# Aurore-Cécile Valfort

**Research Assistant Scientist**

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**Good expertise in molecular biology and genome engineering**

**Development of new assays for drug screening**

**Laboratory and project manager**

## *SKILLS OVERVIEW*

**Cell biology**
Primary and stable cell line culture,
siRNA and DNA transfection,
Flow cytometry

**Genome engineering**
CRISPR/Cas-9
Cre-Lox recombination
Lentiviral production and transduction

**Molecular biology**
Multi-fragment cloning by restriction cloning,
Gibson assembly, gateway cloning,
gDNA extraction and purification,
*in vitro* RNA transcription,
RNA extraction and purification,
RT-qPCR

**Biochemistry**
SDS-PAGE, Western blot,
Co-immunoprecipitation

**Metabolism study**
*In vivo*: CLAMS, NMR
*In vitro*: Seahorse assay

***In vivo* experimentation**
Mouse IP injection, imaging, take down, organ collection

**Microscopy**
Spinning Disk, Confocal microscopy,
Differential interference contrast (DIC),
Leica Thunder microscope

***C. elegans***
Gonad microinjection, bombardment,
Immunostaining,
Forward genetic screen, EMS mutagenesis

**Lab management**
Relation with sales representatives, ordering, update lab database, maintenance of laboratory equipments

**Project management**
Planning, organization, reporting

**Informatics**
Work on Mac and PC. Scientific softwares and tools (Prism, Fiji, Ape, Benchling, NCBI, Pubmed)

**Languages**
French native speaker
Fluent english
Basic spanish

**Mentorship**
Intern and co-workers

## *WORK EXPERIENCES*

Since March 2022 — **Research Assistant Scientist** (Faculty). University of Florida Genetics Institute, Gainesville, FL, (USA)

**Team leader: Dr. Burris T., PhD**

- Design and screening of new small molecules targeting nuclear receptors for the treatment of several metabolic diseases such as Alzheimer, diabetes, obesity
  - In charge of the development of cell-based assay for drug discovery purpose
  - Drug discovery screening: FRET, cell-based transcription assay

- Support in molecular biology for the design of plasmids necessary for molecular
- **Communication:** 1 published article (Murray et al., 2022)

05/2019 – 02/2022 **Senior Research assistant.** University of Health Sciences and Pharmacy in St. Louis and Washington University in St. Louis. Saint Louis, MO (USA).
**Team leader: Dr. Burris T., PhD**

- Drug discovery for the development of new compounds targeting proteins involved in diseases such as diabetes, obesity Alzheimer and prostate cancer
  - Development of new drug discovery assays (cell-based and biochemical)
  - Identification of a dozen of new compounds having a better efficacy than control compounds. Those compounds are currently being characterized by *in vivo* studies.
  - **Communication:** 1 published article (Hegazy *et al.,* 2021)
- Support for molecular biology projects, cell-based and biochemical assays
- Lab manager

07/2017 – 03/2019 **Senior Research assistant.** Saint Louis University, Department of Pharmacology and physiology. Saint Louis, MO (USA)
**Team Leader: Dr. Flaveny C., PhD**

- Elucidation of a process leading a specific kind of breast cancer tumor to escape immune response and immunotherapies treatments. Demonstration of the positive effect of a nuclear receptor targeting drug as a vector for tumor destruction.
  - Implementation of new *in vitro* metabolic assays
  - Development of *in vitro* cell-based assay from mouse and human samples
  - *In vivo* experimentation
  - **Communication:** 2 published articles (Carpenter *et al*., 2019, Sengupta *et al*., 2021)
- Identification of a nuclear receptor as a potent target for the treatment of Duchenne muscular dystrophy
  - Histochemical staining on mouse muscle samples
  - **Communication:** 1 published article (Welch *et al.*, 2017)
- CRISPR development for cell engineering
- Department responsibilities: Training and support of metabolic core equipment
- Lab management: orders, inventories, database management, equipment maintenance

10/2013 – 06/2017 **Senior Research assistant:** Université de Lyon, Institut NeuroMyoGène. Lyon (France)
**Team leader: Pr. Bessereau JL, MD-PhD**

