

# PAOLA VERA-LICONA, PH.D.

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## EDUCATION

- Ph.D., Mathematics, Virginia Polytechnic Institute and State University** **June 2007**  
Mathematics Department and the Virginia Bioinformatics Institute. Virginia, USA  
Thesis: Algorithms for the modeling and simulation of biological systems; applications to gene regulatory networks
- Master of Science, Mathematics, Virginia Polytechnic Institute and State University** **May 2003**  
Mathematics Department and the Virginia Bioinformatics Institute. Virginia, USA.
- B.S. in Mathematics, Universidad Nacional Autonoma de Mexico (UNAM)** **July 2001**  
Mathematics Department, Sciences School. Mexico City, Mexico  
Thesis: The Mystic Hexagram: A Combinatorial Approach

## EMPLOYMENT AND ACADEMIC POSITIONS

- Bioinformatics Consultant** **January 2017-Present**  
Connecticut's Children Medical Center, Hartford, CT
- Assistant Professor** **September 2016-Present**  
Department of Pediatrics, University of Connecticut Health
- Assistant Professor** **January 2014-Present**  
Center for Quantitative Medicine, University of Connecticut Health Center
- Assistant Professor** **January 2014-Present**  
Cell Biology Department, University of Connecticut Health
- Postdoctoral Research Fellow** **July 2009-October 2013**  
Institute Curie, "Bioinformatics and Computational Systems Biology of Cancer"  
UNIT 900 INSERM -Mines Paris Tech. Paris, France  
Project: Research collaboration between Institute Curie and the French pharmaceutical company Servier for the discovery and development of triple negative breast cancer targeted therapies.  
Objective: Development of algorithms and software for the identification of targeted therapies and their combinations for the treatment of triple negative breast cancer.
- Postdoctoral Research Fellow** **July 2007-July 2009**  
The Center for Discrete Mathematics and Theoretical Computer Science (DIMACS),  
The Biology at the Interface with the Mathematical and Physical Sciences (BioMaPS) Institute,  
Mathematics Department, Rutgers University. New Jersey, USA  
Project: Development and application of algorithms for the reverse-engineering of biological networks.
- Graduate Research Associate** **May 2004-June 2007**  
Virginia Bioinformatics Institute, Virginia USA  
Projects: 1) Phase Space Structure of Linear Dynamical Systems. 2) Development of algorithms and software for the reverse-engineering of biological networks.

**OTHER APPOINTMENTS AND AFFILIATIONS**

- Join Faculty Member** **November 2016-Present**  
Mathematics Departments, University of Connecticut, Storrs
- Affiliate Faculty Member** **September 2015-Present**  
Richard D. Berlin Center for Cell Analysis & Modeling, UConn Health
- Faculty Member** **September 2014-Present**  
The Institute for Systems Genomics (ISG), University of Connecticut

