BIOGRAPHICAL SKETCH

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NAME: Gonzalez, Fabio A.

eRA COMMONS USER NAME (credential, e.g., agency login): FABIOGONZALEZ

POSITION TITLE: Graduate Student Research Assistant

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Universidad Icesi, Cali, Colombia	B.S.	07/2013	08/2019	Chemistry
Universidad Icesi, Cali, Colombia	B.S.	07/2013	08/2019	Pharmaceutical Chemistry
University of Delaware	PHD	08/2019	08/2026 (expected)	Biochemistry

A. Personal Statement

My research studies are directed towards understanding the function of membrane proteins and protein complexes, by studying the molecular determinants of protein-to-protein interactions at the atomistic resolution level. During my undergraduate research, I studied DNA-to-protein interactions by molecular dynamics and protein docking simulations. Following this, I spent two years of my graduate studies conducting large-scale simulations of membrane lipids and analyzing the dynamic properties of lipids in biological membranes. The early exposure to computational chemistry familiarized me with experimental tools for integrative modeling, such as NMR restraints, cross-linking restraints, electron microscopy density maps, etc. Complementary to my previous experience, I decided to continue my PhD research in the experimental field where I am interested in understanding the cellular role of selenoproteins, proteins that contain the genetically encoded amino acid selenocysteine. By elucidating the structure of an enzyme acting in cellular stress, selenoprotein S, and its mechanism of binding to protein partners we work to decipher the function of this protein in different cellular mechanisms.

So far, I have gained experience in both experimental structural biology and biochemistry techniques and theoretical techniques. My list of technical skills includes working with Linux operating systems, programming languages (Python, Tk-Tcl, R), and simulation software (NAMD, Amber, Gromacs). In addition, my experimental skills encompass the ability to purify membrane proteins, characterization of biomolecules by size exclusion chromatography and intact mass spectrometry, *in vitro* pull-downs, *in vitro* cross-linking, western blotting, and preparing biological samples for structural studies such as X-ray crystallography, imaging by negative staining EM and structural characterization by Cryo-EM.

My early experience in science has motivated me to pursue a postdoctoral training in an area related to cryo-EM and structural biology. The skills earned in my current Ph.D. career fit both the experimental and computational techniques required to gain experience in novel cryo-EM techniques and methods to characterize proteins and larger protein complexes. A long-term vision for me is to take my knowledge and experience to a research center to train and teach users to use structural techniques to characterize proteins related to their research projects. To accomplish this goal, besides my technical skills I have been working on developing leadership skills, and during my Ph.D. career, I have mentored two students (one undergraduate and one graduate) in our research

group and supervised two rotation students. I plan to expand this mentorship through my Ph.D. career and postdoctoral experience. I believe in the importance of education and I want to make it a personal goal of mine to transfer my knowledge and experience to other people as part of my job.
Born and raised in Colombia, coming to the United States to pursue my Ph.D. career was my first experience as an underrepresented group member. Being here on a solo status has granted me a different perspective based on the opportunities and resources provided to me due to my early efforts as an undergraduate. My research experience in Colombia was very limited, due to the limited number of resources, and I opted to do computational chemistry despite having an interest in other experimental fields. Given the opportunity to complete my graduate studies in the USA, and the chance of being able to receive high-level education and cutting-edge research resources has created a strong sense of commitment to finish my studies and pursue my career goals. This notion has also created a responsibility in me to give other underrepresented individuals help of any kind, such as opportunities, advice, and training. By providing a platform to give underrepresented students opportunities in research and education, we are creating a stronger scientific community with a sense of solidarity for those with a lack of representation. My ultimate desire is to break down barriers and stereotypes for underrepresented groups and serve as a role model to encourage others to pursue their career goals.

B. Positions, Scientific Appointments, and Honors

Positions and scientific appointments

2024-present Member, American Heart Association
2022-2023 Member, American Society for Biochemistry and Molecular Biology
2019-2020 Member, Biophysical Society
2018-2019 Member, American Chemical Society
2019-present Graduate Research Assistant, Department of Chemistry and Biochemistry, University of Delaware

Honors

2024 Brennie Hackley Jr. Award for Excellence in Research, Department of Chemistry and Biochemistry, University of Delaware
2024 Research Supplement to Promote Diversity in Science, American Heart Association
2020 Computer in Science & Engineering 2020 Best Paper Award
2019 Cum Laude (B.S in Chemistry with minor in Biochemistry), Universidad Icesi
2019 Cum Laude (B.S in Pharmaceutical Chemistry), Universidad Icesi
2013-2019 Dean's List, Universidad Icesi

C. Contributions to Science

- **Understanding the dynamical properties of viral envelopes through molecular dynamics simulations.**

My early research involved the mechanistic characterization of full-scale viral lipid bilayers. Using molecular modeling and employing massive parallel computers, I investigated the physical properties of the HIV-1 viral membrane at the coarse-grained resolution level. Using high-performance computing we derived the transverse diffusion rates of lipids in a native environment, an important physical property of heterogeneous lipid bilayers to maintain equilibrium.