- Identification of new genes involved in the synaptic assembly and scaffold at the Neuro-Muscular Junction (NMJ) in *C. elegans.*
  - Genome engineering for the modification of genes of interest using CRISPR/Cas9 technology and other site-directed mutagenesis method specific to *C. elegans*
  - In charge of 3 forward genetic screens leading to the identification of dozens of mutants involved in the formation and regulation of synaptic functions in *C. elegans*.
  - Mutants characterization using Next-Generation Sequencing (NGS), staining and microscopy
  - Database management for the preservation of *C. elegans* mutant strains and DNA constructs.
  - **Communication:** 1 published article (Zhou *et al.*, 2020), 1 poster presentation (**Valfort** et al., 2016)
- Characterization of a gene suspected to be responsible of neurological disorders in human patients.
  - CRISPR/Cas-9 genome engineering for mutation of the *C. elegans* orthologue gene

    - Mutant characterization using gene expression (RT-qPCR) and drug dose-response assay
    - **Communication:** published article (Abiusi *et al.*, 2017)
- Support to other lab members for their molecular biology projects
    - **Communication:** 2 publications acknowledgments (Pinan-Lucarré *et al.*, 2014, Tu *et al.*, 2015)
- Involved in lab's stock management, update of lab's database for plasmid, primers and strains

10/2010 – 09/2013 **Research assistant:** Ecole Normale Supérieure de Lyon. Lyon (France)

**Team leader: Dr. Delattre M., PhD**

- Deciphering of mechanisms involved in spindle size variation during nematode evolution. Project financed by an international grant in collaboration with a US team from Harvard University.
    - Live DIC microscopy recording of the first embryonic cell division among 42 nematode species and more than a thousand embryos
    - Analysis of spindle asymmetric movements responsible of embryo's asymmetric division
    - Work in collaboration for the development of an automated tracking program able to extract the position of the centrosomes over time from our recordings
    - In-depth characterization for each species using microtubule immunostaining and confocal microscopy
    - Data analysis using Matlab scripts
    - Management of hundreds of nematode strains and data
    - **Communication :** 1 talk (**Ver midi XIV**, 2013), 2 published articles (**Valfort** *et al.,* 2018, Farhadifar *et al.*, 2015), 1 poster (**Valfort** *et al.,* 2011)
- Development of new genome engineering method for other nematode species than *c. elegans*
- Manage lab's stock, update lab's database for plasmid, primers, nematode strains
- Mentorship: Master students and undergrad students

01/2010 – 10/2010 **Research assistant**: Ecole Normale Supérieure de Lyon. Lyon, (France)

**Team leader: Dr. Cristofari G., PhD (IRCAN, Nice)**

- Understand mechanisms involved in retrotransposon mobility
    - DNA and siRNA transfection of HEK293T cells
    - Co-immunoprecipitation, SDS-PAGE, Western blot
    - Restriction and Gateway cloning, site directed mutagenesis

2009 (6 months) **M.S. internship**: Biotechnology Research Institute, NRC, Montréal (Canada)

**Team leader: Dr. Gilbert R., PhD**

- Improvement of lentivirus stability for gene therapy optimization
    - Production of pseudotyped lentivirus by transcient transfection
    - Production of DNA vector for lentivirus production.
    - Lentiviral transduction
    - L2 laboratory experience
    - Flow cytometry

## *EDUCATION*

2009 **Master of Science in Biotechnology.** Faculté de pharmacie and Ecole Supérieure de Biotechnologie, Strasbourg, France. Honorable mention, Rank: 1$^{st}$/30

2007 **Bachelor of Science in Biochemistry.** Université Claude Bernard, Lyon, France. Rank: 7$^{th}$/120

2004 **French Baccalauréat**, **major in sciences**. Jean Puy High School**,** Roanne, France

