

# Benjamin Valderrama

Computational Biologist & PhD candidate

| [Email](#) | [Google Scholar](#) | [Personal website](#) | [GitHub](#) | [LinkedIn](#) | [Bioinformatics blog](#) |

## Education

- Current**      **PhD – Bioinformatic approaches to unravel the role of the microbiome in the Gut-Brain axis**  
APC Microbiome Ireland, Cork, Ireland. Supervisors: Professors John F. Cryan and Gerard Clarke.
- 2021**      **Diploma – Bioinformatics and Computational Biology**  
Universidad de Chile, Dept. of Chemistry and Pharmaceutical Science, Santiago, Chile
- 2019**      **Bachelor of Science – Major in Biology**  
Pontificia Universidad Católica de Chile, Department of Biological Sciences, Santiago, Chile.

## Research Experience

- 2023-Current**      **PhD candidate**      APC Microbiome Ireland, Cork, Ireland.
- Summary: I led three bioinformatic projects during my thesis. **(1)** I developed a framework to identify best probiotic candidates with neuroactive potential. The approach was successfully validated in vitro and in vivo. **(2)** I generated the largest archive of South American gut microbiomes. By leveraging that resource and a previous global archive, I created the first planetary-scale analysis of the neuroactive potential of the human gut microbiome. **(3)** I created a novel workflow to assess the microbiome potential to modulate gut barrier integrity. By integrating multiomics approaches, we identified markers of altered permeability in 5 health conditions using data from 21 human studies.
- Additionally, I led or was involved in >15 scientific collaborations with national and international teams. These experiences prompted me to work in multidisciplinary and multicultural teams of academics, industry partners and other stakeholders, developing scientific and communications skills.
- Skills: Microbiome data analysis, Transcriptomics and Metabolomics analysis, Statistical analysis and modelling, Git and GitHub, Nextflow, Docker, Machine Learning, Software development, Genomics Analyses.
- Outputs: >10 Peer-reviewed data publications, 1 book chapter, 1 perspective article, 1 review article, >5 poster presentations.
- 2024**      **Bioinformatician**      GERO Chile, Centre for Geriatric Research in Chile. Santiago, Chile.

Summary: Analysed microbiome samples collected across the county in the largest Chilean cohort to date. I generated automated reports for participants. This was a remote and part time role I held while completing my PhD degree in Ireland.

Skills: Microbiome data analysis, Statistical analysis with R, Git, Scientific writing and figure generation, Work with DNA data from public repositories, Oral presentations.

Outputs: 1 research article (under review).

**2022-  
2023**

**Research Assistant** APC Microbiome Ireland. Cork, Ireland.

Summary: Industry-funded project where I developed a novel framework to identify novel probiotics with neuroactive potential. The identified candidate was experimentally validated in animal models. Additionally, I assisted with the analysis and integration of omics data in multiple projects.

Skills: Microbiome data analysis, RNAseq data from brain and gut tissue, Metabolomics data analysis, Bacterial genomics, Statistical modelling with R, Python, Bash, Git (GitHub), Nextflow, Development of custom workflows for analysis of multiomics data, Docker, Scientific writing and figure generation, Oral presentations with stakeholders.

Outputs: 3 data analysis workflows for internal use, 1 Bacterial genome announcement, 3 Peer-Reviewed research articles.

**2021-  
2022**

**Automation Specialist** Multiplex, Dept of R&D. Santiago, Chile.

Summary: Industry role at a start-up that tested for the presence of viral particles in export fruit. I automated laboratory protocols by programming pipetting robots, such as DNA and RNA extraction, RT-PCR, qPCR and ELISA. My work generated a 7-fold increase in the daily volume of samples analysed. I held this position while studying my diploma in bioinformatics and computational biology.

Skills: Python, Bash, Git (GitHub), Automatic weekly report generation, GUI development, Oral presentations with stakeholders, Opentrons OT-2 robots, Mantis liquid handling robots, Arduino and 3D design and printing.

Outputs: Automated the generation of weekly reports about robot's performance and volume of samples processed. GUI that helped colleagues with non-coding background in the automation of further laboratory protocols.

**2020-  
2021**

**Bioinformatician** National Institute of Nutrition and Food Technology of Chile (INTA). Santiago, Chile

Summary: Analysed microbiome data generated in industry-funded projects aiming to develop new probiotics for the aquaculture industry.

