Javier Ernesto Muñoz Briones

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EDUCATION AND TRAINING

Purdue University August 2019 – Current
PhD Candidate in Agricultural and Biological Engineering. *West Lafayette, IN*
Affiliations: Biomedical Engineering & Interdisciplinary Life Science Program (PULSe)

Armed Forces University - Universidad de las Fuerzas Armadas ESPE August 2012
B.S. in Biotechnology Engineering. *Quito, Ecuador*

Colegio Municipal Sebastián de Benalcázar – High School July 2005
Physics - Mathematics Specialization *Quito, Ecuador*

RESEARCH INTEREST

Develop experimental and computational approaches to study complex interactions between host genetics, immunologic pathways, and microbiome dysbiosis that drive inflammatory bowel diseases and colorectal cancer. I am interested in integrated modeling of multiple clinical and molecular data modalities from patients, animal models, and *in vitro* systems to develop biological hypotheses regarding host cell signaling biology, therapeutic response, and microbial communities' interaction. By the integration of experimental data and clinical information, I plan to translate molecular insights to uncover links in host-microbiome signaling.

Keywords: Translational Pharmacogenomics of Cancer and Inflammatory Diseases, Host-Microbiome Signaling Translation, Quantitative Cell Biology, Immunology, Bioinformatics, Computational and Systems Biology, Genetics, Statistics and Data Analysis

Programming Languages: Python, R, MATLAB, Bash, and SAS.

RESEARCH EXPERIENCE

Purdue University February 2021 – Current
PhD Candidate, Purdue Interdisciplinary Life Science Program *West Lafayette, IN*
Thesis Supervisor: Dr. Douglas Brubaker.

- Abstract submitted to the 2022 BMES Annual Meeting titled: "Bringing Therapeutic Context into Preclinical Development of Engineered Microbial Therapeutics: Engineered Bacteria Secreting IL-22 Protects Against Intestinal Inflammation in a Germ-Free Gut Model". We develop a systems-synthetic biology pipeline to support the clinical translation of microbial therapeutics for inflammatory diseases *(Publication in progress).*

- Abstract submitted to the 2022 BMES Annual Meeting titled: "Systems Modeling of Gut Microbiome Regulation of Estrogen Receptor Beta Signaling in Ulcerative Colitis". We quantified significant multi-omic microbiome interactions associated with disease status and sex that have an impact on ERβ signaling that can aid in identifying new therapeutics for Ulcerative Colitis *(Publication in progress).*

- Abstract submitted to the 2021 BMES Annual Meeting and 2022 PAMS Symposium titled: "Latent Variable Interaction Effects Modeling of Microbiome Multi-omics in Crohn's Disease". A workflow was developed to prioritizes significant microbe-metabolites interactions that coordinate development of Chron Disease *(Publication in progress).* Analysis of 2,915 microbe-metabolite pairs, reduced from >750,000 in the full datasets, identified 644 significant correlations (FDR $q < 0.01$) between microbes and metabolites significantly predictive of Chron Disease status on interacting multi-omic LV's.

Research Intern in Purdue Bioinformatics Core — May 2021 – May 2022
Advisor: Dr. Nadia Lanman and Dr. Sagar Utturkar — *West Lafayette, IN*

- Implementation of RNA-seq pipeline in cancer data and Variant Calling analysis in IBD data.

Graduate Student, Agricultural and Biological Engineering Department — May 2020 – February 2021
Advisor: Dr. Kevin Solomon. — *West Lafayette, IN*

Project: Genetic tools to optimize lignocellulose conversion in anaerobic fungi and interrogate their genomes.
- Thirteen potential constitutive promoter terminator pair sequences were obtained with distinctive levels of expression by paired genomic and transcriptomic data. The number of CAZymes present in *Piromyces indianae* and its architecture were determined by analysis the gene annotation (Poster).
- Selectable markers for anaerobic fungi and its conditions were determined to build an autonomous replicating sequences library for *Neocallimastix giraffae*.

