

# Juan Diaz-Colunga, Ph.D.

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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>	2019
	Severo Ochoa PhD Fellowship	2015 – 2019
	Severo Ochoa Travel Grant (for 6-month stay at MIT)	2018
	Comunidad de Madrid 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>Environmental modulation of global epistasis is governed by effective genetic interactions</b> Juan Diaz-Colunga * ✉, Alvaro Sanchez, C. Brandon Ogbunugafor <i>bioRxiv</i> (2022)
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\* (co-)first author  
✉ (co-)corresponding author

### **Global epistasis on fitness landscapes**

Juan Diaz-Colunga \* , Abigail Skwara, Karna Gowda, Ramon Diaz-Uriarte, Mikhail Tikhonov, Djordje Bajic, Alvaro Sanchez

*arXiv* (2022)

[accepted & pending publication in *Philosophical Transactions of the Royal Society B: Biological Sciences*]

### **The community-function landscape of microbial consortia**

Alvaro Sanchez, Djordje Bajic, Juan Diaz-Colunga, Abigail Skwara, Jean CC Vila, Seppe Kuehn

*EcoEvoRxiv* (2022)

[accepted & pending publication in *Cell Systems*]

### **Emergent ecosystem functions follow simple quantitative rules**

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

*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* (2022)

### **Diversity begets diversity under microbial niche construction**

Sylvie Estrela, Juan Diaz-Colunga, Jean CC Vila, Alicia Sanchez-Gorostiaga, Alvaro Sanchez

*bioRxiv* (2022)

### **Conditional prediction of consecutive tumor evolution using cancer progression models: What genotype comes next?**

Juan Diaz-Colunga \*, Ramon Diaz-Uriarte

*PLOS Computational Biology* (2021)

### **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* (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* (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* (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* (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* (2018)

**Mitochondria and the non-genetic origins of cell-to-cell variability: more is different**

Raúl Guantes, Juan Diaz-Colunga, Francisco J Iborra  
*BioEssays* (2016)

**Selected talks**

**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*

**Quantitative Principles in Biology** 2017

European Molecular Biology Laboratory (EMBL)

Heidelberg, Germany

Title: *Mitochondrial regulation of extrinsic apoptosis*

**CNB Seminar Series** 2016

Spanish National Center for Biotechnology (CNB-CSIC)

Madrid, Spain

Title: *Can we predict apoptosis?*

<b>Teaching</b>	<b>Senior Thesis Supervisor</b>	2021
	Course: EEB Senior Research (EEB475 & 476) Yale University Student: Jack Softchek Thesis title: <i>Global Epistasis &amp; Predicting the Function of Microbial Communities</i>	
	<b>Teaching Assistant</b>	2019
	Course: Experimental Methods in Biophysics (M.Sc. Biophysics) Universidad Autonoma de Madrid	
<b>Reviewing activity</b>	<i>Nature Communications, eLife, Philosophical Transactions of the Royal Society B: Biological Sciences, PLOS Computational Biology, 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	