Juan Diaz-Colunga, Ph.D.

”Ramon y Cajal” Junior Group Leader
Institute of Functional Biology & Genomics (IBFG-CSIC)
University of Salamanca

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Research interests

Biophysics, Systems Biology, Ecology & Evolution, Population Genetics

Education

Ph.D. Biophysics 2015 – 2019
Spanish National Center for Biotechnology (CNB-CSIC)

M.Sc. Biomedical Engineering 2013 – 2014
Universidad Politecnica de Madrid

B.Sc. Physics 2009 – 2013
Universidad Autonoma de Madrid

Awards and fellowships

“Ramon y Cajal” Junior Group Leader Fellowship 2024
→ Top-2 ranked candidate in the area of Biosciences and Biotechnology
→ Start date in Spring 2025
PhD *cum laude* with international mention 2019
“Severo Ochoa” PhD Fellowship 2015 – 2019
“Severo Ochoa” Travel Grant (for 6-month stay at MIT) 2018
Comunidad de Madrid: Undergraduate Excellence Fellowship 2009 – 2013

Research experience

Postdoctoral Scientist
University of Salamanca, Institute of Functional Biology & Genomics 2023 – present
Yale University, Dept. of Ecology & Evolutionary Biology 2020 – 2022
Universidad Autonoma de Madrid, Dept. of Biochemistry 2019 – 2020

Visiting Scholar
Massachusetts Institute of Technology (MIT), Dept. of Physics of Living Systems 2018

PhD Fellow
Spanish National Center for Biotechnology (CNB-CSIC), Dept. of Cellular and Molecular Biology 2015 – 2019

Publications

∗ (co-)first author
✉ (co-)corresponding author

Global epistasis and the emergence of function in microbial consortia
Juan Diaz-Colunga ∗ ✉, Abigail Skwara, Jean CC Vila, Djordje Bajic, Álvaro Sánchez
Cell **187**:1–12 (2024)

Full factorial construction of synthetic microbial communities
Juan Diaz-Colunga ∗, Pablo Catalan, Magdalena San Roman, Andrea Arrabal, Alvaro Sanchez
bioRxiv (2024)

Global epistasis in plasmid-mediated antimicrobial resistance
Javier DelaFuente, Juan Diaz-Colunga ∗, Alvaro Sanchez, Alvaro San Millan
Molecular Systems Biology **20(4)**:311–20 (2024)

The optimization of microbial functions through rational environmental manipulations
Álvaro Sánchez, Andrea Arrabal, Magdalena San Román, Juan Diaz-Colunga
Molecular Microbiology **00**:1–10 (2024)

Environmental modulation of global epistasis in a drug resistance fitness landscape
Juan Diaz-Colunga ∗ ✉, Alvaro Sanchez, C. Brandon Ogbunugafor
Nature Communications **14**:8055 (2023)

Statistically learning the functional landscape of microbial communities
Abigail Skwara, Karna Gowda, Mahmoud Yousef, Juan Diaz-Colunga, Arjun S Raman, Alvaro Sanchez, Mikhail Tikhonov, Seppe Kuehn
Nature Ecology & Evolution **7**:1823—1833 (2023)

Global epistasis on fitness landscapes
Juan Diaz-Colunga ∗ ✉, Abigail Skwara, Karna Gowda, Ramon Diaz-Uriarte, Mikhail Tikhonov, Djordje Bajic, Alvaro Sanchez
Philosophical Transactions of the Royal Society B **378**:20220053 (2023)

The community-function landscape of microbial consortia
Alvaro Sanchez, Djordje Bajic, Juan Diaz-Colunga ∗, Abigail Skwara, Jean CC Vila, Seppe Kuehn
Cell Systems **14(2)**:122–34 (2023)

Predictability of the community-function landscape in wine yeast ecosystems
Javier Ruiz, Miguel de Celis, Juan Diaz-Colunga, Jean CC Vila, Belen Benitez-Dominguez, Javier Vicente, Antonio Santos, Alvaro Sanchez, Ignacio Belda
Molecular Systems Biology **19(9)**:e11613 (2023)

Top-down and bottom-up cohesiveness in microbial community coalescence
Juan Diaz-Colunga ∗, Nanxi Lu, Alicia Sanchez-Gorostiaga, Chang-Yu Chang, Helen S Cai, Joshua E Goldford, Mikhail Tikhonov, Álvaro Sánchez
Proceedings of the National Academy of Sciences **119(6)**:e2111261119 (2022)