**ACADEMIC HONORS AND AWARDS**

- Outstanding Team Presentation at the 2017 Interstellar Initiative for Early Career Investigators** **March 2017**  
Japan Agency for Medical Research Development & New York Academy of Sciences. New York, USA
- Honorable Mention on Competition of Reverse Engineering Methods, 2nd place, Challenge 4, Category *In-silico*** **November 2010**  
The DREAM 5 (Dialogue for Reverse Engineering Assessments and Methods) Challenge. New York, USA.
- Scholarship to pursue master's degree in Mathematics at Virginia Tech** **August 2001- May 2003**  
National Council for Science and Technology (CONACYT), Mexico.
- B.S. in Mathematics with Honors** **July 2001**  
Universidad Nacional Autónoma de Mexico (UNAM), Mexico.
- Scholarship for the completion of undergraduate thesis project** **August 2000-July 2001**  
General Directorate for Affairs of Academic Personnel, UNAM, Mexico.
- Scholarship to pursue undergraduate teaching** **January 2001-July 2001**  
Mathematics Department, Sciences School, UNAM, Mexico.
- Scholarship for research internship at the Mathematics Institute -Morelia, UNAM** **Summer 1998**  
Program *Summer with a Scientist* sponsored by the Mexican Academy of Sciences and CONACYT, Mexico  
Project: Algebraic and combinatorial aspects of Pascal's Mystic Hexagram  
Mentors: Dr. Rodolfo San Agustin Chi and Dr. Humberto Cardenas.
- Recognition for high academic achievement at the 1996-1997 Awards Ceremony** **September 1997**  
Universidad Nacional Autónoma de Mexico (UNAM), Mexico.
- Scholarship for research internship at the School of Marine Sciences and Limnology, Mazatlan, UNAM** **Summer 1996**  
Program *Youths Towards Research* sponsored by the Scientific Research Coordination, UNAM.  
Project: Marine physics and phytoplankton studies on shrimp cultivation  
Mentor: MSc Arturo Nuñez-Pasten.
- Nationwide honor award for outstanding pre-college performance** **November 1996**  
Universidad Nacional Autónoma de Mexico -Incorporated System, Mexico.
- Scholarship for a research internship at the Chemistry School, UNAM** **Summer 1995**  
Program *Youths Towards Research* sponsored by the Scientific Research Coordination, UNAM.  
Project: Applications of Algebra in Chemistry  
Mentor: Dr. Cesar Rincon Orta

**RESEARCH INTERESTS****Mathematics**

Mathematical Modeling  
 Finite Dynamical Systems  
 Polynomial Dynamical Systems  
 Combinatorics  
 Graph Theory

**Mathematical and Computational Biology**

Computational Systems Biology and Systems Medicine  
 Reverse-engineering of biological networks  
 Network Theory  
 Development and application of algorithms for mathematical modeling, analysis and control of biological networks

**EXTRAMURAL GRANT SUPPORT**

<b>NIH 3R01MH102854-03S1</b> <i>Dynamic Connectivity in Neural Networks Engaged for Emotion Regulation</i>	<b>Vera-Licona (Co-Investigator)</b>	<b>07/01/17-06/30/18</b>
<b>NSF DMS-140967</b> <i>REU Site: Modeling and Simulation in Systems</i>	<b>Vera-Licona (Co-PI)</b>	<b>05/01/15-04/30/18</b>
<b>Japan Agency for Medical Research</b> Interstellar Initiative, Cancer Division <i>Predicting patient response to immune checkpoint therapies through deep immune profiling</i>	<b>Vera-Licona (Multiple-PI)</b>	<b>03/21/17-03/20/18</b>
<b>NIH R01AI041576</b> <i>CD8 T Cell Activation and Migration in Vivo</i>	<b>Vera-Licona (Consultant)</b>	<b>08/01/15-07/31/17</b>
<b>NSF DMS-1503562</b> <i>ACSB 2015: A Conference on Algebraic and Combinatorial Approaches in Systems Biology</i>	<b>Vera-Licona (PI)</b>	<b>05/15/15-05/15/16</b>

**PEER-REVIEWED PUBLICATIONS** (\* Denotes equal contribution)

Thibodeau A, Márquez EJ, Shin D, **Vera-Licona P\***, Ucar D\*. Chromatin interaction networks revealed unique connectivity patterns of broad H3K4me3 domains and super enhancers in 3D chromatin. *Sci Rep.* 2017 Oct 31;7(1):14466. doi: 10.1038/s41598-017-14389-7. PubMed PMID: 29089515; PubMed Central PMCID: PMC5663946.

Perez OA, Yeung ST, **Vera-Licona P**, Romagnoli PA, Samji T, Ural BB, Maher L, Tanaka M, Khanna KM. CD169+ macrophages orchestrate innate immune responses by regulating bacterial localization in the spleen. *Science Immunology.* 2017 Oct 6;2(16)PubMed PMID: 28986418, (article featured on the cover)

Gainer-Dewar A, **Vera-Licona P**. The Minimal Hitting Set Generation Problem: Algorithms and Computation. *SIAM Journal on Discrete Mathematics.* 2017; 31(1):63–100.

