CURRICULUM VITAE

PERSONAL INFORMATION

Name: Ferreira de Carvalho, Julie
Researcher id: Orcid 0000-0001-6200-3344

CURRENT PROFESSIONAL APPOINTMENT

2022-present **INRAE Research scientist,** Team Resistance of Pomoides, INRAE IRHS Angers, France. Project: Molecular mechanisms and genetic control of apple resistance to multiple bioagressors.

PREVIOUS PROFESSIONAL APPOINTMENTS

2020-2021 **Post-doctoral fellow**, Team Complex Biotic Interactions, INRAE IGEPP Rennes, France. Project: Genetic bases of plant-microbe interactions in oilseed rape and the role of specialized metabolites.

2018-2020 **Marie Skłodowska Curie IF post-doctoral fellow**, Team Biodiversity and Polyploidy, INRAE IGEPP Rennes, France. SURFInG Project: Structural and functional dynamics of *Brassica napus* allopolyploid genome.

2017-2018 **Marie Skłodowska Curie COFUND post-doctoral fellow,** Team Biodiversity and Polyploidy, INRAE IGEPP Rennes, France. COFUND Agreenskills+ Project: Immediate impact of polyploidy and of human selection on the evolutionary dynamics of *Brassica napus*.

2016-2017 **Guest researcher** PI Prof. Eric Schranz, Biosystematics laboratory, Wageningen University (NL). Project: *Taraxacum officinale* genome assembly and annotation.

2013-2017 **Post-doctoral fellow** PI Dr. Koen Verhoeven, Department of Terrestrial Ecology, Netherlands Institute of Ecology, Wageningen (NL). Project: (Epi)Genomic footprints associated with asexual evolution.

EDUCATION

2013 **Ph.D. in Plant Genomics, Evolution and Ecology** entitled 'Genome Evolution of polyploid *Spartina sp.* invading salt-marshes: contribution of Next-generation Sequencing technologies' Department of Life Sciences, Rennes Univ, France. Supervised by Prof. Malika Aïnouche
Thesis committee members: Prof. J. Wendel (Iowa State U.), Dr. B. Chalhoub (INRAE-CNRS Evry), Dr. A. D'Hont (CIRAD Montpellier) and Dr. A-M Chèvre (INRAE, Rennes).

2009 **M.Sc. in Functional, Behavioural and Evolutionary Ecology** with first class honours, Department of Life Sciences, Univ Rennes, France. Major subjects: Evolutionary and Molecular biology

SCIENTIFIC SKILLS

Comparative genomics and transcriptomics: Bioinformatics analyses, assemblies, annotations, differential gene transcription, SNP calling and identification of promoter regions.
Quantitative Genetics and phylogeny: Neighbor Joining, Maximum Likelihood and Maximum Parsimony, Population structure, Genome Wide Association Studies, genotyping analyses (DNA-Seq and microarrays).
Epigenomics: bisulfite treatment and sequencing (WGBS, Epi-GBS), differential methylation level analyses, smallRNA extraction and analyses.
Bio-statistics and environments: Galaxy and Unix, knowledge in Python programming, R language.
Molecular Biology: DNA, RNA extractions, cDNA synthesis, PCR, real-time quantitative PCR and derived methods, cloning and sequencing, library preparation for different sequencing platforms.

FELLOWSHIPS AND AWARDS

Fellowships

2018-2020 Laureate of the EU's Horizon2020 Programme **Marie Sklodowska Curie Individual Fellowship**, project SURFInG 'Structural and Functional dynamics of *B. napus* polyploid genome'

2017-2018 Laureate of the EU's 7th Framework Programme **Agreenskills+ (MSCA-COFUND)** post-doctoral fellowship

2009-2012 Beneficiary of **the PhD ARED Grant** "EVOSPART", **Regional Council of Brittany** (France)

