# JOSE M. DEL RIO PANTOJA

jdelriopantoja@g.harvard.edu

## EDUCATION

Harvard University
**Ph.D. Chemical Biology** **2018-Present**

Pennsylvania State University
**B.S. Biochemistry and Molecular Biology** **2014-2018**
Thesis: "Structural and Mechanistic Studies of Endoperoxide Formation by the Non-heme Fe(II) and 2-oxo-glutarate-dependent Dioxygenase FtmOx1"

## RESEARCH EXPERIENCE

Karmacharya Laboratory at Harvard University
**Graduate Research Assistant (Rotation)** **Sep 2018 – Nov 2018**

- Plated, fed, split, and differentiated Neural Progenitor Cells (NPC)
- Operated Western Blots and Immunocytochemistry to measure NPC and neural expression of protein implicated in pathways associated with cognition

Boal Laboratory at Pennsylvania State University
**Researcher Assistant** **Jan 2016 – May 2018**

- Operated site-directed mutagenesis, column & size-exclusion chromatography, and X-ray crystallography
- Contributed to the crystal structure solving of metalloenzyme FtmOx1 & VioC
- Ran activity assay for metalloenzyme CAS using liquid chromatography–mass spectrometry (LC-MS), and kinetic studies for FtmOx1 such as Stopped-Flow and Rapid Freeze-Quench

Koide Laboratory at NYU Langone Health
**Research Assistant** **Jun 2017 – Aug 2017**

- Operated site-directed mutagenesis, column & size-exclusion chromatography, surface plasmon resonance (SPR), and thermal shift assay, thermofluor
- Elucidated interphase between synthetic antibody and protein implicated in the maintenance of tumor microenvironment in pancreatic cancer

## TEACHING EXPERIENCE

Pennsylvania State University
**Guided Study Group Leader** **Jan 2017 – May 2018**

- Lead 1.5 hr review sessions twice a week for an average of 80 students per session
- Organized and taught exam reviews, which often filled rooms with 150-200 students

- Designed sessions to be engaging in nature by minimizing unidirectional lecturing and maximizing problem solving discussions through collaborative learning

**Learning Assistant: Biochemistry and Molecular Biology- Majors Colloquium** **Aug 2016 – Dec 2016**

- Guided a group of Biochemistry and Molecular Biology, Biotechnology, and Microbiology freshmen
- Instructed and facilitated discussions on basic science concepts during lecture

**Learning Assistant: Organic Chemistry 1** **Aug 2016 – Dec 2016**

- Independently ran two 55-minutes long review sessions per week
- Assisted an average of 35 students per review session
- Lead workshops once a month, where the most challenging concepts discussed at the time were dissected

**Learning Assistant: General Chemistry 1** **Aug 2015 – Dec 2015**

- Facilitated in-class discussions in a lecture room with an average of 300 students
- Assisted students with problem sets during class recitations

## PUBLICATIONS

**α-Amine desaturation of D-arginine by the iron(II)- and 2-(oxo)-glutarate-dependent L-arginine 3-hydroxylase, VioC**

Noah P. Dunham, Andrew J. Mitchell, José Del Río-Pantoja, Carsten Krebs, J. Martin Bollinger, Jr., and Amie K. Boal

*Biochemistry*, **Just Accepted Manuscript,** *DOI: 10.1021/acs.biochem.8b00901*

When challenged with substrate analogs, iron(II)- and 2-(oxo)glutarate-dependent (Fe/2OG) oxygenases can promote transformations different from those they enact upon their native substrates. We show here that the Fe/2OG enzyme, VioC, which is natively an L-arginine 3-hydroxylase, catalyzes an efficient oxidative deamination of its substrate enantiomer, D-Arg. The reactant complex with D-Arg retains all interactions between enzyme and substrate functional groups, but the required structural adjustments and opposite configuration of C2 position this carbon more optimally than C3 to donate hydrogen (H•) to the ferryl intermediate. The simplest possible mechanism – C2 hydroxylation followed by elimination of ammonia – is inconsistent with the demonstrated solvent origin of the ketone oxygen in the product. Rather, the reaction proceeds via a hydrolytically labile C2-iminium intermediate, demonstrated by its reductive trapping in solution with NaB2H4 to produce racemic 2H-Arg. Of two alternative pathways to the iminium species, C2 hydroxylation followed by dehydration versus direct desaturation, the latter possibility appears more likely, because the former mechanism would be expected to result in detectable 18O incorporation from 18O2. The direct desaturation of a C–N bond implied by this analysis is analogous to that recently posited for the reaction of the L-Arg 4,5-desaturase, NapI, thus lending credence to the prior mechanistic proposal. Such a pathway could also potentially be operant in a subset of reactions catalyzed by Fe/2OG N-demethylases, which

have instead been purported to enact C–N bond cleavage by methyl hydroxylation and elimination of formaldehyde.

## PRESENTATIONS

**Mapping Structural Landscape of Galectin-9 to Determine Antibody Binding Sites**
Jose Del Rio Pantoja
Leadership Alliance National Symposium 2017
Galectin-9 (Gal9) is a protein that has been implicated in the maintenance of an immune suppressive tumor microenvironment in pancreatic cancer. In fact, Gal9 inhibition in mice results in antitumor responses. This has motivated Koide's research laboratory to generate synthetic antibodies that could block Gal9 interactions with its cognate receptors. One possible candidate, FabS17 has displayed strong binding to Gal0. However, there's little structural information about the antibody's binding specificity. The purpose of this research is to determine the binding sites of FabS17 on Gal0 for more in-depth characterization of antibody generation. Gal9 mutants were generated and purified to test their binding affinity to FabS17. Results of the successful protein purifications, their thermostability, and binding affinity to the synthetic antibody are presented and discussed.

## POSTERS

**Mapping Structural Landscape of Galectin-9 to Determine Antibody Binding Sites**
Jose Del Rio Pantoja
NYU Langone Health
Galectin-9 (Gal9) is a protein that has been implicated in the maintenance of an immune suppressive tumor microenvironment in pancreatic cancer. In fact, Gal9 inhibition in mice results in antitumor responses. This has motivated Koide's research laboratory to generate synthetic antibodies that could block Gal9 interactions with its cognate receptors. One possible candidate, FabS17 has displayed strong binding to Gal0. However, there's little structural information about the antibody's binding specificity. The purpose of this research is to determine the binding sites of FabS17 on Gal0 for more in-depth characterization of antibody generation. Gal9 mutants were generated and purified to test their binding affinity to FabS17. Results of the successful protein purifications, their thermostability, and binding affinity to the synthetic antibody are presented and discussed.

## AWARDS

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| Graduate School of Arts and Sciences Prize Fellowship | **2018** |
| Riegel Family Trustee Scholarship | **2017** |
| Student Leader Scholarship | **2016 & 2017** |
| Edmund J. Elder Trustee Scholarship | **2015 & 2016** |
| First Place Winner of Policy Speech Class Competition | **2016** |
| First Place Winner of Engineering Design Class Competition | **2015** |

## LANGUAGES

Spanish– native language

English– speak fluently and read/write with high proficiency
French–speak, read, and write with basic competence

## MEMBERSHIPS

The American Society for Biochemistry and Molecular Biology
Alpha Epsilon Delta