Thibodeau A, Márquez EJ, Luo O, Ruan Y, Menghi F, Shin DG, Stitzel ML, **Vera-Licona P**, Ucar D. QuIN: A Web Server for Querying and Visualizing Chromatin Interaction Networks. *PLoS Comput Biol.* 2016 Jun 23;12(6):e1004809. doi: 10.1371/journal.pcbi.1004809. PubMed PMID: 27336171; PubMed Central PMCID: PMC4919057.

Hosny A\*, **Vera-Licona P\***, Laubenbacher R, Favre T (2016) AlgoRun, a Docker-based packaging system for platform-agnostic implemented algorithms. *Bioinformatics*, doi: 10.1093/bioinformatics/btw120.

**Vera-Licona P**, Jarrah A, Garcia LD, Mcgee J, Laubenbacher R. (2014) An Algebra-Based Method for Inferring Gene Regulatory Networks. *BMC Systems Biology*, **8**:37, (chosen as "Editor's Picks").

**Vera-Licona P**, Bonnet E, Barillot E, Zynovyev A. (2013) OCSANA: Optimal Combinations of Interventions from Network Analysis. *Bioinformatics*, **29** (12): 1571-1573.

Martins A\*, **Vera-Licona P\***, Laubenbacher R. (2013) Computational Systems Biology: Discrete Models of Gene Regulation Networks, Undergraduate Mathematics for the Life Sciences. Ed. Glenn Ledder, Jenna P. Carpenter, and Timothy D. Comar. 1st ed. Washington: Mathematical Association of America, pp. 189-200.

Marbach D, Costello JC, Küffner R, Vega N, Pril RJ, Camacho DM, Allison KR, the DREAM5 Consortium (including **Vera-Licona P**), Kellis M, Collins JJ, Stolovitzky G. (2012) Wisdom of crowds for robust gene network inference. *Nature Methods*, **9**: 796–804.

Hauray AC, Mordelet F, **Vera-Licona P**, Vert JP. TIGReSS (2012) Targeted Inference of Gene Regulation using Stability Selection. *BMC Systems Biology*, **6**:145.

DasGupta B, **Vera-Licona P**, Sontag E. (2011) Reverse Engineering of Molecular Networks from a Common Combinatorial Approach in Computational Molecular Biology: Techniques, Approaches and Applications, Mourad Elloumi and Albert Zomaya (editors), John Wiley & Sons, Inc.

Dimitrova E\*, Garcia-Puente LD\*, Hinkelmann F\*, Jarrah AS\*, Laubenbacher R\*, Stigler B\*, Stillman M\*, **Vera-Licona P.\*** (2011) Parameter estimation for Boolean models of biological networks. *Journal of Theoretical Computer Science*, **412**(26).

Dimitrova E, **Vera Licona P**, McGee J, Laubenbacher R. (2010) Discretization of Time Series Data. *Journal of Computational Biology*, **17**(6): 853-868.

Laubenbacher R\*, Jarrah AS\*, Dimitrova E\*, Stigler B\*, **Vera-Licona P.\*** (2009) Systems Identification for discrete polynomial models of gene regulatory networks. 15th IFAC Symposium on System Identification, St. Malo, France.

**Vera-Licona P**, and Laubenbacher R. (2008) Inference of ecological networks. *Annales Zoologici Fennici*, **45**: 459-464.

Martins A, **Vera-Licona P**, Laubenbacher R. (2008) Model your genes the mathematical way: a mathematical biology workshop for secondary school teachers. *Teaching Mathematics and its Applications*, **27**(2): 91-101

Camacho DM, **Vera-Licona P**, Laubenbacher R, Mendes P. (2007) Comparison of Existing Reverse engineering Methods by Use of an *In Silico* System. *Annals of the New York Academy of Sciences* **1115**(1): 73-89.