Skills: Microbiome analysis with R (16s rRNA and ITS marker genes), Statistical analyses with R, Automated update report generation, Scientific writing, Oral presentations, Scientific writing and figure generation.

Outputs: 2 peer-reviewed research articles.

**2020**      **Research Assistant**      National Institute of Nutrition and Food Technology of Chile (INTA). Santiago, Chile

Summary: Wetlab and Drylab hands-on experience in microbiome analyses.

Skills: Gut microbiome DNA extraction from *Haliothis rufescens* (16s rRNA). DNA extraction from Chilean vineyards (from soil and within the factory). Analysis of microbiome data with R, Phylogenetics analyses, Scientific and Industry report writing and figure generation.

Outputs: Internal reports for the industry partner (Chilean vineyard) regarding the presence of taxa with key roles in modulating the quality of the products.

**2018-2020**      **Research Assistant**      Pontificia Universidad Católica de Chile. Santiago, Chile.

Summary: Role held part-time while completing my bachelor's degree. I generated and analysed behavioural, brain gene expression and gut microbiome data using the animal model *D. melanogaster*.

Skills: Animal behaviour, Experimental design, RNA extraction protocol optimization, Gut microbiome DNA extraction protocol setup, Data analysis with R, Experimental design, Scientific writing and figure generation.

Outputs: 2 peer-reviewed research articles, 1 poster presentation at a national conference.

## Publications

### In preparation

**2026**      **First author**      ***The Microbiome Potential to Modulate Intestinal Permeability Across Conditions and Disease Severity.***

**Benjamin Valderrama**, Thomaz F.S. Bastiaanssen, Aonghus Lavelle, Mireia Valles-Colomer, Subatra Ghosh, Marietta Iacucci, Gerard Clarke, John F. Cryan.

### Under review

**2026**      **First Author**      ***A global-scale assessment of the neuroactive potential of the human gut microbiome***

**Benjamin Valderrama**, Thomaz F.S. Bastiaanssen, Aonghus Lavelle, Gerard Clarke, John F. Cryan.

***Under Review at npj Biofilms & Microbiomes.***

**Contributor**      ***Gut microbiota drives cisplatin chemotherapy-induced impairment in object recognition memory.***

Sarah-Jane Leigh, Paula Sanchez-Diaz, Thomaz F.S. Bastiaanssen, **Benjamin Valderrama**, Cristina Rosell Cardona, John F. Cryan, Gerard Clarke.

**Under Review at Biological Psychiatry.**

**2026** Contributor ***Microbiota-sensitive neuroimmune and metabolic programs in early postnatal brainstem development: relevance to diffuse midline glioma***

Cristina Cuesta-Marti, Caoimhe M.K Lynch, Lars Wilmes, Julia Eckenberger, **Benjamin Valderrama**, Jade A. Lawless; Gerard M Moloney, Subrata Ghosh, Gerard Clarke, John F Cryan.

**Under Review at Brain Behaviour and Immunity.**

**2025** First author ***Beyond Solidarity: Global Mental Health Benefits from Expanding Microbiome-Gut-Brain Axis Research to the Global South.***

**Benjamin Valderrama**, Livia H. Morais, Aonghus Lavelle, Sian M.J. Hemmings, Lindsay J. Hall, Zul Merali, Gerard Clarke, John F. Cryan.

**Under Review at Nature Mental Health.**

Contributor ***Orchestrating Microbiome Analysis with Bioconductor.***

Tuomas Borman, Giulio Benedetti, Geraldson Mulu, Aura Raulo, **Benjamin Valderrama**, Artur Sannikov, Stefanie Peschel, Yihan Liu, Rasmus Hindström, OMA consortium, Katariina Pärnänen, Christian L. Müller, Aki S. Havulinna, Sudarshan Shetty, Marcel Ramos, Domenick J. Braccia, Héctor Corrada Bravo, Felix M. Ernst, Levi Waldron, Thomaz F. S. Bastiaanssen, Himel Mallick, Leo Lahti.

**Under Review at Nature Communications.** Preprint: <https://www.biorxiv.org/content/10.1101/2025.10.29.685036v1.full>

Contributor ***From Gut to Brain: Evidence for a Causal Contribution of Gut-Microbiota to Major Depressive Disorder in Humans.***

Leon Fehse, Adèle H Ribeiro, Nils R Winter (...), **Benjamin Valderrama**, (...), Tilo Kircher, Dominik Heider, Tim Hahn.