Virginia Polytechnic Institute and State University
Student Visitor in Translational Plant Science Program — July 2018 – November 2018
Advisor: Dr. Guillaume Pilot and Dr. John Mcdowell. — *Blacksburg, VA*

- Validate the protocols and results from the project: "*Identification of susceptible genes from the iron deficiency-sensing complex BRUTUS-POPEYE*". Fe deficiency reduces the reproduction of *Hyaloperonospora aradopsidis* in hydroponic system. The bts10, bts12, 35S:bts mutations in *Arabidopsis thaliana* reduces the reproduction of *Hyaloperonospora aradopsidis* in hydroponic system. These are potential susceptibility genes could lead to prime the immune response and reduce iron availability.
- Characterization of loss-of-function mutants Amino Acid Permease by histochemical GUS analysis.

Universidad San Francisco de Quito
Undergraduate Student Researcher — October 2010 – August 2012
Advisor: Dr. Antonio León Reyes. — *Quito, Ecuador*

- Thirty-three *Trichoderma* isolates belonging to species: *Trichoderma harzianum* and *Trichoderma asperellum* were obtained, their antifungal capacity reached from 30% to 65% radial growth inhibition of *Fusarium* and *Alternaria* strains.
- Develop and validate protocols for bioassays in *Arabidopsis thaliana* and *Musa paradisiaca*; isolation and molecular identification of plant pathogens and beneficial fungus, and histochemical staining of β-glucuronidase gene reporter system.

Army Polytechnic School – Universidad de las Fuerzas Armadas ESPE
Undergraduate Student Researcher — January 2009 - July 2010
Advisor: Dr. Luis Cumbal — *Quito, Ecuador*

- Develop the protocol for the synthesis of nanoparticles of Fe (0) to be applied in reduction of the total petroleum hydrocarbons content in contaminated soil.

INDUSTRY EXPERIENCE

Secretary of Higher Education, Science, Technology, and Innovation — March 2014 – August 2017
Technical Coordinator — *Quito – Ecuador*

I coordinated monitoring, and evaluation of results achieved by funded projects for scientific research, technological development, and infrastructure from Universities and Public Research Institutions. I also designed and implemented guidelines, tools, and standards for monitoring and evaluation of scientific research projects. I was responsible for the implementation of Results Based Management (RBM) methodology, I trained research groups about RBM methodology and provided support during the designing and execution of scientific research projects.

I evaluated research proposals based on intellectual focus, rationale, and expected outcomes prior to the prioritization by the National Secretariat of Planning and Development. I provided technical support to design research calls based on research needs for policy making in Ecuador. I prepared technical reports about the impact and the applicability of research results in Agrobiotechnology for policy making.

Petroamazonas EP June 2011 – October 2013
Occupational Health, Environment Control and Safety Industrial Specialist *Quito – Ecuador*

I coordinated and supervised the compliance of Environmental Management Plans, and Safety Industrial Procedures in Block 15 – Indillana, to prevent the occurrence of accidents and incidents that may affect the staff, the environment and facilities. I also supervised the operation of Wastewater Treatment Plant, and the bioremediation treatments to remove pollutants from contaminated soil. I managed the Waste Management Center, the optimization program for biodigesters, and the Plan of Solid, Toxic and Hazardous Waste Management generated by oil extraction activities.

I trained staff regarding policies and procedures of industrial safety, occupational health, and environmental control, ISO normative: 14001, 9001 and 45001. In the field, I provided support during the execution of the mechanical, electrical jobs, in order to establish the necessary precautions to protect personnel involved workspaces, environment and facilities.

Universidad San Francisco de Quito. February 2011 – August 2012
Junior Research Associate *Quito – Ecuador*

I conducted research related to evaluate plant induced resistance by beneficial fungi for controlling plant diseases, and the antagonistic capacity of *Trichoderma* strains against *Fusarium oxysporum* through competition and antibiosis assays. I also isolated and propagated plant beneficial fungi for biological control, as well as identified molecularly plant pathogens from infected tissue.

Agrobiolab SA. March 2008 – June 2008
Junior Research Associate *Quito - Ecuador*

I formulated nutritional treatments to give plants back into vigor after drought stress. I developed studies to assess the induced systemic resistance by biological commercial products in *Brassica oleracea* var. italica against the fungal pathogen *Alternaria brassicae*.

