

CARLOS ANDRÉS DÍAZ RODRÍGUEZ

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🌐 **Portfolio:** CADR BIO.tech
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🗣️ Spanish (native) · English · Portuguese

PROFILE

Computational microbiologist working at the intersection of microbial genomics, functional annotation and systems biology. Experience in the assembly and annotation of single genomes and metagenome-assembled genomes (MAGs) across Illumina, Oxford Nanopore and PacBio data, including formal descriptions of novel bacterial taxa. My doctoral work combines dual RNA-seq transcriptomics with genome-scale metabolic modelling of the *Drosophila*–*Wolbachia* symbiosis. Co-author of a review on prokaryotic taxa discovery in the age of metagenomics and artificial intelligence.

EDUCATION

Gulbenkian Institute for Molecular Medicine | Católica Biomedical Research Centre Oeiras, Portugal
Ph.D. in Integrative Biology and Biomedicine 09/2022 – expected 02/2027

- *Thesis:* Host-Microbe Metabolic Interactions in *Drosophila melanogaster*. Co-supervised by Dr. Maria Zimmermann-Kogadeeva (EMBL Heidelberg).

Universidad de los Andes Bogotá, Colombia
M.Sc. in Biological Sciences – Microbiology 10/2020 – 06/2022

- *Thesis:* Polymer-transforming Potential of a Minimal Lignocellulolytic Bacterial Consortium.

Universidad Nacional de Colombia Medellín, Colombia
B.E. in Biological Engineering 04/2014 – 08/2019

RESEARCH EXPERIENCE

Católica Biomedical Research Centre (CBR) Oeiras, Portugal
PhD Researcher 02/2023 – Present

- Designed and ran a dual RNA-seq study of the *Drosophila melanogaster*–*Wolbachia* symbiosis, and reconstructed a genome-scale metabolic model of *Wolbachia* by integrating multiple automated biochemical reconstructions into an evidence-graded consensus network with host-derived nutrient constraints.
- Assembled the complete genome of a novel bacterial species from hybrid Oxford Nanopore and Illumina data using a curated long-read-first workflow (Tricycler, Medaka, Polypolish, POLCA, manual curation), and annotated it with metannotator. Formal species description in preparation.

European Molecular Biology Laboratory (EMBL) Heidelberg, Germany
Scientific Exchange Visitor 03/2024 – 04/2024

- Reconstructed a draft genome-scale metabolic model of *Wolbachia* growth during a one-month exchange in the Multi-Omics-Based Modelling of Microbial Ecosystems research group led by Dr. Zimmermann-Kogadeeva.

Universidad de los Andes Bogotá, Colombia
Graduate Researcher, Microbial Genomics 10/2020 – 06/2022

- Recovered three circular, high-quality metagenome-assembled genomes from PacBio HiFi metagenomes of a lignocellulolytic bacterial consortium, deposited under BioProject PRJNA842362.
- Established a novel genus and a novel species using ANI, AAI, dDDH and whole-proteome phylogenomics, and named them under the SeqCode with genomes as type material.
- Profiled carbohydrate-active, lignin- and plastic-transforming enzymes and prophages across the genomes (dbCAN2, KEGG, PlasticDB, PHASTER).
- Built a cheminformatic tripartite network to prioritise candidate plastic-degrading enzymes, transferring function from structurally similar lignin-derived substrates using RDKit fingerprints and Tanimoto similarity across 43 plastic- and 70 lignin-derived compounds.

TEACHING & TRAINING

Universidad de los Andes

Invited Lecturer, Introduction to Biotechnology

Bogotá, Colombia

08/2021 – 06/2022

- Took bench-trained students with no prior computational experience to working competence in sequence analysis and protein structure visualisation.
- Co-developed and delivered three lectures with associated practical workshops across two semesters, in guided and self-directed formats.

Universidad de los Andes

Course Coordinator, Cell Biology

Bogotá, Colombia

08/2020 – 03/2022

- Coordinated course delivery for approximately 100 undergraduate students across two academic years.
- Designed workshops, quizzes and examinations, managed assessment and grading, and implemented courses on the WebCT and Brightspace learning platforms.

Universidad de los Andes

Undergraduate Thesis Co-Director

Bogotá, Colombia

08/2020 – 07/2022

- Co-directed a project on microbial consortium construction for lignocellulose degradation; student progressed to an MSc in Environmental Management.

SELECTED PUBLICATIONS AND PRESENTATIONS

- Discovery and cultivation of prokaryotic taxa in the age of metagenomics and artificial intelligence. *The ISME Journal* (2026). D. Jiménez, R. Marasco, J. Schultz, **C. Díaz-Rodríguez**, J. Nogales, L. Rodríguez-R, J. Overmann, A. Soares Rosado. [DOI]
- Novel bacterial taxa in a minimal lignocellulolytic consortium and their potential for lignin and plastics transformation. *ISME Communications* (2022). **C. Díaz-Rodríguez**, L. Díaz-García, K. Herrera, N. Tarazona, C. Spröer, L. Rodríguez-R, B. Bunk, J. Overmann, D. Jiménez. [DOI]
- Complete genome sequence of *Xanthomonas campestris* pv. *campestris* SB80, a race-4 strain isolated from white head cabbage in Turkey. *Microbiology Resource Announcements* (2022). S. Erken-Meral, S. Bibi, **C. Díaz-Rodríguez**, J. Menković, A. Bernal, R. Koebnik. [DOI]
- GIMM Festival, Lisbon, Portugal, 2026 — poster.
- SymbNET Final International Conference on Host–Microbe Symbiosis, Olhão, Portugal, 2024 — oral.
- SymbNET Metabolomics Workshop for Biologists. Lausanne, Switzerland, 2023 — poster.
- Second ISME Latin American Congress (ISME-LAT), Bogotá, Colombia, 2021 — poster.

TECHNICAL EXPERTISE

- **Microbial Genomics & Metagenomics:** Single-genome and metagenome-assembled genome (MAG) assembly, annotation and taxonomic assignment across Illumina, Oxford Nanopore and PacBio HiFi data; complete hybrid genome assembly (Tricycler, Medaka, Polypolish, POLCA); functional annotation with metatranslator; phylogenomic and comparative genomic analyses; polyphasic taxonomy and formal species description.
- **Computational biology & workflows:** dual RNA-seq, differential expression and functional enrichment; genome-scale metabolic modelling with COBRA, CarveMe and Gapseq; Python, R, UNIX/Linux and Bash; HPC with SLURM, Docker and Git.

AWARDS, TRAINING & PROFESSIONAL SERVICE

- **Research Exchange Programme, SymbNET** — competitive award, EMBL Heidelberg, 2024.
- **Programme for Recruitment of Talent, COLFUTURO** — national talent programme, Colombia, 2021–2023.
- **Postgraduate Excellence Scholarship (BEPS)** — Universidad de los Andes, EUR 9,600, 2020–2022.
- **Peer reviewer, Bio-protocol** — microbiology, genomics, transcriptomics and metabolic modelling.
- **International training:** Genomics of Bacterial Pathogens (IRD / Universidad de los Andes, 2021); Innovation in the Study of Enzymes (CABBIO, 2022); Flux Analysis and Synthetic Biology in Bioenergy (ICGEB, 2022).