

Elizabeth Ing-Simmons

Qualifications

- 2012–2017 **PhD**, *MRC Clinical Sciences Centre, Imperial College London, UK.*
The role of cohesin in long-range gene regulation. Supervisors: Matthias Merckenschlager and Boris Lenhard.
- 2011–2012 **MSci Natural Sciences (Systems Biology)**, *University of Cambridge, UK.*
- 2008–2011 **BA Hons Natural Sciences (Genetics)**, *University of Cambridge, UK.*

Research experience

- Postdoctoral research March 2017 - present. Postdoctoral fellow in the Regulatory Genomics group led by Juan M. Vaquerizas at the Max Planck Institute for Molecular Biomedicine, Münster, Germany. Produced and analysed Hi-C data from *Drosophila* embryos. Integrated this with other genomic data to understand the relationship between chromatin conformation and developmentally regulated gene expression.
- PhD research Analysed ChIP-seq data to identify putative enhancers and cohesin and CTCF binding sites, and integrated these with HiC data to investigate roles of cohesin in the topological organisation of the genome and gene expression.
Investigated the role of CTCF at enhancers using publicly available ChIP-seq and ATAC-seq data, as well as producing additional ATAC-seq data.
- R package development Developed the *GenomicInteractions* R/Bioconductor package for handling chromatin interaction data, in collaboration with other group members. Developed and maintained code and documentation, introduced and maintained unit tests.
- MSci project Network-based analysis, using R, Cytoscape and public databases, of the role of amino acid repeats in protein-protein interactions in *Saccharomyces cerevisiae*.

Technical skills

- Programming Experienced: R, Bioconductor. Proficient: Python, Git, Bash
- Data analysis Hi-C, ChIP-seq, RNA-seq, scRNA-seq, ATAC-seq, ChIA-PET
- Laboratory Hi-C; scRNA-seq; *Drosophila* maintenance; mammalian cell culture; DNA & RNA extraction; PCR; qRT-PCR; cellular fractionation; Western blot; ATAC-seq

Awards

- 2019 EMBL Corporate Partnership Programme Fellowship to attend VIZBI conference.
- 2018 Travel grant from the Cells in Motion Cluster of Excellence, to attend Transcription and Chromatin conference.
- 2018 Bursary for Wellcome Genome Campus *Drosophila* Genetics and Genomics Course.
- 2018 Humboldt Foundation Postdoctoral Fellowship. Salary and research allowance; June 2018 - May 2020.
- 2015 Travel award for the Genome Regulation in 3D conference at Weizmann Institute of Science, Israel.
- 2010 Nuffield Foundation Bursary awarded to cover living expenses during summer laboratory placement.
- 2009, 2011 Samuel Taylor Scholarship awarded by Sidney Sussex College, Cambridge on achieving a First in first-year exams (renewed in 2011).

Teaching experience

- 2019 Mentored an undergraduate student for an eight-week internship involving both experimental work and data analysis.
- 2018 Developed and gave lectures and practicals for the *Drosophila* portion of the "Model Organisms in Molecular Biomedicine" Masters module at the University of Münster.
- 2017 Mentored an undergraduate student during a six-week internship to learn R programming and undertake a short research project. The student is now starting a PhD at Rockefeller University.
- 2016 Completed Software Carpentry / Data Carpentry instructor training. Taught at four workshops to date.
- 2014-2016 Experience teaching introduction to R, introduction to ChIP-seq analysis in R, and reproducible research in R at MRC Clinical Sciences Centre courses and the ZENCODE Training Network meeting (2015).

Committee experience

- Postdoc representative Internal postdoc representative, 2019-2020. Part of a small group of representatives who organised academic, career, and social events, and negotiated a budget for future events.
- Athena SWAN Member of MRC Clinical Sciences Centre Athena SWAN self-assessment group and Communications working group. We achieved an Athena SWAN Bronze Award in April 2014, and I participated in working towards a Silver Award.
- Student committee Member of the MRC Clinical Sciences Centre Student Committee, which organised academic, career planning and social events for graduate students. Committee President for 2015.