Grants and Awards

2023-2025 Région Pays de La Loire Pulsar Grant 30K
2022-2024 BAP INRAE starting grant 30K
2019 Beneficiary of the mobility **program TOR** granted by the **French and Swedish embassies**
2019 Beneficiary of the grant **Boost'ERC** by the **Regional Council of Brittany** (France)
2018 **Travel Award SSE** to the 2nd Joint Congress on Evolutionary Biology (Montpellier, France)
2012 **Travel Award SFG** to the Plant and Animal Genome Meetings (San Diego, USA)
2010 **Scholarship** from Rennes PhD School to attend the International European course, ENS, Lyon

PARTICIPATIONS IN GRANTS

2024-2027 **CL6 HORIZON Europe Project 'FruitDiv'** PI Dr. V. Decroocq (INRAE-BFP)
2023-2027 **PEPR Agroécologie et Numérique Flagship 'AgroDiv'** PI : Dr. J. Salse (INRAE)
2020-2023 **PRIMA project 'BrasExplor'** PI Dr. A-M Chèvre (INRAE-IGEPP)
2018-2021 **Promosol (oilseed breeders) project 'DESCRIBE'** PIs Prof. Bouchereau and Dr. Gravot (IGEPP)
2014-2020 **France Genomique project 'POLYSUCCESS'** with National Sequencing Centre Génoscope attributed to Dr. A-M Chèvre (IGEPP)
2014-2017 **European ERA-CAPS 'Evo-Genapus'** PIs Prof. Ian Bancroft (Univ. of York), Prof. Rod Snowdon (Univ. of Giessen) and Dr. A-M Chèvre (INRAE-IGEPP)
2013-2016 **NWO-VIDI project 'Hereditary differences without genetic differences?'** PI Koen Verhoeven
2011-2012 **BARRANDE project on 'Evolution of repetitive sequences in the genome of Spartina species'** PIs Prof. Ainouche and Dr. Ales Kovarik, granted by the Partnership France-Czech Republic
2009-2010 **Project 'GENOSPAR: Genomics of Spartina'** PI Prof. Malika Ainouche, Génoscope, France

SUPERVISION OF GRADUATE STUDENTS, ENGINEERS AND POSTDOCTORAL FELLOWS

PI: **1 PhD thesis:** Romane Lapous (INRAE Univ Angers) to be defended in 2025
3 M.Sc. theses: Paul Galleron (IARA, Rennes)
Camille Haquet (ESA, Angers) currently PhD student INRAE
Romane Lapous (IARA, Rennes) currently PhD student INRAE
Loeiz Maillet (Rennes Univ, France) currently engineer at INRAE
Thomas Chaussepied (Rennes Univ, France) currently engineer at INRAE
Sabrina Kalita (Erasmus+, Germany) currently PhD in Biotech (Germany)
1 Engineer: Loeiz Maillet (INRAE IGEPP, France)
co-PI: **5 M.Sc. these:s** Alise Zvigule (Maastricht Univ, NL) currently PhD in Ecophysio (NL)
Arnoud Witteveen (WUR, NL) Crop Research Manager (UK)
Kim Magnee (WUR, NL) PhD in Plant breeding (NL)
Nikos Pappas (WUR, NL) Research Assistant (NL)
Pierre Bourdaud (Rennes Univ, France) Postdoc at UCT (South Africa)
1 Post-doc fellow: Dr. Desnoues (NIOO-KNAW, NL) Project manager in Crop breeding (CTIFL)
collab: **1 PhD thesis:** Dr. Azibi (UR1 and University of Algiers) defended in September 2020

TEACHING ACTIVITIES

2009-2012 **Teaching assistant at University of Rennes 1**, France. Undergraduate practical classes and lectures 192h (in French and English) in Nutrition and Reproduction, Plant Biology, Evolutionary Biology, Phylogenetic, Biosystematics and Biotic Interactions in Angiosperms.

ORGANISATION OF SCIENTIFIC MEETING

Oct 2024 **Local organizer of DYNAGEV – Dynamics of Plant genomes- in Angers**
Jan 2020 **Polyploidy Symposium at the International Plant and Genome Conference 'PAG'** (approx. 3,000 participants) in San Diego (USA), co-organizer Dr. Scott (UC Davis).

