA. Chapter in *Methods in Molecular Biology* 288 pp 319-42

Publication Awards

“**Fast-Breaking Papers of 2010**” award. Thomson Reuters ScienceWatch, for Ellis *et al*. Nature Biotech 2009

Funding Held as PI

BBSRC Bioinformatics & Biological Resources Fund. “The Sc2.0 UK Genome Engineering Resource (SUGER)” **Ellis T (PI)**, Freemont P, Elfick AE and Oliver SG. Oct 2013. £1.22M for 42 months.

BBSRC Responsive Mode. “Genome Organisation for Optimising Synthetic Secondary Metabolism” **Ellis T (PI)**. Jul 2013. £423,053 for 36 months

EPSRC Responsive Mode. “Engineered burden-based feedback for robust and optimised synthetic biology” **Ellis T (PI)** and Stan GB. Jan 2013. £539,000 for 42 months

Leverhulme Trust Research Project Grant. “Organised Natural Structures using Synthetic Biology” **Ellis T (PI)**. Oct 2012. £144,900 for 36 months

BBSRC BB/J019720/1 “Engineered security systems for environmental synthetic biology” **Ellis T (PI)** and Stan GB. DTSL Joint Synthetic Biology Initiative. Sept 2012. £149,607 for 14 months

Industry-funded PhD project “Investigation and re-wiring of promoter regulation in *Geobacilli*” **Ellis T (PI)**. Four year funding from TMO Renewables Ltd. and Dept of Bioengineering. Oct 2011. £45,000

Funding Held as Co-I

Bill and Melinda Gates Foundation GCE Round 7. "Apply Synthetic Biology to Global Health Challenges – Parasite Protease Biosensors" Freemont P, **Ellis T (Co-I)**, Baldwin GS and Kitney RI. Nov 2011. \$100,000.

EPSRC EP/J02175X "An Infrastructure for Platform Technology in Synthetic Biology" **Co-I at ICL**, with Edinburgh, Cambridge, Newcastle & KCL. May 2012. £6.15M total, ICL split £1.47M

EPSRC IKC "SynbiCITE - an Imperial College led Innovation and Knowledge Centre (IKC) in Synthetic Biology" **Co-I at ICL**, with Imperial (leading), Essex, Newcastle, Glasgow, Bristol, Edinburgh, Cambridge etc. £6.24M

Funding Applications Awaiting Decision

BBSRC Equipment Call. "High throughput platforms for cellular reprogramming and analysis from microbial populations to single cells and molecules". **Co-I at ICL** with Geoff Baldwin (ICL) leading. £527,747

BBSRC Tools and Resources Call. "Evaluation of CIDEA expression as a method to increase lipid production in microorganisms". **Co-I at ICL** with Peter Nixon (ICL) leading. £163,108

Funding Completed

Wellcome Trust iGEM Scheme: "Imperial College London iGEM Project 2011". Secured stipends for six students at £1900 each to cover 10 weeks work over summer. Total awarded: £11400

Research Competitions

iGEM 2011. "Auxin" Imperial College London (main supervisor). European Champions and overall 2nd place from over 170 teams. Winners of 3 major awards.

iGEM 2010. "Parasight" Imperial College London (supervisor). Top 5 finalist from 125. Winners of 3 major awards. Project further funded by Bill and Melinda Gates Foundation.

iGEM 2009. "E.Chromi" University of Cambridge (supervisor). *Grand Prize* winner from 120 entrants

Research Group Posters Presented At Conferences

** Not including 15 Ellis Lab posters at SB5.0 and SB6.0 and 6 Ellis Lab posters at Sc2.0 annual meetings*

Casini A, Macdonald JT, Baldwin GS and Ellis T (2013). R2oDNA Designer: Computational design of biologically neutral synthetic DNA sequences. IWBD 2013, Imperial College London, July 2013

Wright O (**selected for a talk**), Stan GB and Ellis T. Engineering Security Mechanisms for Synthetic Biology. Synthetic biology: containment and release of engineered micro-organisms, Kings College. April 2013

Blount B (**selected for a talk**) and Ellis T. Rational Diversification of a Promoter Providing Fine-Tuned Expression and Orthogonal Regulation for Synthetic Biology. British Yeast Group Meeting 2013

Casini A (**selected for a talk**), Macdonald JT, Baldwin GS and Ellis T. An automated, combinatorial DNA assembly strategy. enGENEious International Conference on Synthetic Biology. Oxford, June 2011.

Algar RA, Stan GB and Ellis T. Understanding and predicting the interactions between a synthetic gene circuit and its chassis cell. enGENEious International Conference on Synthetic Biology. Oxford, June 2011.

Fracchia C (**selected for a talk**), Faba P, Blount B, Cass A and Ellis T. Engineering a programmable potassium efflux pump as a cyborg reporter in synthetic biology. IBE 2012 Annual Conference. Indianapolis, USA, March 2012.

