

## Curriculum Vitae

**First name:** Maria de Fátima  
**Last name:** Cardoso Pereira  
**Affiliation:** Division of Microbial Ecology, Centre for Microbiology and Environmental Systems Science (CMESS), University of Vienna  
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### RESEARCH INTERESTS

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I am interested in the diversity and function of microbes in the gut. I use high-throughput microbiome profiling via next generation sequencing and metagenomics, cultivation, activity-based approaches, and animal models to identify bacteria targeted by host-derived, dietary and pharmaceutical compounds. I am particularly interested in identifying gut commensals who perform functions that provide resistance to colonization by gut pathogens like *Clostridioides difficile*, and in the rational design of probiotic communities able to restore colonization resistance.

A part of my work is also dedicated to understanding the role of host-secreted small RNA molecules on the composition and function of the gut microbiome in microbiome-associated disorders like Inflammatory Bowel Disease.

### RESEARCH EXPERIENCE

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- 07/2019-Present **Senior Postdoc/Principal Investigator** (Project grant)  
Division of Microbial Ecology, CMESS, University of Vienna, Austria.
- 09/2014-06/2019 **Postdoc**  
**Marie Skłodowska-Curie Individual Fellow**  
Division of Microbial Ecology, CMESS, University of Vienna, Austria.  
Host: Prof. David Berry
- 03/2012-04/2012 **Visiting Researcher** at Institut Pasteur, Paris, France.  
Host: Dr. Bruno Dupuy
- 10/2008-07/2014 **PhD candidate** in Molecular Biology  
Instituto de Tecnologia Química e Biológica, NOVA University of Lisbon, Portugal. Supervision: Professor Adriano O. Henriques
- 06/2008-08/2008 **Research trainee**  
Morphogenesis Unit, Instituto de Medicina Molecular (FM-UL, Lisbon, Portugal).
- 10/2006-04/2008 **Research trainee**  
Cell Cycle Group, Instituto Gulbenkian de Ciência, Oeiras, Portugal.

**ACADEMIC DEGREES**

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- 2014      **PhD Degree in Biology**, branch Molecular Biology  
Instituto de Tecnologia Química e Biológica, NOVA University of Lisbon, Portugal.  
Thesis: *Spore differentiation in relation to the infectious cycle of the enteric pathogen Clostridium difficile*.
- 2006      **BSc (5 years Degree) in Biological Engineering**  
Instituto Superior Técnico, Technical University of Lisbon, Portugal, final classification 16/20. Thesis: *Characterization of Drosophila melanogaster Tctp protein*.

**SCIENTIFIC PROJECTS AND AWARDS WITH COMPETITIVE FUNDING**

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- 2019-2021      **Young Independent Research Group grant:** “Adjusting the base: (Epi)transcriptomic RNA modification in inflammation & host-microbiome crosstalk”. Project ZK-57 funded by the **FWF-Austrian Science Fund**. (€ 1.3M total, € 408k for University of Vienna PI Fatima C Pereira).
- 2015-2017      **Project grant:** “MUCDIFF: Competition between the enteric pathogen Clostridium difficile and the commensal members of the gut microbiota for mucosal sugars”. Project funded by the **European Commission/ Marie Skłodowska-Curie Individual Fellow** under Grant agreement No. 658718 to Fatima C Pereira. (€ 166k).
- 2012      **EMBO short-term fellowship** (ATSF 184-2012) to visit the Pathogenesis of Bacterial Anaerobes Laboratory, headed by Dr. Bruno Dupuy, Institut Pasteur, Paris, France. March - April, 2012. (€ 2k).
- 2008-2012      **PhD scholarship** (SFRH/BD/45459/2008) awarded by the **FCT- Portuguese national funding agency** (€ 47k).

## OTHER AWARDS:

- 2021      Selected for the **Early Career Researcher Reviewer Program** from the American Society for Microbiology and to be member of the **mBio Junior Editorial Board**.

