

Diversity, Equity and Inclusion Committee in Microbiology Graduate Group

This seminar is part of an initiative led by the Diversity, Equity, and Inclusion committee in the UC Davis Microbiology Graduate Group. We would like to celebrate the research of scientists from historically excluded identities and would like to showcase their science and research stories to any who want to see themselves in STEM fields.

Microbiology Diversity, Equity, and Inclusion Seminar Series presents Dr. Norma Cecilia Martinez-Gomez

Friday Seminar – 12:10-1 p.m.
Hybrid Meeting
GBSF 1005 and ZOOM Meeting

“Unraveling Lanthanide Transport, Storage, and Usage in bacteria”

Research The recent discovery that metals known as rare earth elements (REE), specifically lanthanides, have an active role in metabolism, particularly in methylotrophy, has opened a venues to resolving long-standing metabolic mysteries across diverse biological systems. Until recently, it was believed that methanol oxidation was catalyzed in the periplasm solely by the extensively studied Ca- and pyrroloquinoline quinone (PQQ)-dependent methanol dehydrogenase (MeDH) encoded by the *mxoFI* genes (MxoFI). It is now recognized that methanol oxidation can be driven by the periplasmic MeDH XoxF, which utilizes lanthanide cofactors in place of Ca. XoxF is highly divergent but widespread in environmental strains including all methylotrophs and numerous non-methylotrophs. My research program is leading efforts in defining the role of lanthanides in biology, focusing on the methylotrophic organism *Methylobacterium extorquens* AM1. We have recently demonstrated far-reaching impacts of lanthanide biochemistry beyond methylotrophy: from the identification of new enzymes and pathways dependent on rare earth chemistry to identifying the effects of lanthanide-dependent metabolism on the local environment and developing biological platforms for efficient recovery.

Publications

Identification of a biosynthetic gene cluster encoding a novel lanthanide chelator in *Methylobacterium extorquens* AM1. Alexa M. Zytneck, Nathan M. Good, Colin C. Barber, Manh Tri Phi, Sophie M. Gutenthaler, Wenjun Zhang, Lena J. Daumann, **N. Cecilia Martinez-Gomez**

Good NM, Lee HD, Hawker ER, Su MZ, Gilad AA, **Martinez-Gomez NC**. Hyperaccumulation of Gallium by *Methylobacterium extorquens* AM1 Reveals Impacts of Lanthanides on Cellular Processes Beyond Methylotrophy. *Front Microbiol.* 2022 Mar 17;13:820327. doi: 10.3389/fmicb.2022.820327. PMID: 35369483; PMCID: PMC8969499.

Roszczenko-Jasińska P, Vu HN, Subuyuj GA, Crisostomo RV, Cai J, Lien NF, Clippard EJ, Ayala EM, Ngo RT, Yarla F, Wingett JP, Raghuraman C, Hoerber CA, **Martinez-Gomez NC**, Skovran E. Gene products and processes contributing to lanthanide homeostasis and methanol metabolism in *Methylobacterium extorquens* AM1. *Sci Rep.* 2020 Jul 29;10(1):12663. doi: 10.1038/s41598-020-69401-4. PMID: 32728125; PMCID: PMC7391723

November
18



Norma Cecilia Martinez-Gomez, Ph.D.
Assistant Professor
Plant and Microbial Biology
University of California, Berkeley

November 18, 2022
12:10 – 1 p.m.
Hybrid Meeting
GBSF 1005 and
ZOOM Meeting

Medical Microbiology &
Immunology
School of Medicine

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We hope to see you there!