

University Studies

- 2007-11 **Ph.D., Molecular Biology**
Imperial College London.
Dissertation: "Metabolic engineering the green algae *Chlamydomonas reinhardtii* for improved solar H₂ production."
- 2004-07 **Bachelor of Science with Honours, Biochemistry, First Class**
University of Edinburgh.

Research and Professional Experience

- 2017-18 **Editorial Community Manager**
eLife Sciences Publications
- Running the eLife early career advisory group, arranging meetings, arranging content for webinars and acting as a go-between the journal and research community.
- 2011-17 **Postdoctoral Research Associate**
Department of Plant Sciences University of Cambridge - Prof. Julian Hibberd
Completed six independent research projects including:
Genome-wide identification of DNA-regulatory elements
- Set up a pipeline for analysis of DNase1-SEQ data using linux and R. Expanded the number of candidate regulatory DNA-elements controlling cell specific transcription in monocots from <10 to more than 100,000.
- Transcriptional control of cell-specific gene expression
- Identified a regulatory system in the coding region of multiple C₄ genes controlling cell specific gene expression, using Gibson assembly techniques, genome walking and biolistic transformation.
- Post-transcriptional control of cell-specific accumulation of mRNA
- Defined a post-transcriptional regulatory module that controls cell-specific accumulation of multiple C₄ genes in collaboration with a postgraduate student, using variety of techniques including tissue culture.
- Development of a microfluidic device for analysis of gene expression in plant protoplasts:
- In collaboration with a chemical engineer and synthetic biologist demonstrated the feasibility of encapsulating and sorting protoplasts in microfluidic chips.
- Light and chloroplast regulation of photosynthetic gene expression:
- Showed regulation of C₄ genes is likely to be pre-existing in contrast to expectations, using a combination of physiological assays, RNA-SEQ and qRT-PCR.
- Establishment of a high-throughput assay for leaf gas exchange
- In collaboration with a plant physiologist established a high-throughput assay for screening photosynthetic mutants using infra-red gas exchange analysis (IRGA).
- 2007-11 **Ph.D. Research,**
Imperial College London - Prof. Peter Nixon
- Generated and analysis of knockdown mutants to assess the impact of metabolic pathways on photobiological hydrogen production leading to two publications.
 - Created resources for studying algal metabolism in the form of eight polyclonal antibodies, and set up procedures for analysis of photobiological H₂ production in the lab, including GC and electrode measurements.
 - Completed a collaborative project with engineers that lead to the design of photobioreactors for analysis of hydrogen production.

Technical Skills and Competences

Molecular Biology: NGS (DNase-SEQ, RNA-SEQ), genome walking, cloning by restriction ligation and Gibson assembly, PCR, qRT-PCR.

Bioinformatics: R, Python, Linux, basic Perl.

Biochemistry: Protein expression, His-tag purification, 1D and 2D SDS-PAGE, immunoblotting, 1D blue native PAGE, 1D colourless native PAGE, silver staining, isolation.

Chromatography: FPLC protein purification, HPLC metabolite analysis, GC gas analysis.

Plant Techniques: Biolistic transformation of plants, Agrobacterium mediated transformation of *Arabidopsis thaliana* by floral dip, *Nicotiana benthamiana* by infiltration, tissue culture. IRGA.

Publications

Burgess, SJ*, Reyna-Llorens, I*, Jaeger, K, Hibberd, JM: A transcription factor binding atlas for photosynthesis in cereals identifies a key role for coding sequence in the regulation of gene expression. **bioRxiv** (2017) doi: <https://doi.org/10.1101/165787> (submitted to Plant Cell)

Reyna-Llorens, I, **Burgess, SJ**, Reeves, G., Singh, P, Stevenson, SR., Williams, BP, Stanley, S, C, Hibberd, JM. Ancient duons may underpin the spatial patterning of gene expression in C₄ leaves. **PNAS** (2018) doi: <https://doi.org/10.1073/pnas.1720576115>

Burgess, SJ*, Kumpers, BMC*, Reyna-Llorens, I, Smith-Unna, R, Bournsnell, C, Hibberd, JM. Shared characteristics underpinning C₄ leaf maturation derived from analysis of multiple C₃ and C₄ species of Flaveria. **Journal of Experimental Botany** (2017) doi: <https://doi.org/10.1093/jxb/erw488>

Burgess, SJ, Moya, IG, Hibberd, JM. Ancestral light regulation forms the foundations for C₄ gene abundance in the model dicot *Gynandropsis gynandra*. **Nature Plants** (2016) doi: <http://dx.doi.org/10.1038/nplants.2016.161>

Burgess, SJ*, Williams, BP*, Kneřová, J, Stanley, S, Hibberd, JM. Mesophyll-Specificity of Multiple C₄ Enzymes in *Gynandropsis gynandra* is Coordinated by RNA Sequence. **The Plant Cell** (2016) doi: <http://dx.doi.org/10.1105/tpc.15.00570>