**Under Review at Nature Communications.** Preprint: <https://www.medrxiv.org/content/10.1101/2024.12.05.24318549v1>

## Accepted, not published yet

**2026** Contributor ***Towards Ecological Psychiatry: The Herbicide Glyphosate Disrupts the Microbiota-Gut-Brain Axis to Regulate Sex-Dependent Behavioral Deficits.***

Rie Matsuzaki, **Benjamin Valderrama**, Gabriel Tofani, Soner Cagun, Patrick Fitzgerald, Gerard Clarke, Eoin Gunnigle, John F. Cryan.

**Accepted at Molecular Psychiatry.**

## Published

**2026** Co-First author ***The Neuroactive Potential of the Elderly Human Gut Microbiome is Associated with Mental Health Status***

Paulina Calderón-Romero, **Benjamin Valderrama**, Thomaz Bastiaanssen, Patricia Lillo, Daniela Thumala, Gerard Clarke, John F Cryan, Andrea Slachevsky, Christian González-Billault, Felipe A Court.

PLOS Biology. [10.1371/journal.pone.0343493](https://doi.org/10.1371/journal.pone.0343493)

Contributor ***Global environmental change and the gut–kidney–brain axis: a review and framework of vulnerability and resilience. (2026).***

Shazia Adalat, Konstantinos Giannakou, **Benjamin Valderrama**, Juan Guillermo Cárdenas-Aguilera, Giorgos K Sakkas, Jonathan Overeem, Gaye Hafez, Dearbhla Kelly, Jelena Vulevic, Guohua He, Silvia M Mihăilă, Alessandra Tamaro, Burcin Ikiz, John F Cryan, on behalf of the Climate-Kidneys-Cognition Working Group.

**The Lancet Planetary Health** [10.1016/j.lanplh.2026.101453](https://doi.org/10.1016/j.lanplh.2026.101453)

Contributor ***Early-life Microbiota Disruption-Induced Deficits in the Social Brain are Sensitive to Diet.***

Anna Ratsika, Cristian A. Bergmann, **Benjamin Valderrama**, Thomaz F. S. Bastiaanssen, Brendan L. Sharvin, Ingrid B. Renes, Jan Knol, Eoin Gunnigle, Gerard Clarke, John F. Cryan.

**iScience.** [10.1016/j.isci.2026.114968](https://doi.org/10.1016/j.isci.2026.114968)

Contributor ***Bifidobacterium longum and prebiotic interventions restore early-life high-fat/high-sugar diet-induced alterations in feeding behavior in adult mice.***

Cristina Cuesta-Marti, Eduardo Ponce-España, Friederike Uhlig, Iris Stoltenborg, Luiza Wasiewska, Lamiah Kareem, Loreto Olavarría-Ramírez, Cristina Rosell-Cardona, Thomaz F.S. Bastiaanssen, Gabriel Tofani, **Benjamin Valderrama**, Klara Vlckova, Dara Hedayatpour, Suzanne Dickson, Aonghus Lavelle, Catherine Stanton, R Paul Ross, John F. Cryan, Timothy Dinan, Gerard Clarke, and Siobhain O'Mahony, Harriet Schellekens.

**Nature Communications.** <https://doi.org/10.1038/s41467-026-68968-2>

**2025** First author ***The South American MicroBiome Archive (saMBA): enriching the microbiome field by studying neglected populations.***

**Benjamin Valderrama**, Paulina Calderón-Romero, Thomaz FS Bastiaanssen, Aonghus Lavelle, Gerard Clarke, John F Cryan.

**Nature Communications.** <https://doi.org/10.1038/s41467-025-62601-4>

First author ***From in silico screening to in vivo validation in zebrafish—a framework for reeling in the right psychobiotics.***

**Benjamin Valderrama**, Isabelle Daly, Eoin Gunnigle, Kenneth J O'Riordan, Maciej Chichlowski, Sagarika Banerjee, Alicja A Skowronski, Neeraj Pandey, John F Cryan, Gerard Clarke, Jatin Nagpal.