**PUBLICATIONS**

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Lee KS, Landry Z, **Pereira FC**, Wagner M, Berry D, Huang WE, Taylor G, Kneipp J, Popp J, Zhang M, Cheng J, Stocker R (2021) Raman microspectroscopy for microbiology. *Nature Reviews Methods Primers*. DOI: 10.1038/s43586-021-00075-6. *In press*.

**Pereira FC**, Wasmund K, Cobankovic I, Jehmlich N., Herbold CW, Lee KS, Sziranyi B, Vesely C, Decker, T, Stocker R, Warth B, von Bergen M, Wagner M, Berry D (2020) Rational design of a microbial consortium of mucosal sugar utilizers reduces Clostridiodes difficile colonization. *Nature Communications* 11: 5104. DOI:10.1038/s41467-020-18928-1

Lee KS, Palatinszky M, **Pereira FC**, Nguyen J, Fernandez VI, Mueller AJ, Menolascina F, Daims H, Berry D, Wagner M, Stocker R (2019) An automated Raman-based platform for the sorting of live cells by functional properties. *Nature Microbiology* 4: 1035-1048. DOI:10.1038/s41564-019-0394-9.

Lee KS, **Pereira FC**, Palatinszky M, Behrendt L, Alcolombri U, Berry D, Wagner M, Stocker R (2021) Optofluidic Raman-activated cell sorting for targeted genome retrieval or cultivation of microbial cells with specific functions. *Nature Protocols*. 16: 634–676. DOI: 10.1038/s41596-020-00427-8.

**Pereira FC**, Nunes F, Cruz F, Fernandes C, Isidro AL, Lousa D, Soares CM, Moran CP, Henriques AO, Serrano M (2019) A LysM Domain Intervenes in Sequential Protein-Protein and Protein-Peptidoglycan Interactions Important for Spore Coat Assembly in *Bacillus subtilis*. *Journal of Bacteriology* 201: e00642-00618. DOI: 10.1128/JB.00642-18

Reese AT, **Pereira FC**, Schintlmeister A, Berry D, Wagner M, Hale LP, Wu A, Jiang S, Durand HK, Zhou X, Premont RT, Diehl AM, O'Connell TM, Alberts SC, Kartzinel TR, Pringle RM, Dunn RR, Wright JP, David LA (2018) Microbial nitrogen limitation in the mammalian large intestine. *Nature Microbiology* 3: 1441-1450. DOI: 10.1038/s41564-018-0267-7.

Ladurner A, Zehl M, Grienke U, Hofstadler C, Faur N, **Pereira FC**, Berry D, Dirsch VM, Rollinger JM (2017) Allspice and Clove As Source of Triterpene Acids Activating the G Protein-Coupled Bile Acid Receptor TGR5. *Frontiers in Pharmacology* 8:468. DOI: 10.3389/fphar.2017.0046

**Pereira FC** & Berry D (2017). Microbial nutrient niches in the gut. *Environmental Microbiology* 19:1366–1378. DOI: 10.1111/1462-2920.13659

Serrano M, Kint N, **Pereira FC**, Saujet L, Boudry P, Dupuy B, Henriques AO, I Martin-Verstraete (2016) A Recombination Directionality Factor Controls the Cell Type-Specific Activation of  $\sigma_K$  and the Fidelity of Spore Development in *Clostridium difficile*. *PLoS Genetics*. 12(9):e1006312. DOI: 10.1371/journal.pgen.1006312

Serrano M, Crawshaw AD, Dembek M, Monteiro JM, **Pereira FC**, Pinho MG, Fairweather NF, Salgado PS and AO Henriques (2016) The SpoIIQ-SpoIIAH complex of *Clostridium difficile* controls forespore engulfment and late stages of gene expression and spore morphogenesis. *Molecular Microbiology* 100(1):204-28. DOI: 10.1111/mmi.13311

