SEBASTIÁN AYALA-RUANO

I am a focused and motivated young researcher that has worked in **Bioinformatics** for **four years** at different laboratories. **Phylogenetics** and **Structural Bioinformatics** have been the main topics of this research experience. However, my current interests are devoted to **Network Science**, **Complex Systems**, and **Machine Learning** to understand different biological phenomena.

I am involved in various initiatives to empower Bioinformatics in Ecuador and Latin America.

EDUCATION

2020 | 2015

B.Eng., Biotechnology

Universidad San Francisco de Quito (USFQ) — Quito, Ecuador

- **Minor**: Systems engineering.
- **GPA**: 3.77/4 (Magna Cum Laude)
- **Thesis**: Computational study of the structural changes of two Cereblon protein mutations using Molecular Dynamics and Quantum Mechanics.
- **Advisor**: Miguel Angel Méndez Silva[1]

RESEARCH EXPERIENCE

Current | 2021

Applied Signal Processing and Machine Learning Research Group - USFQ

Research Assistant — Quito, Ecuador

- Performing an unsupervised learning approach based on network science and similarity searching to explore the chemical space of antiparasitic peptides, and discover new potential drugs.
- **Advisors**: Yovani Marrero-Ponce[2], Noel Pérez Pérez[3]

2020 | 2017

Computational and Theoretical Chemistry Group[4] - USFQ

Undergraduate Researcher — Quito, Ecuador

- Identified binding specificity between repressor proteins and a transcriptional factor associated with the Jasmonic Acid pathway in Arabidopsis thaliana through Molecular Dynamics simulations and Machine Learning algorithms.
- Proposed molecular mimicry between Zika envelope protein and human neuronal proteins through structural similarity predictors, Molecular Dynamics, and Protein-Protein Interaction Networks.
- **Advisor**: Miguel Angel Méndez Silva[5]

2020 | 2018

Bio-Chemoinformatics Group[6] - Universidad de Las Américas

Research Intern — Quito, Ecuador

- Understood the impact of horizontal gene transfer in the genome of Streptomyces clavuligerus using Phylogeny, RNAseq data, and other bioinformatics tools.
- Performed genomic comparative study of genes related to lignin degradation through Protein-protein Interaction Networks.
- **Advisor**: Vinicio Armijos[7]

CONTACT

- sebasar1245@gmail.com
- sayalaruano
- sayalaruano
- sayalaruano.github.io
- sayalaruano
- ORCiD
- Google Scholar
- ResearchGate

SKILLS

Programming:

R and R Markdown
Python
Bash
SQL
C++
Java
Git/GitHub

Languages:

Spanish (Native)
English (Advanced)
German (Basic)
Korean (Basic)

Made with the R package pagedown.

The source code is available at sayalaruano/cv.

Last updated on 2021-06-25.

View this CV online at sayalaruano.github.io/cv

2019

Tumor Metabolism and Therapeutic Oncology Laboratory[8] - Gwangju Institute of Science and Technology

Research Intern — Gwangju, South Korea

- Performed a computational study of a missense mutation from Cereblon protein using Molecular Dynamics and Quantum Mechanics simulations, and other bioinformatics tools.
- **Advisors**: Miguel Angel Méndez Silva[9], Steve K. Cho[10]

TEACHING EXPERIENCE

2021

Linux and Bash/AWK scripting Boot Camp

RSG Ecuador and iGEM Ecuador — Virtual event

- Co-organizer and co-instructor.
- Designed and taught most of the course material[11], which was held for five weeks.
- Covered the basics of Linux, terminal usage, text and file processing command line tools, Bash/AWK scripting with applications in Bioinformatics, and Git/GitHub.

2020

Undergraduate Teaching Assistant

Learning Center - USFQ — Virtual events

- Provided online mentorship of Biotechnology, Mathematics, and Systems Engineering subjects to undergraduate students that needed help.

2018 | 2016

Undergraduate Teaching Assistant

General Biology Laboratory - USFQ — Quito, Ecuador

- Graded reports, tests, and other homework from the course.
- Provided feedback and guidance to undergraduate students in topics of the course.
- Helped to design experiments for lectures.

PUBLICATIONS

2020

4th ISCB Latin American Student Council Symposium: a virtual and inclusive experience during COVID19 times

Editorial journal article

- Castillo-Vilcahuaman, C., Valdivia C., Osorio-Mogollón C., Silva-Andrade, C., Puche, R., **Ayala-Ruano, S.**, Cuesta-Astroz, Y., Parra, G. *F1000Research* (2020). doi: 10.12688/f1000research.28330.1[12].

2020

The molecular basis of JAZ-MYC coupling, a protein-protein interface essential for plant response to stressors

Peer reviewed journal article

- Oña-Chuquimarca, S., **Ayala-Ruano, S.**, Goossens, Pauwels, L., Goossens, A., Leon-Reyes, A., & Méndez, M. A. *Frontiers in Plant Science* (2020). doi: 10.3389/fpls.2020.01139.
- This article was chosen to feature in the Frontiers in Plant Science 2020 highlights e-book collection. doi: 10.3389/978-2-88966-723-9[13]

2019

A putative antimicrobial peptide from Hymenoptera in the megaplasmid pSCL4 of Streptomyces clavuligerus ATCC 27064 reveals a singular case of horizontal gene transfer with potential applications

Peer reviewed journal article

- **Ayala-Ruano, S.**, Santander-Gordón, D., Tejera, E., Perez-Castillo, Y., & Armijos-Jaramillo, V. *Ecology and Evolution* (2019). doi: 10.1002/ece3.4924[14].

