

# Juan Diaz-Colunga, Ph.D.

Postdoctoral Associate  
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**Research interests** Ecology & Evolution, Population Genetics, Biophysics, Systems Biology

<b>Education</b>	<b>Ph.D. Biophysics</b> Spanish National Center for Biotechnology (CNB-CSIC)	Madrid, Spain 2015 – 2019
	<b>M.Sc. Biomedical Engineering</b> Universidad Politecnica de Madrid	Madrid, Spain 2013 – 2014
	<b>B.Sc. Physics</b> Universidad Autonoma de Madrid	Madrid, Spain 2009 – 2013


<b>Honors and fellowships</b>	PhD <i>cum laude</i> with international mention	2019
	Severo Ochoa PhD Fellowship	2015 – 2019
	Severo Ochoa Travel Grant (for 6-month stay at MIT)	2018
	Comunidad de Madrid Excellence Undergraduate Fellowship	2009 – 2013

<b>Research experience</b>	<b>Postdoctoral Associate</b> Yale University Dept. of Ecology & Evolutionary Biology Advisors: Prof. Alvaro Sanchez & Prof. C. Brandon Ogbunugafor	2020 – Present
	<b>Postdoctoral Researcher</b> Universidad Autonoma de Madrid Dept. of Biochemistry, School of Medicine Advisor: Prof. Ramon Diaz-Uriarte	2019 – 2020
	<b>Visiting PhD Fellow</b> Massachusetts Institute of Technology (MIT) Physics of Living Systems dept. Advisor: Prof. Jeff Gore	2018
	<b>PhD Fellow</b> Spanish National Center for Biotechnology (CNB-CSIC) Dept. of Cellular and Molecular Biology Advisors: Dr. Francisco J. Iborra & Prof. Raul Guantes	2015 – 2019


<b>Publications</b>	<b>Learning the functional landscape of microbial communities</b> Abigail Skwara, Karna Gowda, Mahmoud Yousef, <u>Juan Diaz-Colunga</u> , Arjun S Raman, Alvaro Sanchez, Mikhail Tikhonov, Seppe Kuehn <i>Nature Ecology &amp; Evolution</i> [in press] (2023)
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\* (co-)first author  
✉ (co-)corresponding author


**Global epistasis and the emergence of ecological function**

Juan Diaz-Colunga \* , Abigail Skwara, Jean CC Vila, Djordje Bajic, Álvaro Sánchez  
*bioRxiv* (2023)

**Environmental modulation of global epistasis is governed by effective genetic interactions**

Juan Diaz-Colunga \* , Alvaro Sanchez, C. Brandon Ogbunugafor  
*bioRxiv* (2022)

**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  
*bioRxiv* (2022)

**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, Madeline Bender, Richard Li, Madeleine C Mankowski, Molly Bassette, Julia Borden, Stefan Golfier, Paul Gerald L Sanchez, Rachel Waymack, Xinwen Zhu, 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**

**IBFG Seminar Series** 2023

Institute for Functional Biology and Genomics (IBFG-CSIC)  
Salamanca, Spain  
Title: *Design strategies for microbial communities*

**CAB Conference:** 2022

**Microbial Communities at the Interface between Ecology and Evolution**

Mexico City, Mexico  
Title: *Design strategies for microbial communities: searching for functional maxima in ecological landscapes*

**XXIX Workshop: Advances in Molecular Biology** 2021

Spanish National Center for Biotechnology (CNB-CSIC)  
Virtual seminar  
Title: *Engineering microbial communities with global epistasis*

**Evolutionary & Ecological Systems Biology Talks** 2021

Massachusetts Institute of Technology (MIT)  
Virtual seminar  
Title: *Top-down and bottom-up co-selection in microbial community coalescence* (invited talk)

**Physics of Living Systems Seminar Series** 2018

Massachusetts Institute of Technology (MIT)  
Cambridge, USA  
Title: *The energy cost of living and dying*

	<b>Quantitative Principles in Biology</b> European Molecular Biology Laboratory (EMBL) Heidelberg, Germany Title: <i>Mitochondrial regulation of extrinsic apoptosis</i>	2017
	<b>CNB Seminar Series</b> Spanish National Center for Biotechnology (CNB-CSIC) Madrid, Spain Title: <i>Can we predict apoptosis?</i>	2016
<b>Teaching</b>	<b>Senior Thesis Supervisor</b> Course: EEB Senior Research (EEB475 & 476) Yale University Student: Jack Softchek Thesis title: <i>Global Epistasis &amp; Predicting the Function of Microbial Communities</i>	2021
	<b>Teaching Assistant</b> Course: Experimental Methods in Biophysics (M.Sc. Biophysics) Universidad Autonoma de Madrid	2019
<b>Reviewing activity</b>	<b>Review Editor</b> for <i>Frontiers in Synthetic Biology</i>  Reviewer for <i>Nature Communications</i> , <i>The ISME Journal</i> , <i>eLife</i> , <i>Philosophical Transactions of the Royal Society B</i> , <i>PLOS Computational Biology</i> , <i>mSystems</i>	
<b>Skills</b>	<b>Programming:</b> R, Python, Matlab <b>Wet lab:</b> General microbiology techniques <b>Languages:</b> English (fluent), Spanish (native), German (basic)	
<b>Other interests</b>	Coach for high school & elementary school basketball teams Retirement home volunteer General interest in scientific outreach & education	