Burgess, SJ*, Taha, H*, Yeoman, JA., Iamshanova, O, Chan, KX, Boehm, M, Bundy, J, Bialek, W, Murray, JW, Nixon, PJ. Identification Of The Elusive Pyruvate Reductase Of *Chlamydomonas reinhardtii* Chloroplasts. **Plant Cell Physiology** (2015) doi: <http://dx.doi.org/10.1093/pcp/pcv167>

Bellasio, C, **Burgess SJ**, Griffiths, H, Hibberd, JM. A high throughput gas exchange screen for determining rates of photorespiration or regulation of C₄ activity. **Journal of Experimental Botany** (2014) doi: <http://dx.doi.org/10.1093/jxb/eru238>

Burgess, SJ, Tredwell, G, Molnar, A, Bundy, JG, Nixon, PJ. Artificial microRNA-mediated knockdown of pyruvate formate lyase (PFL1) provides evidence for an active 3-hydroxybutyrate production pathway in the green alga *Chlamydomonas reinhardtii*. **Journal of Biotechnology** (2012) doi: <http://dx.doi.org/10.1016/j.jbiotec.2012.05.010>

Nguyen, AV, Toepel, J, **Burgess, SJ**, Uhmeyer, A, Blifernez, O, Doebbe, A, Hankamer, B, Nixon, PJ, Wobbe, L, Kruse, O. Time-course global expression profiles of *Chlamydomonas reinhardtii* during photo-biological H₂ production. **PLOS One** (2011) doi: <http://dx.doi.org/10.1371/journal.pone.0029364>

Review Papers and Editorials:

Ahmad, N., **Burgess, SJ**, Nielsen, BL: Editorial: Advances in Plastid Biology and Its Applications. **Frontiers in Plant Science** (2016) doi: <http://dx.doi.org/10.3389/fpls.2016.01396>

Burgess, SJ, Hibberd, JM. Insights into C₄ metabolism from comparative deep sequencing. **Current Opinion in Plant Biology** (2015) doi: <http://dx.doi.org/10.1016/j.pbi.2015.05.017>

Covshoff, S, **Burgess, SJ**, Kneřová, J, Kumpers, BM. Getting the most out of natural variation in C₄ photosynthesis. **Photosynthesis Research** (2014) doi: <http://dx.doi.org/10.1007/s1120-013-9872-8>

Burgess, SJ, Zemichael, F, Tamburic, B, Hellgardt, K, Nixon, PJ. Solar-driven hydrogen production in green algae. **Advances in Applied Microbiology** (2011) doi: <http://dx.doi.org/10.1016/B978-0-12-387046-9.00004-9>

Teaching and Supervision

Supervised 13 research projects including:

Ph.D. Hussein Haji Taha (2010-2011).

M.Sc. Stephen Rowden (2011), Aimee Parsons (2010), Danielle Gallagher (2010), Alison Richardson (2009).

B.Sc. Ignasi Granero-Moya (2015), Susannah Guinee (2014), Nicola Capstaff (2014), Eleanor Adams (2013), Fredrick Bunbury (2013), Stephen Barratt (2013), Jemima Brinton (2012).

- Introduced projects, explained background theory and suggested literature.
- Demonstrated techniques and supervised practical work.
- Provided constructive feedback about experimental findings and helped develop understanding of the scientific method.
- Provided support and assessed best working practices for a constructive relationship.
- Helped with data analysis and interpretation.
- Gave feedback and made suggestions about draft reports and oral presentations.

Presentations

2016 **Invited Speaker**, Crop Genetics Seminar Series, John Innes Centre, Norwich.
2016 **Invited Speaker**, OpenPlant Forum, John Innes Centre, Norwich.
2014 **Invited Speaker**, Departmental Seminar, Imperial College London.
2011 ESF-BU-CeBiTec Conference, Bielefeld, Germany.
2010 World Hydrogen Energy Conference, Essen, Germany.
2010 Plastid Preview, Imperial College London, UK.
2009 Plastid Preview, University of Cambridge, UK.

Funding

2016 **OpenPlant Grant (£4k)**
Planned, wrote and managed a grant for development of a low-cost open-source set up for microfluidic analysis in collaboration with physicists.

2015-16 **Cambridge Synthetic Biology Strategic Research Initiative Fund (£4k)**
Initiated and led a team to set up a microfluidic device for analysis of gene expression in plant protoplasts in collaboration with members of the Chemistry and Physics departments.

Service and Administrative Experience

2011-present **Reviewer** for scientific journals including titles such as the International Journal of Hydrogen Energy, the Journal of Experimental Botany, Scientific Reports and the Journal of Chemical Technology and Biotechnology.

2017 **PDRA representative** Cambridge Synthetic Biology SRI Steering Committee.

2016 **Organiser** of the Department of Plant Sciences Postdoc Mentoring Scheme

2015-16 **Community Editor** for the PLOS Synthetic Biology Blog ([link](#) to summary of posts).

2015-16 **Co-editor of** Frontiers Research Topic 'Advances in Plastid Biology and its Applications'

2015-16 **Founding Member** of the Postdoc Committee, Department of Plant Sciences, University of Cambridge.

References

Available on request