REVIEWING ACTIVITIES and INSTITUTIONAL RESPONSIBILITIES

2022-present Representative of INRAE Researchers at the Pays de la Loire INRAE Council
2016-present Reviews for the French National Agency (ANR) and member of the C02 committee 'Living earth'
2019-2022 Elected representative of INRAE-IGEPP council
2013-2019 16 manuscripts reviewed for 11 international scientific journals including *Nature Communications*, *GigaScience, Functional Ecology, Ecology and Evolution, The Plant Journal.*
2015-2017 Committee member for hiring Bioinformaticians, NIOO-KNAW, Wageningen (NL).

PUBLICATIONS

Peer-reviewed publications (IF=impact factor):

1. Xiong W., Risse J., Berke L., Zhao T., van de Geest H., Oplaat C., Busscher M., **Ferreira de Carvalho J.**, van der Meer I.M., Verhoeven K.J.F., Schranz ME and K. Vijverberg. Phylogenomic analysis provides insights into MADS-box and TCP gene diversification and floral development of the Asteraceae, supported by *de novo* genome and transcriptome sequences from dandelion (Taraxacum officinale) (2023). ***Frontiers in Plant Science*** Jun 21;14:1198909.
2. **Ferreira de Carvalho J.,** Missinou A., Marnet N., Delhaye T., Hamzaoui O., Sayed A., Guitton Y., Lebreton L., Langrume C., Laperche A., Delourme R., Manzanares-Dauleux M., Bouchereau A. and A. Gravot (2022). Identification and Quantification of Glucosinolates and Phenolics in a Large Panel of Brassica napus Highlight Valuable Genetic Resources for Chemical Ecology and Breeding. ***Journal of Agricultural and Food Chemistry*** 70: 5245-5261.
3. Boideau F., Richard G., Coriton O., Huteau V., Belser C., Deniot G., Eber F, Falentin C., **Ferreira de Carvalho J.,** Gilet M., Lodé-Taburel M., Maillet L., Morice J., Trotoux G., Aury JM., Chèvre AM. And M. Rousseau-Gueutin. Epigenomic and structural events preclude recombination in Brassica napus. ***New Phytologist*** 2022 Apr;234(2):545-559.
4. Falentin C., Richer V., Glory P., Deniot G., **Ferreira de Carvalho J.,** Bartoli C., Guillerm-Erckelboudt AY., Thénéré S., Doré S., Gilet M., Rousseau-Gueutin M., Gay L. and AM Chèvre (2022). Projet BrasExplor : élargir les ressources génétiques du CRB BrACySol pour Brassica oleracea et Brassica rapa. ***NOV'AE*** NS2, pp.21-27.
5. **Ferreira de Carvalho J.,** Stoeckel S., Eber F., Lodé-Taburel M., Gilet M., Trotoux G., Morice J., Falentin C., Chèvre A-M and M. Rousseau-Gueutin (2021). Untangling structural factors and evolutionary drivers in nascent polyploid success. *New Phytologist* 230(5):2072-2084.
6. Rousseau-Gueutin M., Belser C., Da Silva C., Richard G., Istace B., Cruaud C., Falentin C., Boideau F., Boutte J., Delourme R., Deniot G., Engelen S., **Ferreira de Carvalho J.,** Lemainque A., Maillet L., Morice J., Wincker P., Denoeud F., Chèvre A-M., and J-M Aury (2020). Long-reads assembly of the *Brassica napus* reference genome, Darmor-bzh. ***GigaScience*** 9(12): giaa137 (IF=6.00)
7. Boutte J., Maillet L., Chaussepied T., Letort S., Boideau F., Brunet A., Coriton O., Falentin C., Huteau V., Morice J., Trotoux G Chèvre AM., Rousseau-Gueutin M. and **J. Ferreira de Carvalho** (2020). Genome Size variation and comparative genomics reveal intraspecific diversity in *Brassica rapa*. ***Frontiers in Plant Science*** 11:577536 (IF=4.40)
8. Azibi T., Hadj-Arab H., Lodé M., **Ferreira de Carvalho J.,** Trotoux G., Nègre S., Gilet M., Boutte J., Lucas J., Vekemans X., Chèvre AM., M. Rousseau-Gueutin (2020). Impact of Whole genome Triplication on the evolutionary history and the functional dynamics of regulatory genes involved in Brassica self-incompatibility signaling pathway. ***Plant reproduction*** (IF=3.96)
9. **Ferreira de Carvalho J.**, Lucas J., Deniot G., Falentin C., Filangi O., Gilet M., Legeai F., Lode M., Morice J., Trotoux G., Aury J-M., Barbe V., Keller J., Snowdon R., He Z., Denoeud F., Wincker P., Bancroft I., Chèvre A-M. and M. Rousseau-Gueutin (2019). Cytonuclear interactions remain stable during allopolyploid evolution despite repeated whole-genome duplications in *Brassica*. ***The Plant Journal*** 98(3):434-447 (IF=6.14)
10. Alvarez M., **Ferreira de Carvalho J.**, Salmon A., Ainouche M., Cavé-Radet A., El Amrani A., Foster T.E., Moyer S. and C.L. Richards (2018). Transcriptome response of the foundation plant *Spartina alterniflora*. To the Deepwater Horizon oil spill. ***Molecular Ecology*** 27(14):2986-3000 (IF=5.16)