#### OTHER PUBLICATIONS

**Vera-Licona P**, (2007) Algorithms for Modeling and Simulation of Biological Systems; Applications to Gene Regulatory Networks. Thesis Dissertation, Ph.D. in Mathematics. Mathematics Department, Virginia Polytechnic Institute and State University. <http://scholar.lib.vt.edu/theses/available/etd-06182007-222927/>

**Vera Licona P**, (2001) A Geometric-Combinatorial Analysis of Pascal's Mystic Hexagram. Thesis Dissertation Bachelor's Degree in Mathematics. Sciences School, UNAM, <http://bidi.unam.mx/>

**TEACHING AND OUTREACH**

- Mentor at the 2017 Avon High School Internship Program** **Summer 2017**  
 Student: Vishal Shah  
 Project title: Building Reproducible and Shareable Pipelines in Computational Biology
- Co-PI and Mentor at the NSF Research Experiences for Undergraduates (REU) Program Summer** **2015 - Present**  
 Center for Quantitative Medicine, UConn Health, Farmington, CT  
 Project title: Reverse Engineering Dynamical Functional Brain Networks from fMRI data  
 Students Summer 2015: Christopher Tseng, Emory University; Shichao Wang, University of Pennsylvania  
 Students Summer 2016: Erin Boggess, Simpson College; Tiffany Jann, University of California, Berkeley  
 Students Summer 2017: Katherine Thai, Rutgers University; Luke Wohlford, Arizona University.
- Mentor at the 2016 Summer Research Fellowship Program** **2016 - Present**  
 Department of Health Career Opportunity, UConn Health, Farmington, CT  
 Student Summer 2016: Mark Nwokocha, University of Texas at Dallas (Intracellular signaling network reconstruction and analysis to reveal mechanisms of CD8+ T-cell Memory Formation)
- Invited Speaker at the High school Junior & Senior Doctors Academy Program** **2015 - Present**  
 Department of Health Career Opportunity, UConn Health, Farmington, CT  
 Applications of Algebra, Combinatorics and Computer Sciences
- Co-advisor, Master's Internship** **November 2010-May 2011**  
 École Nationale de la Statistique et de l'Administration Économique, Paris, FR  
 Students: Khalid Jebbari, Yann-Edern L'Hour and James Ridgway (Methods for Inferring Gene Regulatory Networks)
- Mentor at the 2008 NSF Research Experiences for Undergraduates (REU) Program** **Summer 2008**  
 DIMACS/DIMATIA REU Programs, New Jersey, USA  
 Student: Max Shron (On the Reverse-engineering of Biological Systems)
- Co-director of the Workshop: Model your genes the mathematical way** **June 2006**  
 The Institute for Advance Learning and Research (IARL), Danville, VA USA
- President of the SIAM Student Chapter at Virginia Tech** **June 2005-June 2007**  
 Society for Industrial and Applied Mathematics (SIAM)
- Graduate Teaching Assistant, Mathematics Department, Virginia Tech** **2003-2004**  
 Freshman Differential Calculus combined with MatLab computer lessons (Fall 2004)  
 College Discrete Mathematics, Virginia Tech, Virginia (Spring 2004)  
 Calculus for Business and Administration, Virginia Tech, Virginia (Fall 2003)
- Research Collaborator, Mathematics Education Project , UPN** **August 1999-December 2000**  
 Mi Ayudante, Auxiliar Didáctico de Matemáticas para el Maestro de Educación Primaria: Project for the Improvement of Learning Mathematics in Elementary School  
 Mexican Mathematical Society (MMS) and the National Pedagogical University (UPN)  
 "One of the most visited educational websites in Mexico" (UPN)
- Undergraduate Teaching Assistant, Sciences School, UNAM Mexico** **Fall 2000-Spring 2001**  
 Algebra I and II. Courses taught (50% of course material shared with professor and responsible for the elaboration of all partial exams)

**Staff Member in the Mathematics Hall, Sciences Museum Universum**      **Spring 1999-Summer 2000**  
Bureau of Diffusion of Science, UNAM, Mexico City, Mexico.

