Semidán Robaina Estévez

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_4 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 Plank 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)
- 9th 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).
- 22nd IUBMB & 37th FEBS Congress: From Single Molecules to Systems Biology. Seville, September, 2012. *System analysis of the role of Acetil 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
  Room 2.253
  Am Mühlenberg, 1
  14476 Potsdam, Germany
  (0049) 331 567 8630
  nikoloski@mpimp-golm.mpg.de

- *PhD committee member*
  Prof. Dr. Lothar Willmitzer
  Max Planck Institute of Molecular Plant Physiology
  AG Lothar Willmitzer
  Am Mühlenberg, 1
  14476 Potsdam, Germany
  (0049) 331 567 8202
  willmitzer@mpimp-golm.mpg.de

- *MSc supervisor*
  Prof. Dr. Néstor Torres Darias
  Universidad de La Laguna. Facultad de Ciencias
  Departamento de Bioquímica, Microbiología, Biología Celular y Genética
  Pabellón de Gobierno, Molinos de Agua s/n
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