11. Verhoeven K.J.F, Verbon E., van Gurp T., Oplaat C., **Ferreira de Carvalho J.**, Morse A., Stahl M., Macel M. and L. McIntyre (2018). Intergenerational environmental effetc: functional signals in offspring transcriptomes and metabolomes after parental jasmonic acid treatment in apomictic dandelion. ***New Phytologist*** 217(2):871-882 (IF=8.51)

12. **Ferreira de Carvalho J.**, Desnoues E., Zonner C., and T. Crowther (2017). Nurture is more important than nature in determining leaf out timing across temperate tree species. ***Forest Ecosystems*** 4:26 (IF=2.70)

13. **Ferreira de Carvalho J.**, Boutte J., Bourdau P., Chelaifa H., Ainouche K., Salmon A. and M. Ainouche (2017). Gene expression variation in natural populations of hexaploid (parents and hybrids) and allododecaploid Spartina species (Poaceae). ***Plant Systematics and Evolution*** 303(8):1061-79 (IF=1.33)

14. Morgado L., Preite V., Oplaat C., Anava S., **Ferreira de Carvalho J.**, Rechavi O., Johannes F., and K.J.F. Verhoeven (2017). Small RNAs reflect environment from grandparental generation in apomictic dandelions. ***Molecular Biology and Evolution*** 34(8):2035-40 (IF=11.06)

15. **Ferreira de Carvalho J.**, de Jager V., van Gurp T., Wagemaker N. and K.J.F. Verhoeven (2016). Recent and dynamic transposable elements contribute to genomic divergence under asexuality. ***BMC Genomics*** 17:884 (IF=4.09)

16. Boutte J., **Ferreira de Carvalho J.**, Ainouche M. and Salmon A. Reference transcriptomes and detection of duplicated copies in hexaploid parents, hybrids and allododecaploid Spartina species (Poaceae) (2016). ***Genome Biology and Evolution*** 8(9):3030-44 (IF=3.46)

17. Huska D., Leitch I., **Ferreira de Carvalho J.**, Leitch A., Salmon A., Ainouche M. and A. Kovarik (2016). Persistence, dispersal and genetic evolution of recently formed Spartina homoploid hybrids and allopolyploids in Southern England. ***Biological Invasions*** 18(8):2137-51 (IF=3.09)