**Foods & Function.** [10.1039/D4FO03932G](https://doi.org/10.1039/D4FO03932G)

First author ***Chapter 26 - Supervised Machine Learning.***

**Benjamin Valderrama.**

**Orchestrating Microbiome Analysis with Bioconductor** Available online: [https://microbiome.github.io/OMA/docs/devel/pages/machine\\_learning.html](https://microbiome.github.io/OMA/docs/devel/pages/machine_learning.html)

Contributor ***In vitro assessment of bacterial supernatants on hypothalamic gene expression: implications for appetite regulation.***

Cristina Cuesta-Marti, **Benjamin Valderrama**, Thomaz Bastiaanssen, John F Cryan, Catherine Stanton, Siobhain M O'Mahony, Gerard Clarke, Harriët Schellekens.  
**npj Biofilms and Microbiome.** <https://doi.org/10.1038/s41522-025-00820-9>

Contributor ***Gut microbiota regulates exercise-induced hormetic modulation of cognitive function.***

Elisa Cintado, Pablo Muela, Lucía Martín-Rodríguez, Ignacio Alcaide, Patricia Tezanos, Klara Vlckova, **Benjamin Valderrama**, Thomaz F.S. Bastiaanssen, María Rodríguez-Muñoz, María L. de Ceballosa, María R. Aburto, John F. Cryan, José Luis Trejo.

**The Lancet eBioMedicine.** [10.1016/j.ebiom.2025.105876](https://doi.org/10.1016/j.ebiom.2025.105876)

Contributor ***Escitalopram alters tryptophan metabolism, plasma lipopolysaccharide, and the inferred functional potential of the gut microbiome in deer mice showing compulsive-like rigidity.***

Larissa Karsten, Brian H Harvey, Dan J Stein, **Benjamin Valderrama**, Thomaz FS Bastiaanssen, Gerard Clarke, John F Cryan, Rencia van der Sluis, Heather Jaspán, Anna-Ursula Happel, De Wet Wolmarans.

**Acta Neuropsychiatrica** <https://doi.org/10.1017/neu.2025.16>

**2024** First author ***High-quality draft genome of Lactiplantibacillus plantarum strain APC2688 isolated from human feces.***

**Benjamin Valderrama**, Isabelle Daly, Eoin Gunnigle, Mary C Rea, John Kenny, Mairead Coakley, John F Cryan, Gerard Clarke, Jatin Nagpal.

**Microbiology Resource Announcements.** <https://doi.org/10.1128/mra.00641-24>

**2023** Contributor ***Kanamycin treatment in the pre-symptomatic stage of a Drosophila PD model prevents the onset of non-motor alterations.***

Daniela Molina-Mateo, **Benjamin Valderrama**, Raffaella V Zárata, S Hidalgo, Javier Tamayo-Leiva, Antonia Soto-González, Simón Guerra-Ayala, Vicente Arriagada-Vera, C Oliva, B Diez, Jorge M Campusano.

**Neuropharmacology.** <https://doi.org/10.1016/j.neuropharm.2023.109573>

**2021** First author ***Cultivable Yeast Microbiota from the Marine Fish Species Genypterus chilensis and Seriolella violacea.***

**Benjamin Valderrama**, Ruiz, J. J., Gutiérrez, M. S., Alveal, K., Caruffo, M., Oliva, M., Flores, H., Silva, A., Toro, M., Reyes-Jara, A., & Navarrete, P.

**Journal of Fungi.** <https://doi.org/10.3390/jof7070515>

Contributor ***Probiotic Yeasts and Vibrio anguillarum Infection Modify the Microbiome of Zebrafish Larvae.***

Vargas, O., Gutiérrez, M. S., Caruffo, M., **Benjamin Valderrama**, Medina, D. A., García, K., Reyes-Jara, A., Toro, M., Feijóo, C. G., & Navarrete, P.

**Frontiers in Microbiology.** <https://doi.org/10.3389/fmicb.2021.647977>

- 2020** Contributor *The behavioral and neurochemical characterization of a Drosophila dysbindin mutant supports the contribution of serotonin to schizophrenia negative symptoms.*  
Hidalgo, S., Castro, C., Zárata, R. V., Benjamin Valderrama, Hodge, J. J. L., & Campusano, J. M.  
**Neurochemistry International.** <https://doi.org/10.1016/j.neuint.2020.104753>

## Poster presentations

- 2025** **NeuroGASTRO – European Society of Neurogastroenterology and Motility**  
London, UK (International)
- 2025** **International Symposium of Hispanics in Bioinformatics and Computational Biology**  
Virtual (International)
- 2024** **Virtual Institute for Bioinformatics and Evolution (VIBE) conference**  
Galway, Ireland (National)
- 2018** **Annual Conference of the National Society of Neuroscience**  
Puerto Varas, Chile (National)