Publications

Ing-Simmons, Elizabeth, Vaid R, Bing XY, Levine M, Mannervik M, Vaquerizas JM: **Independence of chromatin conformation and gene regulation during *Drosophila* dorsoventral patterning**. *Nature Genetics* 2021, [<http://www.nature.com/articles/s41588-021-00799-x>].

Ing-Simmons, Elizabeth, Vaquerizas JM: **Visualising three-dimensional genome organisation in two dimensions**. *Development (Cambridge)* 2019, **146**(19).

Cuartero S, Weiss FD, Dharmalingam G, Guo Y, Ing-Simmons, Elizabeth, Masella S, Robles-Rebollo I, Xiao X, Wang YF, Barozzi I, Djeghloul D, Amano MT, Niskanen H, Petretto E, Dowell RD, Tachibana K, Kaikkonen MU, Nasmyth KA, Lenhard B, Natoli G, Fisher AG, Merckenschlager M: **Control of inducible gene expression links cohesin to hematopoietic progenitor self-renewal and differentiation**. *Nature Immunology* 2018, **19**(9):932–941.

Harmston N, Ing-Simmons, Elizabeth, Tan G, Perry M, Merckenschlager M, Lenhard B: **Topologically associating domains are ancient features that coincide with Metazoan clusters of extreme noncoding conservation**. *Nature Communications* 2017, **8**:441.

Chavali S, Chavali PL, Chalancon G, Sanchez de Groot N, Gemayel R, Latysheva NS, Ing-Simmons, Elizabeth, Verstreppe KJ, Balaji S, Madan Babu M: **Constraints and consequences of the emergence of amino acid repeats in eukaryotic proteins**. *Nature Publishing Group* 2017, (August).

Lun AT, Perry M, Ing-Simmons, Elizabeth: **Infrastructure for genomic interactions: Bioconductor classes for Hi-C, ChIA-PET and related experiments [version 1; referees: 2 approved]**. *F1000Research* 2016, **5**(950).

Harmston, Nathan*, Ing-Simmons, Elizabeth*, Perry, Malcolm*, Barešić A, Lenhard B: **GenomicInteractions: An R/Bioconductor package for manipulating and investigating chromatin interaction data**. *BMC Genomics* 2015, **16**:963.

Ing-Simmons, Elizabeth*, Seitan, Vlad C*, Faure AJ, Flicek P, Carroll T, Dekker J, Fisher AG, Lenhard B, Merckenschlager M: **Spatial enhancer clustering and regulation of enhancer-proximal genes by cohesin**. *Genome Research* 2015, **25**:504–513.

Seitan VC, Faure AJ, Zhan Y, McCord RP, Lajoie BR, Ing-Simmons, Elizabeth, Lenhard B, Giorgetti L, Heard E, Fisher AG, Flicek P, Dekker J, Merckenschlager M: **Cohesin-based chromatin interactions enable regulated gene expression within pre-existing architectural compartments**. *Genome Research* 2013, **23**:2066–77.

* Equal contributions.

Conference and seminar presentations

- 2020 *Independence of 3D chromatin conformation and gene regulation during Drosophila dorsoventral patterning*. Fragile Nucleosome seminar series, online. Talk.
- 2020 *Independence of 3D chromatin conformation and gene regulation during Drosophila dorsoventral patterning*. EMBL Transcription and Chromatin, online. Poster presentation.
- 2019 *Visualising 3D genome organisation in two dimensions*. VIZBI, Heidelberg, Germany. Poster presentation.
- 2018 *Control of chromatin conformation in the early Drosophila embryo*. EMBL Transcription and Chromatin, Heidelberg, Germany. Poster presentation.
- 2016 *Topologically associated domains are ancient features that coincide with Metazoan clusters of extreme noncoding conservation* Cell Symposium: Transcriptional Regulation in Development and Disease, Chicago, USA. Poster presentation.
- 2015 *GenomicInteractions: manipulating and investigating genomic interaction data*. European Bioconductor Developers' Meeting, Cambridge, UK. Oral presentation.
- 2015 *Enhancer clustering and regulation of enhancer-proximal genes by cohesin*. Genome Regulation in 3D, Weizmann Institute of Science, Israel. Oral and poster presentation.
- 2014 *How cohesin mediates long-range interactions between regulatory elements*. Quantitative Genomics, London, UK. Oral presentation.