## LEISURE ACTIVITIES

**Sports** Triathlon training and competition

**Music** Clarinetist in a band for 10 years.

**Travel** Reunion Island, Thailand, USA, Canada, Ireland, Scotland, England, Hungary, Austria, Spain, Germany, Italy

## KEY ACHIEVEMENTS

**Publications**

Farhadifar R, Baer CF, **Valfort AC**, Andersen EC, Müller-Reichert T, Delattre M, Needleman DJ (2015) Scaling, selection and evolutionary dynamics of the mitotic spindle. *Current biology*, 25(6):732-740

Abiusi E, D'Alessandro M, Dieterich K, Quevarec L, Turczynski S, **Valfort AC**, Mezin P, Simon P, Gut M, Gut I, Bessereau JL, Melki J (2017), Biallelic mutation of UNC50, encoding a protein involved in AChR trafficking, is responsible for arthrogryposis. *Human Molecular Genetics*, 26(20):3989-3994

Welch RD, Billon C, **Valfort A-C**, Burris TP, Flaveny CA (2017) Pharmacological inhibition of REV-ERB stimulates differentiation, inhibits turnover and reduces fibrosis in dystrophic muscle. *Sci. Rep*., 7(1) :17142

**Valfort AC,** Launay C, Sémon M, Delattre M (2018) Evolution of mitotic spindle behavior during the first asymmetric embryonic division of nematodes. *PLoS Biol*. 16(1): e2005099

Carpenter KJ, **Valfort A-C**, Steinauer N, Chatterjee A, Abuirqeba S, Majidi M, Sengupta M, Di Paolo RJ, Shornick LP, Zhang J, Flaveny CA (2019) LXR-inverse agonism stimulates immune-mediated tumor destruction by enhancing CD8 T-cell activity in triple negative breast cancer. *Sci. Rep*., 9(1):19530

Zhou X, Gueydan M, Jospin M, Ji T, **Valfort AC**, Pinan-Lucarré B, Bessereau JL (2020), The netrin receptor UNC-40/DCC assembles a postsynaptic scaffold and sets the synaptic content of GABA A receptors. *Nat. Commun.* 11(1):2674

Sengupta M, Abuirqeba S, Kameric A, **Valfort AC**, Chatterjee A, Griffett K, Burris TP, Flaveny CA (2021) A two-hit model of alcoholic liver disease that exhibits rapid, severe fibrosis. PloS One, 16(3):e0249316

Hegazy L, **Valfort AC**, Burris TP, Elgendy B (2021), Distinct REV-ERBα Conformational State Predicted by GaMD Simulations Leads to the Structure-Based Discovery of Novel REV-ERBα Antagonist. *bioRxiv,* 2021.05.26.445894

Murray MH, **Valfort AC**, Koelblen T, Ronin C, Ciesielski F, Chatterjee A, Veerakanellore GB, Elgendy B, Walker JK, Hegazy L, Burris TP. (2022) Structural basis of synthetic agonist activation of the nuclear receptor REV-ERB. *Nat. Commun*, 13(1):7131

**Acknowledgements** Pinan-Lucarré B, Tu H, Pierron M, Cruceyra PI, Zhan H, Stigloher C, Richmond JE, Bessereau JL. (2014) *C. elegans* punctin specifies cholinergic versus GABAergic identity of postsynaptic domains. Nature, 511(7510):466-470

Tu H, Pinan-Lucarré B, Ji T, Jospin M, Bessereau JL (2015) *C. elegans* punctin clusters GABA(A) Receptors via neuroligin binding and UNC-40/DCC recruitment. Neuron, 86(6):1407-1419

**Talk** Ver midi XVI (French annual meeting), Lyon (02/2013)

**Valfort AC,** Farhadifar R, Needleman D, Delattre M, *Evolution of mitotic spindle shape and motion in nematode embryos*

**Poster presentations**

**Valfort A-C**, Bessereau J-L. Genome engineering using CRISPR/Cas9 system and a removable selection cassette in *C. elegans.* Intern event (06/2016)

**Valfort AC**, Bozonnet N, Farhadifar R, Needleman D, Delattre M, *Evolution of mitotic spindle shape in nematode embryos.* Ver midi XIV (French annual meeting), Paris (Jan. 2011)

## *REFERENCES*


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