Lee Mariault

Postdoctoral researcher in bioinformatics · host–pathogen multi-omics & comparative genomics

Montpellier, France | lee.mariault@gmail.com | lee-06.github.io
github.com/Lee-06 | linkedin.com/in/lee-mariault | ORCID 0000-0001-9836-6630 | Google Scholar

RESEARCH PROFILE

Bioinformatician studying how genomes evolve and how infection shapes the immune system. At IRD, I integrate single-cell, spatial and other omics layers to understand how malaria in pregnancy reprograms fetal immunity. During my PhD, I built an annotation-free pipeline that screened about 1,500 plant and fungal genomes and uncovered rare, strongly asymmetric fungus-to-plant gene transfers, work recognised with a best short talk award at Plant Chromosome Biology 2025. Earlier work spans single-cell transcriptomics of paediatric leukaemia and structural variation in nematode genomes.

RESEARCH EXPERIENCE

Postdoctoral researcher — Mar. 2026 – present
MIGEVEC unit, IRD (French National Research Institute for Sustainable Development) — Montpellier, France
Fetal immune response to Plasmodium falciparum in malaria during pregnancy

- Characterising how placental infection reshapes the transcriptional landscape of cord-blood monocytes.
- Building an integrated multi-omics workflow: single-cell RNA-seq and multiome, spatial transcriptomics, epigenomics, proteomics and metabolomics.
- Maintaining reproducible R/Quarto analysis reports on a 58,000-cell multiome dataset (Seurat v5, SingleR), with caching and parallelised rendering.

PhD candidate — Oct. 2022 – Nov. 2025
Plant Genome & Development Lab (LGDP), CNRS / Univ. of Perpignan — Perpignan, France
Thesis: Genomic study of plant–fungus and liana–tree horizontal transfers

- Built an annotation-free comparative genomics pipeline (Python, R, Bash on a SLURM cluster) screening 418 plant and 1,081 fungal genomes for horizontal transfers of genes and transposable elements.
- Identified 22 high-confidence recent inter-kingdom transfers, 21 of them from fungi to plants (mainly bryophytes and Pooideae grasses), and traced their contrasting fates after integration.
- Discovered a plant-derived DNA transposon that invaded a powdery mildew fungus and expanded into a 172-copy MITE family.
- First-author review in *The Plant Cell* (2025) and first-author preprint (2026); 4 conference talks, including a best short talk award (Vienna, 2025).

MSc research intern — Jan. – June 2022
Sophia Agrobiotech Institute, INRAE / CNRS / Univ. Côte d'Azur — Sophia-Antipolis, France

- Identified structural variants associated with virulence in *Meloidogyne incognita* populations using a hybrid short/long-read pipeline on an HPC cluster (SLURM).

MSc research intern — Feb. – July 2021
Mediterranean Centre for Molecular Medicine (C3M), INSERM / Univ. Côte d'Azur — Nice, France

- Analysed single-cell RNA-seq of paediatric T-cell acute lymphoblastic leukaemia (Seurat, SCENIC, Monocle) and identified gene signatures predictive of relapse risk.
- Side project: drug repositioning for SARS-CoV-2 with the Connectivity Map, published as co-first author in *PLOS ONE*.

ADDITIONAL PROFESSIONAL EXPERIENCE

Bioinformatics expert, agentic AI evaluation (freelance) — Jan. 2026 – present
Mercor, via micro-entreprise — four concurrent AI-evaluation projects — Remote

- Promoted from task writer to reviewer to super reviewer on an agentic scientific-coding benchmark; write and QC multi-step tasks (reference solutions, tests, difficulty calibration) and coach writers and reviewers.
- Author expert genomics tasks with rubric-based grading and multi-step decision points.
- Annotate bioinformatics investigation tasks built on real biological datasets to stump frontier models; review AI agent trajectories against project guidelines.
- Human expert baseline for frontier-LLM evaluation; built automated validation harnesses (adversarial naive-baseline gates) with agentic coding workflows.