HONORS AND AWARDS

- 2021 Leslie Bottorff Fellowship, The Innovation for Clinical Translation (ICT) Fellowship Program to translate technologies to clinical practice.
- 2019 Lynn Fellowship, Purdue University Interdisciplinary Life Science Graduate Program (PULSe).
- 2017 FULBRIGHT Commission Certificate - English Teaching Program.
- 2016 Ecuadorian National Scholarship for Graduate Studies – SENESCYT
- Auditor of Integrated management Systems ISO 9001, 14001 and 45001 organized by CISHT – SGS.
- Qualified Educator by SENESCYT to National Leveling and Admission System.

CONTRIBUTED SCIENTIFIC CONFERENCE PRESENTATIONS

- Latent Variable Interaction Effects Modeling of Microbiome Multi-omics in Crohn's Disease. 2022 PAMS Symposium. US – Oral presentation. 2021 BMES Annual Meeting. US – Oral presentation.
- Abstract submitted to the 2021 BMES Annual Meeting and 2022 PAMS Symposium
- Genetic Tools for anaerobic fungi to enhance lignocellulose degradation for bioenergy. Central US Synthetic Biology Workshop - Poster.
- Molecular and functional Characterization of *Trichoderma* spp. collected from organic farms in the highlands of Ecuador. Agrobiotechnology and Food Science Symposium. – Poster.

- Analysis of expression and suppression of defense genes (PR) under nutritional stress by histochemical staining of β-glucuronidase activity in Arabidopsis thaliana. Pest Control and Diseases in ornamental crops Symposium – Poster.

PUBLICATIONS (*in progress***)**

- Causal Modeling of Microbiome Multi-omics Data in Inflammatory Bowel Diseases with Latent Variable Interaction Effects. **Javier. E. Munoz,** Douglas. K. Brubaker
- Systems Modeling of Gut Microbiome Regulation of Estrogen Receptor Beta Signaling in Ulcerative Colitis **Alan Trinh BS; Javier Munoz,** Tzu-Wen Cross, Doug Brubaker.
- Bringing Therapeutic Context into Preclinical Development of Engineered Microbial Therapeutics: Engineered Bacteria Secreting IL-22 Protects Against Intestinal Inflammation in a Germ-Free Gut Model **Javier. E. Munoz,** Smrutiti Jena, Liana Merk, Leopold Green, Douglas. K. Brubaker

SCHOLARLY ACTIVITIES

Teaching
Guest Lecturer: Fundamental of Chemistry at School of Medical Sciences at Universidad Central del Ecuador E-learning Tool Management Course.

Teaching Assistant: BME 30400 Biomedical Transport Fundamentals Fall 2020. Biomedical Engineering. Purdue University.

• Fluid Statics, Buoyancy and Flow Descriptors • Conservation of mass, linear momentum, energy, and differential form of the conservation relations. • Dimensional Analysis and Similarity • Naiver-Stokes equations, viscous flow, and boundary layers • Reaction and Diffusion • Heat transfer.

Leadership
President of Association Ecuadorians in Purdue.
Purdue Agricultural and Biological Engineering Department Ambassador
Purdue Microbiome Applied Sciences Student Representative
Annual Training Fire Control organized by Petroamazonas EP.
Leader of the Brigade Control Oil Spills in Petroamazonas EP.

Community
Organizer of "Pest Control and Diseases in ornamental crops Symposium".
Organizer of "III National Agrobusiness Symposium".
Organized of Results Based Management Methodology Workshop.

REFERENCES

Douglas Brubaker, Ph.D
Major PhD Research Advisor
Assistant Professor, Department of Biomedical Engineering
Purdue University
Email: dkbrubak@purdue.edu

Kevin Solomon, Ph.D
Graduate Studies Research Advisor
Assistant Professor, Department of Chemical Engineering
University of Delaware
Email: kvs@udel.edu

Guillaume Pilot, Ph.D
Graduate Studies Research Advisor
Associate Professor, School of Plant and Environmental Sciences.
Virginia Polytechnic Institute and State University
Email: gpilot@vt.edu