18. **Ferreira de Carvalho J.**, Oplaat C., Pappas N., Derks M., de Ridder D. and K.J.F. Verhoeven (2016). Heritable gene expression differences between apomictic clone members in *Taraxacum officinale*: Insights into early stages of evolutionary divergence in asexual plants. ***BMC Genomics***. 17: 203 (IF=4.09)

19. Boutte J., Aliaga B., Lima O., **Ferreira de Carvalho J.**, Ainouche A., Macas J., Rousseau-Gueutin M., Coriton O., Ainouche M. and A. Salmon (2015). Haplotype Detection from Next Generation Sequencing in High Ploidy-Level Species: 45S rDNA Gene Copies in the Hexaploid *Spartina maritima*. ***G3*** 6(1):29-40 (IF=2.78)

20. Martin G., Rousseau-Gueutin M., Cordonnier S., Lima O., Michon-Coudouel S., Naquin D., **Ferreira de Carvalho J.**, Ainouche M., Salmon A. and A. Ainouche (2014). The first complete chloroplast genome of Genistoid legume *Lupinus lucteus*: Evidence for a novel major lineage-specific rearrangement and new insights regarding plastome evolution in the legume family. ***Annals of Botany*** 113 (7): 1197-1210 (IF=4.01)

21. **Ferreira de Carvalho J.**, Poulain J., Da Silva C., Wincker P., Michon-Coudouel S., Dheilly A., Naquin D., Boutte J., Salmon A. and M. Ainouche (2013a). Transcriptome de novo assembly from Next-Generation Sequencing and comparative analyses in the hexaploid salt marsh species *Spartina maritima* and *Spartina alterniflora* (Poaceae). ***Heredity*** 110: 181-93 (IF=4.10)

22. **Ferreira de Carvalho J.**, Chelaifa H., Mangenot S., Couloux A., Wincker P., Bellec A., Fourment J., Berges H., Salmon A. and M. Aïnouche (2013b). Exploring the genome of the salt-marsh species *Spartina maritima* (Poaceae, Chloridoideae) through BAC End Sequence analysis. ***Plant Molecular Biology*** 83: 591-606 (IF=4.07)

<u>Peer-reviewed international conference proceedings:</u>

19. Alvarez M., Foust C.M., Robertson M., Ainouche M**., Ferreira de Carvalho J.**, Meals C.J., Preite V., Salmon A., Shayter A., Schrey A.W, Verhoeven K.J.F. and C.L. Richards. (2016). Molecular response to challenging environmental conditions in *Spartina alterniflora*: an integrated approach. *Proceedings of the 4th International Conference on Invasive Spartina*.

20. Huska D., Leitch I., **Ferreira de Carvalho J.**, Leitch A., Salmon A., Ainouche M. and A. Kovarik (2016). Estimation of ploidy levels and rDNA genotypes in two mixed populations of recently formed *Spartina* hybrids in southern England. *Proceedings of the 4th International Conference on Invasive Spartina.*

21. Salmon A., Boutte J., **Ferreira de Carvalho J.**, et al. (2016). The challenges of genomics in polyploid *Spartina* species: how to deal with hybrid genomes and high redundancy? *Proceedings of the 4th International Conference on Invasive Spartina.*

Book chapters:

1. Rousseau-Gueutin M., Keller J., **Ferreira de Carvalho J.**, Aïnouche A., and G. Martin (2018). The intertwined plastid and nuclear evolution in land plants. In: Soltis PS, Soltis DE (Eds) Chloroplasts - Physiology and Genetics, IntechOpen.

2. Ainouche M., Chelaifa H., **Ferreira de Carvalho J.**, Bellot S., Ainouche A. and A. Salmon (2012). Polyploid evolution in Spartina: dealing with highly redundant genomes. In: Soltis PS, Soltis DE (Eds) Polyploidy and Genome Evolution, Springer Berlin Heidelberg. pp 225-244

3. SELECTED ORAL PRESENTATIONS

-Ferreira de Carvalho J., *et al.* On the road to polyploid success. **Plant and Animal Genome Conference 2020 (San Diego, USA)**.