## My work on the Media

- 2025** **CNN Chile – Future 360**  
CNN Chile interviewed me about my research published in Nature Communications. Article: <https://doi.org/10.1038/s41467-025-62601-4>. See the interview in CNN's youtube: <https://www.youtube.com/watch?v=2TQiuFNrDeU> (Minute 00:50 to 08:50).
- El Mercurio newspaper – News release**  
One of the largest Chilean newspapers covered my research published in Nature Communications. Article: <https://doi.org/10.1038/s41467-025-62601-4>. News report: <https://x.com/IrlEmbChile/status/1961543041707327884>.
- The microbiologist – News release**  
Opinion piece covering the relevance of saMBA for global microbiome research and health: <https://www.the-microbiologist.com/opinion/key-lessons-from-the-samba-studies-on-human-gut-microbiome-diversity/6629.article>.
- Microbiome Digest**  
This website is a hub for weekly highlights in impactful microbiome research. The website highlighted saMBA when it was released as a preprint in BioRxiv on April 11<sup>th</sup> : <https://microbiomedigest.com/2025/04/10/april-11-2025/>.
- APC Microbiome Ireland – Spotlights on Scientific Excellence**

The APC Microbiome Ireland highlighted saMBA as part of the works that shape microbiome research globally. It gave saMBA a spotlight of half a page in the section “Scientific Excellence” <https://www.ucc.ie/en/apc/about/impact/#2024-2025-report-impact-through-excellence>.

### **University College Cork – Research News**

The university covered the impact of saMBA as part of their research news: <https://www.ucc.ie/en/research/news/2025/ucc-researchers-develop-the-largest-archive-of-gut-microbiomes-in-south-america.html>.

## Societal Impact Beyond Academia

### **2019 Scientific Coordinator – Academy ‘Youth for the Future’**

Senate of the Republic of Chile.

I worked for the **Senate of Chile**, where **I led the organization of the Academy and served as its Scientific Coordinator**. We selected outstanding students of scientific degrees across the country based on academic excellence and their societal impact. The academy offered master classes with scientific experts and politicians, who trained the students in the political and scientific aspects required to face the global challenges of the future, such as climate change, increasing economic and gender inequity, the use of AI, energy production and shortage, and others. In addition to the training, **our work led to the proposal of two bills, with one becoming a Law in Chile in 2021**.

## Awards

### **2025 PhD student of the year**

University College Cork.

### **2025 PhD student of the year – Scientific Excellence Award**

APC Microbiome Ireland.

### **2024 Best Poster Award**

Virtual Institute for Bioinformatics and Evolution (VIBE) conference, Galway, Ireland

I received the award for my poster entitled “The South American MicroBiome Archive (saMBA): enriching the microbiome field by studying neglected populations”. Later published in Nature Communications: <https://doi.org/10.1038/s41467-025-62601-4>.

### **2022 PhD Scholarship (Declined)**

National Agency for Research and Development (ANID), Chile

I was honored with the most competitive scholarship in the country. Nevertheless, I humbly rejected the award to start a position as a Bioinformatics Analyst in the research laboratory lead by Professors John Cryan and Ger Clarke at the APC Microbiome Ireland.

## Workshops attendance

**2024 Neuroscience School of Advanced Studies**  
Venice, Italy (International)

### Teaching Experience

<b>2024</b>	University College Cork, Ireland	Introduction to Computational Biology
<b>2021</b>	Pontificia Universidad Católica (PUC), Chile	Introduction to R: Data analysis and visualization
<b>2021</b>	PUC, Chile	Introduction to Cellular Biology
<b>2019 - 2020</b>	PUC, Chile	Biostatistics
<b>2019</b>	PUC, Chile	Genetics and Evolution
<b>2018</b>	PUC, Chile	Biochemistry and Cellular Biology (Practicals)
<b>2018</b>	PUC, Chile	Bioethics

### Peer Review

I have served as a reviewer for *Gut Pathogens* and *NPJ | Biofilms & Microbiomes*. Additionally, I have assisted my supervisors as a co-reviewer for *Cell reports*.

### Contributions to Open-Source Software and Projects

[‘mikropml’](#) – An R package for applying machine learning to microbiome data.

[Orchestrating Microbiome Analysis](#) – I wrote the book chapter ‘Supervised Machine Learning’

### Working Groups Membership

[Climate-Kidney-Cognition](#) – International Research Network