Blount B and Ellis T. Engineering a penicillin biosynthesis pathway into yeast to elucidate the effects of 3D positioning in the genome on transcription. Synthetic Biology of Antibiotic Production, Sant Feliu de Guixols, Spain, October 2011

Algar RJ, Stan GB and Ellis T. Too much synthetic biology? Quantifying and modelling device-imposed burden on *E.coli* chassis. International Conference on Synthetic Biology, Genopole, France, December 2010.

Invited Talks

Society for Exp. Biology AGM, Manchester: July 2014	SEB Syn Bio Symposium, London: Jan 2014
Frontiers in BioSustainability, Korea: Oct 2013	2nd Annual Sc2.0 meeting, London: July 2013
SB6.0 Conference, Imperial College: July 2013	UK-Korea SynBio Workshop, BIS London: July 2013
GARNet 2013 Workshop, Nottingham: May 2013	British Yeast Group Meet, Nottingham: Mar 2013
University of Kent Fungal Group: Dec 2012	The CRICK Institute, London: Sep 2012
Cambridge BioDesign Forum, Cambridge: Sep 2012	EnGENEious Conference, Oxford: June 2012
New Phytologist Workshop, Bristol: June 2012	Thematic Research School, Evry, France: May 20
1 st International Sc2.0 Meeting, Beijing: Apr 2012	17 th IBC IUPAB Conference, Beijing: Nov 2011
FERA themed workshop, York: Sep 2011	IEEE EMBC Conference, Boston, USA: Sep 2011
2 nd BIOFAB meeting, Stanford USA, July 2011	Synthetic Biology Workshop, LSE: June 2011
Synthetic Biology, NTU, Singapore: May 2011	Synthetic Bio Conference, Evry, France, Dec 2010
IOSSB Symposium, Imperial College: Nov 2010	Topical Day in Bioinfo, SCK.CEN Belgium, Nov 2010
SynBioStandards Network, Edinburgh: Sept 2010	Advances in Synthetic Biology, London, April 2009

Research Impact and Outreach

Guest Speaker at University of Westminster Faculty Seminar Series, London (Nov 2013)

Invited Speaker at 2013 'Pint of Science' Festival in London, Oxford and Cambridge (May 2013)

Invited Speaker at 2013 SGM and Society of Biology's 'Brilliant Breakthrough' Day for Teachers (Jan 2013)

Guest Speaker for the prestigious Trinity College Cambridge, Science Society (Nov 2012)

Academic Champion for the Synthetic Life undergraduate Grand Challenge, Exeter University (Nov 2012)

Invited Speaker and Runner-up at the Royal Institution's Synthetic Biology Smackdown Event (Oct 2012)

Blount *et al.* PLoS ONE paper selected for inclusion in the PLoS ONE Synthetic Biology Collection (Aug 2012)

Selected Article for the Leverhulme Trust Newsletter Print Edition (Aug 2012)

Interviewed for GEN magazine article: "Synthetic Biology Defined by Interdisciplinarity" (May 2012)

Imperial Science Festival: PhD student Ben Reeve demonstrating our synthetic biology work (May 2012)

Interviewed in I,Science magazine article: "Engineering Life" (Mar 2012)

Press reports of PLoS ONE article www.eurekalert.org/pub_releases/2012-03/icl-sdt031912.php (Mar 2012)

Ellis *et al.* Integrative Biology paper is the most read paper in the journal for 2011 (Dec 2011)

Exhibited research at Natural History Museum, London at EU-wide Science Uncovered Event (Sept 2011)

Interview for Nature magazine "Synthetic genomes: The next step for the synthetic genome" (May 2011)

Interviewed for Nature Methods article "Microarrays, megasynthesis" (May 2011)

Collaborated with RCA MA student Nicola Morgan on bacterial-patterned fashion (Jan to May 2011)

Interviewed for conceptual art work "Public Misunderstandings of Science" (March 2011). Part of the Laboratory Life series organised by Lighthouse/The Arts Catalyst, staged part of Brighton Science Festival.

Invited Speaker for the Natural History Museum, Nature Live! Night Event (May 2010)

"E.Chromi" Cambridge iGEM 2009 (supervisor) was nominated for Design of the Year 2010 at British Design Awards and exhibited at MOMA, New York. Project was also a winner at the 2011 Bio-Fiction film festival.