-Ferreira de Carvalho J., *et al.* Cytonuclear interactions remain stable during allopolyploid evolution despite repeated whole-genome duplications in *Brassica*. **2nd Joint Congress on Evolutionary Biology Evolution 2018, Montpellier (France).**

-Ferreira de Carvalho J., *et al.* Cytonuclear interactions remain stable during allopolyploid evolution despite repeated whole-genome duplications in *Brassica*. **21st Crucifer genetics Conference Brassica 2018, Saint-Malo (France).**

-Ferreira de Carvalho J., Chaussepied T., Letort S., Chèvre A-M. and M. Rousseau-Gueutin. Structural and functional consequences of transposable elements after multiple Whole-Genome Duplication events. **French annual meeting on Plant Genome Dynamics DynaGev, 2018 Rennes (France).**

-Ferreira de Carvalho J. and K. Verhoeven. Dead-end trajectory of young triploid apomicts: Can transposable elements improve their adaptive potential? **ESEB 2017, Groningen (The Netherlands).**

-Ferreira de Carvalho J. and K. Verhoeven. Dead-end trajectory of young triploid apomicts: Can transposable elements improve their adaptive potential? **International Conference on Polyploidy, Hybridization and Biodiversity ICPHB 2016, Rovinj (Croatia).**

-Ferreira de Carvalho J. and K. Verhoeven. Dead-end trajectory of young triploid apomicts: Can transposable elements improve their adaptive potential? **French annual meeting on Plant Genome Dynamics DynaGev 2016, Paris (France).**

-Ferreira de Carvalho J. and K. Verhoeven. Transposable elements and methylation variation between apomictic clone members in *Taraxacum officinale*: Insights into early stages of genome evolution under asexuality. **Plant Genome Evolution Conference 2015, Amsterdam (The Netherlands)**.

-Ferreira de Carvalho J. et al. Phenotypic, transcriptomic and epigenetic heritable variation within apomictic lineages of dandelion natural populations. **Society of Molecular Biology and Evolution 2014, San Juan (Puerto Rico)**.

-Ferreira de Carvalho J. et al.. Genome and Transcriptome analysis of the hexaploid *Spartina* species colonizing salt marshes using next generation sequencing. **International Conference on Polyploidy, Hybridization and Biodiversity ICPHB 2012, Prague (Czech Republic).**

-Ferreira de Carvalho J., Salmon A. and M. Aïnouche. Genome evolution of *Spartina* hybrid and allopolyploid species invading salt marshes. **Polyploidy and Cytogenetics workshop 2011, London (England).**

-Ferreira de Carvalho J., Chelaifa H., Salmon A., Macas J. and M. Aïnouche. High-throughput genome and transcriptome sequencing in hexaploid and allo-dodecaploid *Spartina* species (Poaceae). **French annual Polyploidy Meeting 2011, Montpellier (France).**

INVITED PRESENTATIONS

-Ferreira de Carvalho J. Transposable elements as a source of new phenotypic diversity. **Workshop REACTION - Réseau d'échange sur les mécanismes Epigénétiques qui façonnent les interacTIONs Plantes, Bioagresseurs et Organismes Symbiotiques 2019 (Lyon, France)**. Invited by Dr. G. Letrionnaire.

-**Ferreira de Carvalho J.** Structural and functional dynamics of *Brassica napus* polyploid genome. **Université de Rennes 1 2018 (France).** Invited by Prof. M. Aïnouche.

-Ferreira de Carvalho J. Unravelling the importance of transposable elements for phenotypic divergence in triploid asexual dandelions. **Plant and Animal Genome Conference 2017 (San Diego, USA)**. Invited by Dr. B. Chalhoub.

-Ferreira de Carvalho J. Genomic footprints of asexuality in dandelions. **University of Neuchatel 2015 (Switzerland)**. Invited by Dr. C. Parisod.