PUBLICATIONS

Journal articles

[1] **Mariault L.**, Puginier C., Keller J., El Baidouri M., Delaux P-M. (2025). Mechanisms, detection, and impact of horizontal gene transfer in plant functional evolution. *The Plant Cell*. doi:10.1093/plcell/koaf195

[2] Bonnet R.*, **Mariault L.***, Peyron J-F. (2022). Identification of potentially anti-COVID-19 active drugs using the Connectivity Map. *PLOS ONE*. doi:10.1371/journal.pone.0262751 *co-first authors

Preprints

[P1] **Mariault L.**, Lasserre E., Qian J., Hwang J-H., Kim K.D., Gibert A., Kusch S., Panstruga R., El Baidouri M. (2026). Asymmetric inter-kingdom gene transfer and a horizontal transposon invasion in a powdery mildew fungus. *bioRxiv*. doi:10.64898/2026.10.11.757921

[P2] Salvado P., Gibert A., Chaib S., Raviglione D., Bertrand C., El Baidouri M., **Mariault L.**, ..., Bertrand J.A.M. (2026). A cryptic hybrid zone reveals the genomic basis of flower colour variation in a plant with a large and complex genome. *bioRxiv*. doi:10.64898/2026.01.30.700338

CONFERENCE TALKS

Cross-kingdom horizontal gene transfers between plant and fungal genomes: insights from large-scale comparative genomics
Plant Chromosome Biology 2025, Vienna, Austria · **Best Short Talk Award** — Sept. 2025

Divergent horizontal transfer landscapes in liana–tree and plant–fungus interactions revealed by large-scale genome comparisons
25th National Congress on Transposable Elements (CNET 2025), Bordeaux, France — July 2025

Divergent horizontal transfer landscapes in plant–plant and plant–fungus interactions revealed by large-scale genome comparisons
Occitano-Catalan Meeting, Perpignan, France — June 2025

Horizontal transfers in the Massane forest: the well-kept secret of lianas
50th anniversary symposium of the Massane Nature Reserve, Banyuls-sur-Mer, France — Nov. 2023

TEACHING & MENTORING

Co-supervision of an MSc intern · LGDP — project scoping, HPC training, weekly follow-up and code review — 2025

Applied Computing for Biologists · 2nd-year BSc, UPVD, 12 h — advanced R, Leslie matrices, regression — 2025

Introduction to R for Scientists · 1st-year BSc, UPVD, 27 h — R basics, ggplot2, descriptive statistics — 2025

Statistics tutoring · 1st-year BSc, Université Côte d'Azur, 6 h — 2021

EDUCATION

PhD in Biology — 2022 – 2025
University of Perpignan Via Domitia — Perpignan, France

MSc in Life Sciences — Biology, Computer Science & Mathematics track (with honours) — 2020 – 2022
Université Côte d'Azur — Nice, France

BSc in Life Sciences — Bioinformatics track — 2017 – 2020
Université Côte d'Azur — Nice, France

TULIP Summer School on Integrative Biology and Ecology · Toulouse & Vallée de l'Esponne — July 2023

TECHNICAL SKILLS

Programming	Python (pandas, scikit-learn) · R (tidyverse, ggplot2, Quarto) · Bash · SQL
Workflows & HPC	Nextflow · Snakemake · Docker / Singularity · Git · SLURM
Single-cell & spatial	Seurat v5 · SingleR · Monocle 3 · SCENIC · Squidpy · cell2location
Genomics & phylogenomics	BWA-MEM2 · Minimap2 · DIAMOND · BEDTools · MAFFT · IQ-TREE 2 · AUGUSTUS
Statistics & ML	GLM · survival analysis · Bayesian statistics · random forest · Plotly, Seaborn
Languages	French (native) · English (fluent, C1 — TOEIC 955/990) · Spanish (limited working proficiency)

SERVICE, OUTREACH & SCIENCE COMMUNICATION

Author and volunteer reviewer, bioinfo-fr.net, a French-language bioinformatics blog for a general audience — 2025 – present

PhD representative, LGDP lab council and ED305 doctoral school council — 2023 – 2025

IT coordinator, UPVDoc PhD students' association — 2022 – 2023

Outreach: science festival workshops "DNA in all its states" (2022) and "PlantAdapt" (2024); DECLICS ambassador at Lycée Arago (2023) — 2022 – 2024