Further Roles and Responsibilities

Panel Member for the ERASynBio 1st call: Dec 2013 – EU FP7 Synthetic Biology ERA-NET scheme

Member of UK Synthetic Biology Delegation to Boston: Sept 2013 – FCO UK-US Synthetic Biology Campaign

The 2nd Annual Sc2.0 meeting, Imperial College London: July 2013 – Chair of meeting and main organiser

The SB6.0 Conference, Imperial College London: July 2013 – Executive programming committee member

SynBioBeta UK meeting on UK biotech start-ups. July 2013 – Member of programming team

Synthetic Biology: Containment and Release, Kings College London: April 2013 – Co-organiser and chair

Bioengineering Department REF Impact Committee member: 2011-2012

Bioengineering Department Undergraduate and MSc Tutoring (12 students): since Oct 2011

Bioengineering Department Seminar Series organisation (with Guy-Bart Stan): Sep 2010 to Aug 2011

Supervision of 5 work experience students from Eton College: July 2012

Supervision of 2 Korean high-school students from KSA KAIST: July 2010

Construction of the website for Centre for Synthetic Biology and Innovation: May-June 2010

Refereed papers for: *Science, Nature Biotechnology, Nature Methods, Nature Comms, Nucleic Acids Research, PLoS Computational Biology, Journal of Biol Eng, Integrative Biology, ACS Synthetic Biology.*

Membership of Professional Bodies and Societies

Invited Edition Editor and member of the Editorial Board for ACS Synthetic Biology (since Mar 2013)

Scientific Advisory Board member for Addgene.org: the world's largest plasmid provider (since 2012)

BioBricks Foundation SB6.0 Executive Programming Teaming (2012-2013)

iGEM European Judging Committee member (2011)

Member of the Institution of Engineering and Technology (IET) (since 2009)

Christ's College, University of Cambridge (since 2000)

Wadham College, Oxford University (since 1996)

Imperial Personal Development Courses Attended

Research Proposal Checklist Workshop, 21-JAN-11 Workshop on Engineering Education, 26-MAY-11

Communicating Knowledge, 09-JUN-10 and 17-JUN-10 Introduction to teaching and learning, 15-SEP-11

Using Feedback to Enhance Student Learning, 03-JUN-10 EPSRC Study Day Workshop, 20-SEP-10

Introduction to Personal Tutoring at Imperial, 19-JAN-12 Month One Safety Training, 21-JAN-10

Introduction to Supervising PhD Students at Imperial, 14-DEC-11 Laboratory Teaching, 06-MAY-10

Assessing Student Learning in Science and Engineering, 23-MAR-10 Imperial Insights, 28-JAN-10

Recruitment and Selection for Academic & Research Staff, 18-JUN-10 InfoEd Training, 29-APR-10

Health and Safety Responsibilities for Academic Supervisors, 30-NOV-12

Observation of my lecturing, 23-JAN-12 (Overby) and 25-JAN-12 (Bull)

Observation of senior lecturers, 1-MAR-12 (Boutelle) and 8-MAR-12 (Krams)

1. Biomedical Engineering course-convener for ICL undergraduate Synthetic Biology course

Duties: 2 hours of lectures. Co-supervise a further 29 hours of practicals, classes and workshops. Mark four items of coursework for 42 students. Set/mark two different exams. SOLE score total as individual lecturer:

2013:	Very Good 18	Good 8	Satisfactory 2	Poor 1	Very Poor 0
2012:	Very Good 20	Good 31	Satisfactory 17	Poor 0	Very Poor 0
2011:	Very Good 34	Good 24	Satisfactory 23	Poor 14	Very Poor 1

Innovations: Biomedical Engineering content reduced to a single module. Split the lectured material into *foundational knowledge* and *case studies*, with the latter all based on iGEM project examples that made publication. Introduced separate exams for Life Sci and Biomedical Engineering students, which led to improved grades for both cohorts of students and improved feedback scores.

2. Course-convener for ICL Biomedical Engineering Year 2 Wet-lab Skills course

Duties: 18 hours of practical and class supervision (45% of course load). Also arrange labs, prepare some materials, organise course GTAs, prepare handbook and Blackboard material. **Note: 28 hours in 2013**

Innovations: Added a bioinformatics practical, replaced pharmacology practical with a neuro practical. Added a prize competition to the molecular biology practical which led to dramatically improved results.

3. Lecturer and project supervisor for ICL MRes in Systems and Synthetic Biology course

Duties: 2 hours of lectures and project supervision. Examining essays, project plans and completed projects. Supervising and co-supervising 1 or 2 project students per year (8 month projects).

Innovations: Added a 1 hour class on the PhD application process in 2011 which led to more than 50% of students leaving the 2011/2012 course with offers of PhD positions.

4. Guest lecturer on other courses at Imperial and elsewhere

Duties: 3 hours of lectures for 3 different courses.