2019 **Uncovering JAZ-MYC biochemical and structural interactions**

Peer-reviewed Conference Proceeding

• Oña-Chuquimarca, S., **Ayala-Ruano, S.**, Gallardo, S., & Méndez, M. A. _ International work-conference on Bioinformatics and biomedical engineering (IWBBIO 2019)_ (2019) ISBN: 978-8417293-94-9[15]

CONFERENCE PRESENTATIONS

2020 **Modeling of protein-protein interaction and search for key residues by machine learning of the JAZ-MYC3 complex of Arabidopsis thaliana**

5th RSG-Argentine Symposium of Young Researchers in Bioinformatics — Virtual event

• Oral presentation[16]
• Authored with Samara Oña-Chuquimarca and Miguel Ángel Méndez.

2020 **In silico detection of horizontal gene transfer in Streptomyces clavuligerus**

International Society for Computational Biology Student Council Webinar series — Virtual event

• Oral presentation[17]
• Authored with Vinicio Armijos.

2019 **In silico detection of an antimicrobial peptide (AMP) transferred horizontally from arthropods to bacteria**

2nd RSG-Colombia Symposium of young researchers in Bioinformatics — Ibagué, Colombia

• Oral presentation
• Authored with Vinicio Armijos.

2019 **Modeling of Protein-protein interaction and search for key residues by machine learning of a protein complex in the jasmonic acid route in Arabidopsis thaliana**

XLIII National Biology Conference — Urcuquí, Ecuador

• Poster presentation
• Authored with Samara Oña-Chuquimarca and Miguel Ángel Méndez.

2019 **Structural changes due to a mutation in Cereblon might be a cause for intellectual disability**

Global Intern Program at Gwangju Institute of Science and Technology — Gwangju, South Korea

• Poster presentation
• Authored with Miguel Ángel Méndez, Francisco Yanqui-Rivera, and Steve K. Cho

2019 **Uncovering JAZ-MYC biochemical and structural interactions**

7th International work-conference on Bioinformatics and Biomedical Engineering — Granada, Spain

• Poster presentation
• Authored with Samara Oña-Chuquimarca and Miguel Ángel Méndez.

2018 **Characterization of the proteome of the babaco mosaic virus (BMV)**

VI Ecuadorian Congress of Information Technologies — Riobamba, Ecuador

• Oral presentation
• Authored with Miguel Ángel Méndez.

HONORS AND AWARDS

2021 — **Innovation challenge *For more data of labor informality*[18] award**
Datalat, PNUD Ecuador, UN Women Ecuador, and the International Labour Organization — Virtual event

- This competition searched for a technological solution to collect labor informality data in Ecuador. There were 39 proposals from 80 interdisciplinary teams. This blog[19] has a detailed explanation of the challenge.
- The economic award of all stages of the competition was $ 4.300

2020 | 2016 — **Chancellor's Honor List**
Universidad San Francisco de Quito — Quito, Ecuador

- This award recognizes students who have a GPA of 3.7/4 or higher.

2020 — **Third HPC Summer School Colombia: Bio and Data Science[20] scholarship**
CyberColombia — Virtual event

- The scholarship covered registration expenses for the event.

2020 — **Saturdays.AI Quito 2020 scholarship**
Saturdays.AI Quito — Virtual event

- The scholarship covered registration expenses for the Saturdays.AI Quito 2021.

2019 — **2nd RSG-Colombia Symposium of young researchers in Bioinformatics travel award**
RSG Colombia — Ibagué, Colombia

- This award covered the travel expenses to attend the event.

2019 — **Global Intern Program[21]**
Gwangju Institute of Science and Technology — Gwangju, South Korea

- The GIP awarded students with accommodation and a monthly stipend to cover living expenses for eight weeks. During this time, we were involved in a research project and received valuable training and mentoring.

LEADERSHIP AND SERVICE

Current | 2020 — **Regional Student Group Ecuador[22]**
International Society for Computational Biology Student Council — Quito, Ecuador

- Co-founder and current president of the RSG Ecuador
- This group aims to create a long-lasting community of students, professors, and researchers residing in Ecuador, capable of learning, teaching, and using technologies related to Bioinformatics.

2021 — **17th Student Council Symposium[23]**
International Society for Computational Biology Student Council — Virtual event

- I was the fellowship committee chair and contributed to other organization tasks.

2020 — **4th ISCB Latin American Student Council Symposium[24]**
International Society for Computational Biology Student Council — Virtual event

- I contributed to the program and fellowships committees.

2020

Saturdays.AI Quito 2020 scholarship

Saturdays.AI Quito

Virtual event

- I led the project presented for my group at this event.
- Our project was an information extraction tool that found relevant scientific articles related to questions about COVID-19. For this task, we applied some Natural Language Processing algorithms. The code of this project is available in this GitHub repository[25].

2019 | 2018

Biotechnology club

Universidad San Francisco de Quito

Quito, Ecuador

- This club aimed to develop projects in base of the knowledge acquired throughout our career, learn about certain topics not covered in our courses, and communicate science topics to other students and the overall community.