1. Segura CP, Katyal N, **González-Arias F**, Bryer AJ, Perilla JR, Hadden-Perilla JA. Coronavirus through Delaware's Computational Microscope. Delaware Journal of Public Health. 2020 July;6(2):6-9. PMID: 34467099
2. **Gonzalez-Arias F**, Reddy T, Stone JE, Hadden-Perilla JA, Perilla JR. Scalable analysis of authentic viral envelopes on FRONTERA. Computing in science & engineering. 2020 August; 22(6):11-20. PMID: 33510584

- **Characterization of selenoprotein S cellular functions.**

Our research group is interested in understanding the different cellular roles of membrane-bound enzymes. My focus is selenoprotein S, which takes place in the resolution of ER stress and signaling pathways. The lack of structural information on this selenoprotein prevents understanding the primary function of selenoprotein S in different cellular processes such as Endoplasmic Reticulum Associated Degradation Pathway, inflammation, viral replication, gene regulation, etc. Thus, our ongoing efforts are

directed at characterizing the binding mechanism of selenoprotein S to molecular partners through biochemical techniques and structural techniques. So far, we have summarized in a review the latest insights into the structure, interactome studies, and cellular roles of selenoprotein S. I have also contributed to studies elucidating the role of selenoprotein S in SARS-CoV-2.

1. Ghelichkhani F, **Gonzalez FA**, Kapitonova MA, Schaefer-Ramadan S, Liu J, Cheng R, Rozovsky S. Selenoprotein S: A versatile disordered protein. Archives of Biochemistry and Biophysics. 2022 November 30;731:109427. PMID: 36241082
2. Ghelichkhani F, **Gonzalez FA**, Kapitonova MA, Rozovsky S. Selenoprotein S interacts with the replication and transcription complex of SARS-CoV-2 by binding nsp7. Journal of Molecular Biology. 2023 April 435(8), 168008. PMID: 36773692
3. Serbynovskyi V, Wang J, Chua EY, Ishemgulova A, Alink LM, Budell WC, Johnston JD, Dubbeldam C, **Gonzalez FA**, Rozovsky S, Eng ET. CryoCycle your grids: Plunge vitrifying and reusing clipped grids to advance cryoEM democratization. bioRxiv. 2024 Jan 24:2024-01

Complete List of Published Work in My Bibliography:
https://www.ncbi.nlm.nih.gov/myncbi/fabio.gonzalez.1/bibliography/public/

D. Scholastic Performance

YEAR	COURSE TITLE	GRADE
	Universidad Icesi	
2013	Algebra	4.5
2013	Logic and Argumentation	4.4
2013	Written communication I	3.6
2013	General Biology and Lab	4.3
2013	General Chemistry and Lab	4.5
2014	Industrial Safety and Hygiene	3.8
2014	Calculus I	4.1
2014	Written communication II	3.8
2014	Cellular Biology and Lab	4.5
2014	Organic Chemistry I and Lab	4.6
2014	Introduction to Pharmaceutical Sciences	4.3
2014	Organizations	4.0
2014	Calculus II	4.8
2014	Physics and Lab	4.3
2014	Biochemistry and Lab	4.3
2014	Organic Chemistry II and Lab	4.5
2015	Biostatistics	4.6
2015	Physical Chemistry I and Lab	4.3
2015	Analytical Chemistry and Lab	4.4
2015	Experimental Design	4.3
2015	Differential Equations	4.0
2015	Microbiology and Lab	3.9
2015	Physical Chemistry II and Lab	4.7
2015	Instrumental Analysis and Lab	4.4
2016	Principles of Economy	4.7
2016	Principles of Constitutional Law	4.9
2016	Organic Chemistry III and Lab	4.1
2016	Pharmacognosy and Phytochemistry and Lab	4.5
2016	Pharmacotechnics I and Lab	4.4

YEAR	COURSE TITLE	GRADE
2016	Molecular Biology	4.2
2016	Biotechnology and Lab	4.2
2016	Anatomy and Human Physiology and Lab	4.1
2016	Principles of Bioinorganic	4.6
2016	Enzymology and Lab	4.5
2017	Inorganic Chemistry and Lab	5.0
2017	Computational Biochemistry	4.1
2017	Pharmacotechnics II and Lab	4.1
2017	Public Health and Management	4.1
2017	Pharmacology	4.0
2017	Nutrition, Bromatology and Lab	4.5
2017	Physical Chemical and Microbiological Control	4.5
2017	Pharmacokinetics and Lab	4.5
2017	Toxicology and Lab	4.2
2017	Industrial Pharmacy and Lab	4.3
2017	Introduction to Drug Discovery	4.5
2018	Industrial Microbiology and Lab	4.5
2018	Bioethics	4.0
2018	Advanced Biochemistry and Lab	4.3
2018	Statistical Mechanics	4.5
2018	Clinical Pharmacy	4.3
2019	Senior Project	Approved
	University of Delaware	
2019	Quantum Chemistry	A-
2019	Solid State NMR Spectroscopy	A
2020	Chemical Dynamics	A-
2020	High-Performance Computing for Scientific Applications	A
2020	Biophysical Chemistry	A
2020	Chemical Thermodynamics	A

Universidad Icesi grades classes from 0 to 5. Passing is 3.0 or better.