Since 2013: 1 hour lecture for Topics in Bioengineering Year 1 (Warren MacDonald, Bioengineering)

Since 2013: 1 hour lecture for Pathology MRes Course (ICL)

Since 2011: 1 hour lecture for Part III Systems Biology (Cambridge)

5. PhD and MPhil Examination Duties

Steven Kane	University of Edinburgh	External Examiner	Dec 2013
Judy Savitskaya	University of Cambridge	External Examiner	Sep 2013
Mark Walsh	University of Manchester	External Examiner	Dec 2012
Camille Delebecque	University of Paris Descartes	External Examiner	Nov 2012
Orr Yarkoni	Newcastle University	External Examiner	Dec 2011

Current Lab Members as Lead Supervisor

Ben Blount, PDRA	from Oct 2010	4 years funding from BBSRC (SUGER)
Ollie Wright, PDRA	from Sep 2012	1.2 years funding from DSTL/BBSRC
Francesca Ceroni, PDRA	from Jan 2013	3.5 years funding from EPSRC
Ali Raza Awan, PDRA	from Jul 2013	3 years funding from BBSRC
Rustem Khusainov, PDRA	from Nov 2013	1 year funding from EPSRC (CSynBI)
Rhys Algar, PhD candidate	from Oct 2010	3 years funding from CSynBI (now expired)
NB: Rhys Algar is due to submit thesis within Oct 2013 and take viva exam before the end of 2013		
Elena Martinez-Klimova, PhD candidate	from Jan 2011	4 years funding from Mexican government
Ben Reeve, PhD candidate	from Oct 2011	4 years funding from TMO Ltd/BioEng Dept
Dejana Jovicevic, PhD candidate	from Apr 2012	self-funded
Tim Weenink, PhD candidate	from Oct 2012	3 years funding from BioEng Department
Georgios Pothoulakis, PhD candidate	from Oct 2012	3 years funding from Leverhulme Trust
Marta Garcia-Bellmunt, RA Technician	from Apr 2013	3 years funding from BBSRC and EPSRC

Current Project Students

Isuru Goonatilake	from Oct 2013	BioEng MEng project student
Mihails Delmans	from Oct 2013	BioEng BEng project student
Michael Florea	from Oct 2013	Biotechnology term-time UROP student
Bianca de Blasi, Sophie Morse, Yutong Wu, Jocelyne Holdbrook and Henrik Hagemann	from Oct 2013	BioEng MEng group project students

New Lab Members to Hire from October 2013

Bioinformatician, RA Technician	SUGER Project	Dec 2013 – Dec 2016
Microbiologist, RA Technician	SUGER Project	May 2014 – May 2017

Current Lab Members as Co-Supervisor:

Alex Webb, PDRA (Freemont)	from May 2012	1.3 years funding from Gates Foundation
Arturo Casini, PhD candidate (Baldwin)	from Oct 2010	part-time PhD/RA funded 4 years (EU)
Wei Pan, PhD candidate (Stan)	from Oct 2011	3 years funding from Microsoft Research
Alejandro Granados, PhD candidate (Tanaka)	from Oct 2012	3.5 years funding from EPSRC

Former Lab Members Supervised to Completion (and Destination if Known)

* lead supervisor unless indicated as co-S

Rhys Algar	Sys and SynBio MRes Project	Feb 2010 - Sep 2010	(PhD in our lab)
Tim Weenink	Sys and SynBio MRes Project	Feb 2011 - Sep 2011	(PhD in our lab)
Georgios Pothoulakis	Sys and SynBio MRes Project	Feb 2012 - Sep 2012	(PhD in our lab)
Nicolas Kylilis	Sys and SynBio MRes Project (co-S)	Feb 2012 - Sep 2012	(PhD at ICL)
Joshua Smit	Sys and SynBio MRes Project	Feb 2013 - Sep 2013	(USA Med School)
Devang Mehta	Sys and SynBio MRes Project (co-S)	Feb 2013 - Sep 2013	(PhD - ETH Zurich)
Fabio Chizzolini	UROF MSc from Padova University	Sep 2010 - July 2011	(PhD at Trento U.)
Anna Kress	UROF MSc from University of Aachen	Apr 2012 - Sep 2012	
Joachim De-Jonghe	BioEng MSc Project	Nov 2012 - Sep 2013	
Thomas Hargest	BioEng MSc Project	Nov 2012 - Sep 2013	
Riham Satti	BioEng MEng Project	Nov 2010 - June 2011	(PhD at ICL)
Serge Vasylechko	BioEng MEng Project	Nov 2010 - June 2011	(MSc at ICL)
Piotr Fabr	BioEng MEng Project	Nov 2011 - June 2012	
Hung Hsu	BioEng BEng Project	Nov 2010 - June 2011	
Yaksha Novicic	BioEng BEng Project	Nov 2011 - June 2012	
Jiayue Zhu	BioEng BEng Project	Nov 2011 - June 2012	(MSc at ICL)
Charles Fracchia	Biology BSc Project	May 2011 - July 2011	(PhD at MIT)