

# Semidán Robaina Estévez, Ph.D.

Research Scholar

Ronin Institute for Independent Scholarship



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## RESEARCH INTERESTS

I am interested in exploring general patterns of metabolic network operation, as well as the constraints that they impose in life. My motivation is twofold: (i) better understanding the evolution of life on Earth and (ii) identifying universal features of putative living systems elsewhere. Additionally, I enjoy the intellectual challenges faced when developing mathematical tools to investigate metabolic networks. I am interested in advancing towards a mathematical formalization of biology.

## EDUCATION

- *September 2017. Dr. rer. nat.*, Max Planck Institute of Molecular Plant Physiology and University of Potsdam  
*Dr. rer. nat. in Systems Biology (Magna cum laude)*. International Max Planck Research School “Primary Metabolism and Plant Growth”  
Thesis: Context-specific metabolic predictions: computational methods and applications  
Relevant coursework: metabolic networks, network science, convex optimization, high-throughput experimental data analysis, systems biology
- *June 2013. M. Sc.* Universidad de La Laguna  
MSc in Biotechnology  
Thesis: Mathematical optimization methods to improve acetate overflow in batch cultures of *Escherichia coli*.  
Relevant coursework: Analytical techniques in organic chemistry and biochemistry, plant biotechnology, cell culture techniques, ethics and animal management in research, computational biology, mathematical modeling of metabolic systems

- *March 2012*. Licenciatura, Universidad de La Laguna  
Licenciatura (3+2 years) in Biology with focus on Molecular and Cell Biology

## PUBLICATIONS

- Robaina-Estévez S., Nikoloski Z., (Under Review, 2019). Flux-based hierarchical organization of *Escherichia coli*'s metabolic network. <https://www.biorxiv.org/content/10.1101/731356v1>.
- Robaina-Estévez S. *Universität Potsdam* (2017). Thesis: Context-specific metabolic predictions: computational methods and applications. <https://publishup.uni-potsdam.de/frontdoor/index/index/docId/40136>
- Robaina-Estévez S., Nikoloski Z. *PLOS Computational Biology* (2017). On the effects of alternative optima in context-specific metabolic model predictions. 10.1371/journal.pcbi.1005568
- Robaina-Estévez S., Daloso D.M., Zhang Y, Fernie A.R., Nikoloski Z. *Scientific Reports* (2017). Resolving the central metabolism of Arabidopsis guard cells. 10.1038/s41598-017-07132-9
- Robaina-Estévez S., Nikoloski Z. *Plant Cell Physiology* (2016). Metabolic network constraints gene regulation of C<sub>4</sub> photosynthesis: the case of maize. 0: Pcw034. doi: 10.1093/pcp/pcw034
- Robaina-Estévez S., Nikoloski Z. *PLOS ONE* (2015). Context-specific metabolic model extraction based on regularized least squares optimization. 10: e0131875. doi: 10.1371/journal.pone.0131875
- Robaina-Estévez S., Nikoloski Z. *Frontiers in Plant Science* (2014) Generalized framework for context-specific metabolic model extraction methods. 5: 491. doi: 10.3389/fpls.2014.00491

## GRANTS, FELLOWSHIPS AND AWARDS

- 2016 IMPRS (International Max Planck Research School) fellowship extension
- 2013 IMPRS fellow (Max Planck Institute of Molecular Plant Physiology)
- 2013 Selected for the IMPRS fellow final interviews at the Max Planck Institute of Molecular Genetics (declined)
- 2011 Awarded a publicly competitive research fellowship at Universidad de La Laguna under Spanish research grant: MICINN, Ref. No. BIO2011-29233-C02-02

## CONFERENCE PRESENTATIONS

- Metabolic Pathway Analysis 2017. Bozeman, Mt, July, 2017. *On the effects of alternative optima in context-specific metabolic predictions* (Poster)

- Metabolic Pathway Analysis 2015. Braga, June, 2015. *Context-specific metabolic model extraction based on regularized least squares optimization* (Poster)
- 9<sup>th</sup> European Conference on Mathematical and Theoretical Biology (ECMTB). Gothenburg, June, 2014. *Generalized framework for cell-type and condition-specific metabolic network models* (Poster).
- Frontiers in Systems and Synthetic Biology '13 (FSSB'13). Atlanta, March, 2013. *Minimization of excreted acetate concentration in E. coli culture media: a modeling approximation* (Poster).
- 22<sup>nd</sup> IUBMB & 37<sup>th</sup> FEBS Congress: From Single Molecules to Systems Biology. Seville, September, 2012. *System analysis of the role of Acetyl CoA Synthetase acetylation in an E. coli transient diauxic system* (Poster)

#### WORKSHOPS ATTENDED

- Annual meetings of the Max Planck PhD Organization
  - Visions in Science: Breaking the Enigma, Berlin, September, 2016.
  - Visions in Science: Branch and Connect Bonn, September, 2015. Contributed talk: Go open access!
  - Visions in Science: Bridge the Gap, Berlin, September, 2014. Contributed talk: The logic of metabolism
- Open Access Ambassadors, Munich, December, 2014. Organized by the Max Planck Society to promote open access publishing.
- Soft-skill workshops organized by the Max Planck Society
  - Scientific writing, Potsdam, January, 2015
  - Team dynamics, Potsdam, September, 2015
  - Intercultural communication, Potsdam, January, 2014
  - Scientific presenting, Potsdam, March, 2014

#### RESEARCH EXPERIENCE

- *October 2017 – January 2019.* Guest scientist at the Max Planck Institute of Molecular Plant Physiology
- *October 2017 – January 2019.* Postdoc position at the Bioinformatics group, Institute of Biochemistry and Biology. University of Potsdam
- *October 2013 – September 2017.* PhD student at the Max Planck Institute of Molecular Plant Physiology
- *June 2011 – June 2012.* Researcher at Universidad de La Laguna under Spanish grant: MICINN, Ref. No. BIO2011-29233-C02-02 “Modelización matemática para la optimización de la biosíntesis de terpenos”

#### TEACHING EXPERIENCE

- University of Potsdam. MSc in Bioinformatics. Teaching of the module: *High-throughput data integration in context-specific metabolic network reconstructions*. May, 2015

- Universidad de La Laguna. Lab assistant position at Departamento de Bioquímica y Biología Molecular. March-April, 2013

## LANGUAGES

Spanish (native), English (fluent), German (beginner)

## COMPUTER LANGUAGES

Comfortable with Python R, JavaScript, HTML5, CSS3. Some knowledge of Julia.

## ADDITIONAL COMPUTER SKILLS

Familiar with convex optimization solvers Gurobi, Cplex, GLPK (employed in my PhD studies). Familiar with non-linear optimization techniques, particularly genetic algorithms (employed in my MSc studies). Familiar with the Jupyter notebook platform, the COBRA and COBRApy toolboxes. Familiar with LATEX, Git and GitHub.

## REFERENCES

- *PhD supervisor*  
Prof. Dr. Zoran Nikoloski  
Max Planck Institute of Molecular Plant Physiology  
*Systems Biology and Mathematical Modeling Group*  
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Am Mühlenberg, 1  
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- *PhD committee member*  
Prof. Dr. Lothar Willmitzer  
Max Planck Institute of Molecular Plant Physiology  
*AG Lothar Willmitzer*  
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- *MSc supervisor*  
Prof. Dr. Néstor Torres Darias  
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*Departamento de Bioquímica, Microbiología, Biología Celular y Genética*  
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