Cassona CP, **Pereira FC**, Serrano M and AO Henriques (2016) A Fluorescent Reporter for Single Cell Analysis of Gene Expression in *Clostridium difficile*. *Methods in Molecular Biology*. 1476:69-90. DOI: 10.1007/978-1-4939-6361-4\_6

Saujet L, **Pereira FC**, Henriques AO and I Martin-Verstraete. (2014) The regulatory network controlling spore formation in *Clostridium difficile*. *FEMS Microbiology Letters* 358(1):1-10. DOI: 10.1111/1574-6968.12540

**Pereira FC**, Saujet L, Tomé AR, Serrano M, Monot M, Couture-Tosi E, Martin-Verstraete I, Dupuy B and AO Henriques. (2013) The spore differentiation pathway in the enteric pathogen *Clostridium difficile*. *PLoS Genetics*, 9(10):e1003782. DOI: 10.1371/journal.pgen.1003782

Saujet L, **Pereira FC**, Serrano M, Soutorina O, Monot M, Shelyakin P, Gelfand MS, Dupuy B, AO Henriques and I Martin-Verstraete. (2013) Genome-wide analysis of cell type-specific gene expression during spore formation in *Clostridium difficile*. *PLoS Genetics*, 9(10):e1003756. DOI: 10.1371/journal.pgen.1003756

Janoir C, Denève C, Bouttier S, Barbut F, Caleechurn L, Hoys S, Chapeton-Montes D, **Pereira FC**, Henriques AO, Collignon A, Monot M and B Dupuy. (2013) Insights into the adaptive strategies and pathogenesis of *Clostridium difficile* from in vivo transcriptomics. *Infection and Immunity*, 81(10):3757-69. DOI: 10.1128/IAI.00515-13

## COMMUNICATION SKILLS (ORAL AND WRITTEN)

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### Oral Presentations:

- 2021 **13<sup>th</sup> Seeon Conference - Microbiota, Probiotics and Host**, Seeon, Germany. "SRS-FISH: High-Throughput Platform Linking Microbiome Function to Identity at the Single Cell Level". Invited short talk.
- 2021 **1<sup>st</sup> Young Austrian Microbiome Initiative Symposium, Vienna, Austria**. "Probing microbiome function using next-generation Raman-FISH". Invited speaker.
- 2019 **4<sup>th</sup> Microbial Single Cell Genomics Workshop**, Bigelow Single Cell Genomics Centre, Maine, USA. "Linking chemical microscopy and single cell genomics". Invited speaker.
- 2017 **4<sup>th</sup> Theodor Escherich Symposium** on Medical Microbiome Research, Graz, Austria. "Sorting and sequencing active host-derived compound foragers from the mouse gut microbiota".
- 2016 **9<sup>th</sup> Seeon Conference - Microbiota, Probiotics and Host**, Seeon, Germany. "Identifying and sorting host compound foragers from the gut microbiota by heavy water-based activity labelling and raman microspectroscopy".
- 2015 **8<sup>th</sup> Seeon Conference and Science Camp - Intestinal Microbiota**, Seeon, Germany." Tracking heavy water incorporation to identify and sort active cells of the gut microbiota".
- 2012 **XXXVII Portuguese Genetics Conference**, Lisbon, Portugal. "Morphodynamics of spore differentiation in relation to pathogenesis in *Clostridium difficile*".
- 2007 **National Meeting of Drosophilists** (Drotuga 2007), Porto, Portugal. "Identification and characterization of new *Drosophila* Kinetochore proteins".
- 2006 **National Meeting of Drosophilists** (Drotuga 2006), Oeiras, Portugal. "*Drosophila* Tctp is required for spindle assembly".

Poster presentations, in a total of **15 posters**, three of them awarded with the prize for **Best poster**.

**Best Poster. 9<sup>th</sup> Seeon Conference - Microbiota, Probiotics and Host**, Seeon, Germany, July 7-9, 2017.

**Best Poster. 5<sup>th</sup> European Spores Conference**. Royal Holloway, University of London, United Kingdom. April 16-19, 2012.