#### **WORKSHOPS AND CONFERENCES ORGANIZED**

**Algebraic and Combinatorial Approaches in Systems Biology (ACSB 2015)**      **May 2015**  
The Center for Quantitative Medicine, UConn Health, Farmington CT

**Workshop on Software Development on Parameter Estimation for Boolean models of biological networks**      **June 2009**  
The Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), New Jersey, USA

**Workshop: Model your genes the mathematical way**      **June 2006**  
The Institute for Advance Learning and Research (IARL), VA USA

#### **REFeree AND REVIEW ACTIVITIES**

**Guest Editor**      **December 2016-Present**  
PLOS Computational Biology

#### **Conferences Refereed**

- **18th International Congress of Animal Reproduction: ICAR.**      **June 2016**  
  **Session "Toward integrative and predictive biology of reproduction"**  
  Vinci International Congress Center, Tours, France
- **12th International Conference on Computational Methods in Systems Biology**      **November 2014**  
  University of Manchester, Manchester, England

#### **Journals Refereed**

- Bioinformatics
- PLOS Computational Biology
- BMC Bioinformatics
- BMC Systems Biology
- IEE/ACM Transactions on Computational Biology and Bioinformatics
- Journal of Mathematical Biology
- Journal of Theoretical Biology
- IET Systems Biology
- Biosystems
- PLOS One

#### **Granting Agencies Refereed**

- NIH/NIGMS Panel (Phone) Reviewer, Special Emphasis Panel for NIH/NIGMS for Research Centers in Injury and Perioperative Sciences (P50).      **April 2014**

**SELECTED TALKS**

- 2017 Interstellar Initiative for Early Career Investigators** **March 2017**  
**Japan Agency for Medical Research Development & New York Academy of Sciences**  
 Predicting patient response to immune checkpoint therapies through deep immune profiling
- 2016 SIAM Annual Meeting** **July 2016**  
**The Westin Boston Waterfront, Boston, MA, USA**  
 Combinatorial Interventions for Control Tasks in Large-Scale Signaling Networks
- Discrete Math Day of the Northeast** **April 2016**  
**Smith College, Northampton MA, USA**  
 On the minimal hitting set generation problem and its applications
- Algebraic and Combinatorial Approaches in Systems Biology (ACSB2015)** **May 2015**  
**Center for Quantitative Medicine, UConn Health. Farmington CT, USA**  
 Combinatorial Interventions for Control Tasks in Large-Scale Signaling Networks
- The Winter q-bio Meeting 2015** **January 2015**  
**Maui, Hawaii, USA.**  
 Controllability of large scale networks
- 6th International Moscow Conference on Computational Molecular Biology (MCCMB'13)** **July 2013**  
**Lomonosov Moscow State University. Moscow, Russia.**  
 A Signaling Pathway Rationale for the Design of Combination Therapies for Cancer
- Workshop: Algebraic Methods in Systems and Evolutionary Biology.** **May 2012**  
**The Mathematical Biosciences Institute. Ohio, USA.**  
 An Algebra-Based Method to Infer the Structure and Dynamics of Gene Regulatory Networks.
- 8th European Conference on Mathematical and Theoretical Biology and Annual Meeting of The Society for Mathematical Biology. Krakow, Poland.** **July 2011**  
 Computational Systems Biology: Discrete Models of Gene Regulatory Networks.
- Journées Ouvertes en Biologie, Informatique et Mathématiques.** **June 2011**  
**Institut Pasteur. Paris, France.**  
 An Integrative Signaling Pathway Analysis for Determining Master Regulators and Dysregulated Pathways in Her2 Over-Expressed Human Breast Cancer.
- IB-PAS 2010: International Workshop and Summer School on Integrative Pathway Analysis and Simulation. Bielefeld, Germany.** **May 2010**  
 An Integrative Analysis for Determining Key Molecular Players Involved in Her2+ Human Breast Cancer.
- 15th International Federation of Automatic Control (IFAC) Symposium on 2009** **July**  
**System Identification. Saint Malo, France.**  
 System Identification for Discrete Polynomial Models of Gene Regulatory Networks.
- Department of Neurology, Mount Sinai School of Medicine, New York, USA** **February 2009**  
 Inference of Molecular Regulatory Networks.
- Department of Pathology Informatics, Yale School of Medicine, Connecticut, USA** **February 2009**  
 Reverse-Engineering of Molecular Regulatory Networks.