Diversity begets diversity under microbial niche construction
Sylvie Estrela, Juan Diaz-Colunga ∗, Jean CC Vila, Alicia Sanchez-Gorostiaga, Alvaro Sanchez
eLife (accepted) (2022)

Engineering complex communities by directed evolution
Chang-Yu Chang, Jean CC Vila, [...], Juan Diaz-Colunga, Sylvie Estrela, Maria Rebolleda-Gomez, Alvaro Sanchez
Nature Ecology & Evolution **5(7)**:1011–23 (2021)

Directed evolution of microbial communities
Álvaro Sánchez, Jean CC Vila, Chang-Yu Chang, Juan Diaz-Colunga, Sylvie Estrela, María Rebolleda-Gomez
Annual Review of Biophysics **50**:323–41 (2021)

Conditional prediction of consecutive tumor evolution using cancer progression models: What genotype comes next?
Juan Diaz-Colunga ∗, Ramon Diaz-Uriarte
PLOS Computational Biology **17(12)**:e1009055 (2021)

Osmotic modulation of chromatin impacts on efficiency and kinetics of cell fate modulation
Ana F Lima, Gillian May, Juan Diaz-Colunga, Susana Pedreiro, Artur Paiva, Luciana Ferreira, Tariq Enver, Francisco J Iborra, Ricardo Pires das Neves
Scientific Reports **8(1)**:1–14 (2018)

Mitochondrial levels determine variability in cell death by modulating apoptotic gene expression
Silvia Márquez-Jurado, Juan Diaz-Colunga ∗, Ricardo Pires das Neves, Antonio Martinez-Lorente, Fernando Almazán, Raúl Guantes, Francisco J Iborra
Nature Communications **9(1)**:1–11 (2018)

Epigenetic control of influenza virus: role of H3K79 methylation in interferon-induced antiviral response
Laura Marcos-Villar, Juan Diaz-Colunga, Juan Sandoval, Noelia Zamarreño, Sara Landeras-Bueno, Manel Esteller, Ana Falcón, Amelia Nieto
Scientific Reports **8(1)**:1–13 (2018)

Mitochondria and the non-genetic origins of cell-to-cell variability: more is different
Raúl Guantes, Juan Diaz-Colunga, Francisco J Iborra
BioEssays **38(1)**:64–76 (2016)

Selected talks

Scientific Spring Meeting of the Royal Dutch Society of Microbiology 2024
Arnhem, the Netherlands
Invited talk

Industrial Microbiology Seminar Series 2024
Delft University of Technology, the Netherlands
Invited talk

17th Meeting of the Spanish National Network of Lactic Acid Bacteria 2024
León, Spain
Invited talk – keynote speaker

IBFG Seminar Series 2023
Institute for Functional Biology and Genomics (IBFG-CSIC), Salamanca, Spain
Invited talk

CAB Conference: 2022
Microbial Communities at the Interface between Ecology and Evolution
Mexico City, Mexico

XXIX Workshop: Advances in Molecular Biology 2021
Spanish National Center for Biotechnology (CNB-CSIC), virtual seminar

Evolutionary & Ecological Systems Biology Talks 2021
Massachusetts Institute of Technology (MIT), virtual seminar
Invited talk

Physics of Living Systems Seminar Series 2018
Massachusetts Institute of Technology (MIT), Cambridge, USA

Quantitative Principles in Biology 2017
European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

CNB Seminar Series 2016
Spanish National Center for Biotechnology (CNB-CSIC), Madrid, Spain

Teaching

Senior Thesis Supervisor 2023
B.Sc. Final Research Project, Universidad Complutense de Madrid

Senior Thesis Supervisor 2021
EEB Senior Research (EEB475 & 476), Yale University

Teaching Assistant 2019
M.Sc. Experimental Methods in Biophysics, Universidad Autonoma de Madrid

Reviewing activity

Review Editor for *Frontiers in Synthetic Biology* 2024 – present

Project Reviewer for the French National Research Agency (ANR) 2024

Reviewer for *Nature Communications, The ISME Journal, eLife, Nature Cities, Philosophical Transactions of the Royal Society B, Global Change Biology, PLOS Computational Biology, mSystems*

Skills

Programming: R, Python, Matlab
Wet lab: General microbiology laboratory techniques
Languages: English (fluent), Spanish (native), German (basic)

Outreach & service

Participant & organizer at various scientific outreach activities
Member of the Committee for Gender Equality at IBFG-CSIC
Founder of the Commission for Cultural Activities at IBFG-CSIC