**Best Poster (3<sup>rd</sup> place). ELSO meeting**, Dresden, Germany. September 1-4, 2007.

## COLLABORATION PARTNERS

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- **Dr. Cláudia R Serra and Dr. Paula Enes:** CIIMAR, Matosinhos, Portugal.
- **Dr. Cornelia Vesely and Dr. Michael Jantsch:** Center for Anatomy and Cell Biology, Medical University of Vienna, Austria.
- **Dr. Riem Gawish:** Department of Medicine I, Medical University of Vienna, Austria.
- **Dr. Kang Soo Lee and Prof. Roman Stocker:** Environmental Microfluidics Group, ETH Zurich, Switzerland.
- **Dr. Ji-Xin Cheng:** College of Engineering, Boston University, USA.
- **Dr. Kim de Paepe and Prof. Tom Van de Wiele:** Center for Microbial Ecology and Technology, Ghent University, Belgium.

## SCIENCE COMMUNICATION

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2020	“Behind the paper” blog article at Nature Microbiology Research Community: ( <a href="https://naturemicrobiologycommunity.nature.com/users/410574-fatima-pereira">https://naturemicrobiologycommunity.nature.com/users/410574-fatima-pereira</a> )
2016, 2017 & 2019	Co-organizer of the KinderUni workshop for children "A journey into microbial life on earth". University of Vienna. ( <a href="https://kinderuni.at/kinderuniwien/">https://kinderuni.at/kinderuniwien/</a> )
2016	European Researcher's Night. Vienna Institute of Technology (TGM), Vienna, Austria. ( <a href="http://www.be-scienced.eu/de/">http://www.be-scienced.eu/de/</a> )
2011 & 2013	Participation in the ITQB Open day, ITQB- NOVA, Oeiras, Portugal

## PEER-REVIEW ACTIVITIES

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- **Ad-hoc Reviewer** for *Environmental Microbiology*, *Frontiers in Microbiology*, *Microbial Biotechnology*, *npj Biofilms and Microbiomes*.

## TECHNICAL SKILLS

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**Microbial Ecology:** application of stable-isotope probing methods to study the function of microorganisms in complex intestinal communities; Raman microspectroscopy; Fluorescence *in situ* hybridization (FISH); Raman-FISH; Raman-activated cell sorting; stimulated Raman scattering (SRS); Nanoscale secondary ion mass spectrometry (NanoSIMS); Bioorthogonal non-canonical amino acid tagging (BONCAT); Fluorescence-activated cell sorting (FACS); 16S rRNA amplicon sequencing; genomics and metagenomics; *in vivo* colonization and infection models (mice).

**Microbiology:** general microbiological techniques; isolation and manipulation of anaerobic organisms; bacterial spore manipulation and characterization methods.

**Molecular biology:** DNA and RNA isolation; reverse transcription; PCR; qPCR and RT-qPCR; bacterial whole genome amplification; Illumina sequencing library preparation; bacterial genetic engineering and cloning techniques; Southern blotting; amplicon sequencing (16S and functional gene markers); metagenomics; transcriptomics.

**Bioinformatics:** High-throughput analysis of 16S rRNA gene amplicon sequencing data using R packages vegan, DESeq2, phyloseq, ampvis2, Rhea; *de novo* assembly and annotation of microbial genomes using Spades and RAST; metagenomic genome binning with MetaBat; sequencing coverage normalization with BBnorm; genome bin dereplication and quality assessment using dRep and CheckM; phylogenomic analysis using FastTree.

**Biochemical techniques:** Protein expression and purification; SDS-PAGE; Western blotting; protein-protein interaction (“pull-down”) assays.

## LANGUAGE SKILLS

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- Portuguese (mother tongue), English (advanced proficient user-C1), German (basic user-A2).