Emmanuel Cazottes

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Education

Oct 2019-Dec 2023 **Epigenetics and Cell Fate Unit, Université Paris Cité**
PhD in Genetics, supervisor: Dr. Céline Morey. Defense in December 2023

Evolution of X Chromosome Inactivation (XCI) and regulatory non-coding RNA in primate

- Annotated lncRNA, enhancers and chromatin architecture de-novo over a 3 Mb X-linked locus to identify candidate regulators of the *XIST* gene in marmosets, macaques, chimpanzees and humans. Established HiC data generation and analysis in a lab focused on RNAs.
- Perturbed conserved and species-specific candidates using CRISPR tech in marmoset, macaque and human pluripotent stem cells. Established macaque/marmoset PSCs culture and CRISPR.
- Conducted the evolutionary analysis of the candidates and revealed the major contribution of non-adaptive changes. Integrated evolutionary tools and concepts into a developmental biology lab.
- Conducted a collaborative effort with three labs on HiC, primate pluripotency and evolution, leading to the main publication of the PhD research.

2016-2019 **Master in Molecular biology and genetics, with highest honors**
Université Paris Cité, France

2013-2015 **Technical degree in bioengineering**
University of Western Brittany, France

Research experience

Sep-present 2024 **University of British Columbia, de Boer lab, Vancouver, Canada**
Post-doctoral fellow

Feb-June 2024 **Epigenetics and Cell Fate unit, Rougeulle lab, Université Paris Cité**
Transition post-doc

Jan-July 2019 **Epigenetics and Cell Fate unit, Rougeulle lab, Université Paris Cité**
Master 2 internship, supervisor: Dr. Céline Morey

April-Aug 2018 **Dept. of Genetics and Genome Science, University of Connecticut, USA**
Master 1 internship, supervisor: Dr. Stefan Pinter

Mai-July 2017 **Dept. of Microbiology, University of Kassel, Germany**
Bachelor internship, supervisor: Dr. Alexander Hammermeister

Scholarships and Awards

2023 EMBO registration fee waiver for the 5th XCI meeting.
2022 Travel grant 'Fondation pour la Recherche Médicale' (2 000€/2 110$).
2022 4th-year doctoral scholarship 'Fondation pour la recherche Médicale' (34 000€/35 900$).
2021 Keystone symposia registration fee waiver: Non-coding RNAs, biology and applications.
2019 Secured a competitive 3-year doctoral scholarship, ~12/150 applications are funded

Publications

1. **Cazottes, E**., Alfeghaly, C., Rognard, C., Loda, A., Castel, G., Villacorta, L., Dong, M., Heard, E., Aksoy, I., Savatier, P., Morey, C., Rougeulle, C., 2023. Extensive remodelling of XIST regulatory networks during primate evolution. https://doi.org/10.1101/2023.12.04.569904
2. Alfeghaly C, Castel G, **Cazottes E**, Moscatelli M, Moinard E, Casanova M, Boni J, Mahadik K, Lammers J, Freour T, Chauviere L, Piqueras C, Boers R, Boers J, Gribnau J, David L, Ouimette JF, Rougeulle C. Nat Struct Mol Biol. 2024 Jun 4. doi:10.1038/s41594-024-01325-3. PMID: 38834912
3. Rosspopoff O, **Cazottes E**, Huret C, Loda A, Collier AJ, Casanova M, Rugg-Gunn PJ, Heard E, Ouimette JF, Rougeulle C. Species-specific regulation of XIST by the JPX/FTX orthologs. Nucleic Acids Res. 2023 Mar 21;51(5):2177-2194. doi:10.1093/nar/gkad029. PMID: 36727460; PMCID: PMC10018341.
4. **Cazottes E**, Rougeulle C. Straight to the X: Modeling Human X Chromosome Inactivation in hESCs by FGF Signal Blockade. Cell Stem Cell. 2020 Sep3;27(3):352-353. doi: 10.1016/j.stem.2020.08.008. PMID: 32888422.

Conference presentations

2023 5th XCI meeting, EMBO Workshop. Berlin, Germany. (Poster + co-host for a 1h historical session with key PIs in the field)
2022 Plasticity across scales, EMBL Symposium. Heidelberg, Germany. (Poster)
2022 4th Danube Conference on Epigenetics. Budapest, Hungary. **(Selected talk)**
2021 Non-coding RNAs, biology and applications. Keystone online symposia. (Poster)
2021 The non-coding genome. EMBL Symposium. Online. (Poster)
2021 Young Researchers of Institut Cochin Symposium. Online. **(Selected talk)**.

Research skills

Dry

- R, bash (command line and scripting), Snakemake workflows, R/Jupyter Notebooks.
- Developed a custom capture-HiC analysis pipeline: HiC-pro + cooler/cooltools + HiCexplorer.
- Developed a custom pipeline for the analysis of expressed SNPs from RNA-Seq based on GATK.
- Discovery and annotation of long non-coding RNAs using RNA-Seq data.
- Nucleotide level scoring of natural selection with PhyloP.
- CUT&RUN and ChIPSeq data analysis with MACS2 and ChromHMM.
- Statistics for molecular biology, differential gene expression analysis with DESEQ2.

Wet

- Established non-human primate PSCs culture, nucleofection and generation of mutant cell lines.
- Capture-HiC: probe design and generation of 3C template.
- CRISPR-Cas9: sgRNA design & cloning, mutant screening.
- CRISPRi: sgRNA design to target TSS and enhancers.
- Molecular biology: purification of DNA & RNA from cultured cells, PCR, cloning, RT-qPCR.
- Molecular cytogenetics: RNA/DNA-FISH, immunofluorescence, image analysis with ImageJ.

Leadership and scientific outreach

May 2024	Speaker at the Pint of Science outreach Festival.
2021-2023	PhD representative at the Epigenetic and Cell Fate Unit board. Initiated a mentoring program to accelerate PhD candidates' careers and established monthly PhD lunches, motivating PhD students to build their career project early on.
Sep 2021-2023	Host at the 'European Researchers' Night', engaging with non-academic audiences about my research. Gained strong storytelling skills.
2020-2023	Co-organizer of a monthly seminar series on X Chromosome Inactivation + 5 days scientific retreat in Greece involving 3 labs from France, Germany and the Netherlands.
Sep 2023	'La fête de la Science'. Co-host of an experimental workshop on the epigenetics of DNA damage for a non-academic audience.
Jan-June 2022	'The research apprentices'. Mentoring high school students in conducting a 6 month research project, which they had to publicly defend at the end.

Mentoring

2020-2024 **Bachelor, Master and PhD students**
Introduction to bioinformatics, retrieval from online repositories and analysis of nucleotide sequences with BLAST and Jupyter notebooks. Stem cell culture. Project Management.