- Department of Mathematical Sciences. University of Delaware, Delaware, USA**      **February 2009**  
On the Inverse Problem for Molecular Regulatory Networks.
- Institut Curie, Paris, France**      **January 2009**  
Inference of Molecular Regulatory Networks Using Evolutionary Computation.
- Minority Biomedical Research Support Seminars, Rutgers University, New Jersey, USA**      **May 2008**  
Inference of Brain Connectivity Networks.
- Mathematical Biosciences Institute (MBI), Ohio State University, Ohio, USA**      **March 2008**  
Reverse-Engineering of Biological Network Models from Noisy Time-Course Data
- Mathematical Biology Seminar, Mathematics Department**      **November 2007**  
**Rutgers University, New Jersey, USA**  
Discrete Finite Dynamical Systems for the Reverse-Engineering of Biochemical Networks.
- 2nd Research Mixer, Bell Laboratories, New Jersey, USA**      **October 2007**  
Reverse-Engineering of Biological Systems Using Discrete Mathematics.
- Dynamics of Infectious Diseases Meeting. The Statistical and Applied**      **March 2007**  
**Mathematical Sciences Institute (SAMSI), North Carolina, USA**  
Reverse-Engineering of Biochemical Networks.
- Gene Network Sciences, Inc. Boston, USA**      **February 2007**  
Algorithms for the Modeling and Simulation of Gene Regulatory Networks.
- Center for Multiscale Analysis of Genetic Networks. Columbia University, NY, USA**      **February**  
**2007**  
Dynamical Modeling of Gene Regulatory Networks.
- Society for Industrial and Applied Mathematics (SIAM) Annual Meeting, Boston, USA**      **July 2006**  
An Evolutionary Algorithm for the Identification of Biochemical networks.
- Park City Math Institute (PCMI) and the Institute of Advanced Studies (IAS)**      **August 2005**  
**Graduate Summer School in Mathematical Biology, Utah, USA**  
Nonlinear Dynamics of Structured Populations: Theory and Applications of Matrix Models.
- Mathematics Department, Sciences School, UNAM. Mexico City, Mexico**      **July 2001**  
The Mystic Hexagram: A Combinatorial Approach.
- Mathematics Month at the Museum of Sciences "Universum", Mexico City, Mexico**      **March 1999**  
Secrets Among Prime Numbers: An Introduction to Cryptography.
- National Conference for the "Summer with a Scientist" Research Program.**      **October 1998**  
**Veracruz, Mexico.**  
Pascal's Mystic Hexagram: Combinatorial and algebraic aspects.
- COMMUNITY SERVICE**
- The Lewis Mills Math and Science Career Day, Burlington, CT**      **December 2015**  
The Lewis Mills High School  
Career opportunities in mathematical and computational biology



**Harvard University, Cambridge, MA**

**November 2008**

Women in Science: Conversations from a today's perspective.  
Invited speaker for activity organized for English class.

**Kipps Elementary School, Blacksburg, VA**

**July 2006**

Learning Polyhedra Through Origami: activities developed for 4th graders  
as part of school's math awareness activities.

**Margaret Beeks Elementary School, Blacksburg, VA**

**May 2006**

Magic Squares: activities developed for 6th graders