Pablo Cárdenas R.

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Education

Massachusetts Institute of Technology (MIT) — Cambridge, MA, USA **Sep, 2018 – Present**
PhD Student, Department of Biological Engineering (GPA: 5.0/5.0)

Universidad de Los Andes (Uniandes) — Bogotá, Colombia **March, 2018**
Bachelor of Science *Summa Cum Laude* in Microbiology, minor in Bioinformatics (GPA: 4.84/5.0)

Research

Department of Biological Engineering, MIT — Cambridge, MA
Graduate Research Assistant **Sep 2018 – Present**

- → Designing molecular and computational tools for transcriptional control in the malarial parasite *Plasmodium falciparum* (Prof. Jacquin Niles)
- → Helped design, model, construct, and test a management system for cell resource sharing in genetic circuits (Prof. Domitilla Del Vecchio, Mechanical Engineering)
- → Designed a mathematical model to complement an *in vitro* study of the efficacy and dynamics of a synthetic probiotic system for prevention of gut infection (Prof. James Collins)

Department of Systems Biology, Harvard Medical School — Boston, MA
Undergraduate Researcher **Feb – Jul 2018**

- → Helped develop computational workflows for analysis of single-cell imaging (Prof. Johan Paulsson)
- → Constructed and applied microfluidic systems to study bacterial physiology and persister cell formation

Eligo Bioscience — Paris, France
Research Intern in Synthetic Biology **Aug 2017 – Jan 2018**

- → Created DNA constructs and bacterial strains for phage production using CRISPR-Cas9 editing
- → Screened libraries of synthetic phage candidates against bacterial strains

Mathematical and Theoretical Biology Institute, Arizona State University — Tempe, AZ
Undergraduate Researcher **Jun – Jul 2017**

- → Created a 3D, spatially explicit computational model of bacterial resistance to antibiotics in a biofilm

Department of Biological Engineering, MIT — Cambridge, MA
Undergraduate Researcher **May – Aug 2016**

- → Assembled CRISPR-Cas9 constructs for gene editing in the malaria parasite (Prof. Jacquin Niles)
- → Created software that automates the design of the genome-editing plasmids being assembled *in vitro*
- → Carried out a computational genome-wide scan and analysis of Cas9 and Cas12 edition sites in *P. falciparum*

Department of Biological Sciences, Uniandes — Bogotá, Colombia
Undergraduate Researcher **May 2015 - Aug 2017**

- → Designed and experimentally tested an ODE model of phage-host dynamics (Prof. Martha Vives)
- → Applied Hidden Markov Models to identify phages in human gut metagenomes (Prof. Alejandro Reyes)
- → Led an all-student team to create a statistical model for snakebite forecasting which garnered the Best Project in Biomedical Engineering Award at the May 2015 ExpoAndes Student Fair

Teaching

Department of Biomedical Engineering, Uniandes — Bogotá, Colombia
Teaching Assistant **Jan – Dec 2016**

→ Assignment design and grading, review sessions, and teaching main lectures during professor absences for 100 students (Quantitative Human Physiology I and II, Prof. Juan Manuel Cordovez)

Department of Biological Sciences, Uniandes — Bogotá, Colombia
Teaching Assistant, Parasitology Laboratory **Jan – Jun 2015**

→ Provided review sessions and tutoring, helped develop and grade assignments, and prepared microscope slides (Instructor Laura Tamayo and Prof. Camila González)

Department of Student Affairs, Uniandes — Bogotá, Colombia
Teaching Assistant, Social Practice Program **Jul – Dec 2015**

→ Trained, guided, and evaluated 60 Uniandes students serving as tutors for low-income high school students (Social Practice Program, Instructors David Parga and María del Pilar Pérez)

Publications

Host Resistance, Genomics and Population Dynamics in a Salmonella *Enteritidis and Phage System.* **2019**
A.V. Holguín, P. Cárdenas, C. Prada-Peñaranda, L. Rabelo Leite, C. Buitrago, V. Clavijo, ... & M.J. Vives. *Viruses, 11*(2), 188.

Cheating the Cheaters: Spatial Dynamics in the Evolutionary Stability of Antibiotic Resistance. **2018**
D. Akman*, L. Callaway III*, P. Cárdenas*, J. Nieve-Silva*, J Chen, B. Espinoza, L. Arriola, C. Castillo–Garsow. Technical report available from MTBI, Arizona State University.

**These authors contributed equally to the work.*

Awards

Summa Cum Laude, top 1% historic graduates in Faculty of Sciences (Uniandes) **Mar 2018**
Best *Saber Pro* Graduate National Exam, Biology (Ministry of Education, Colombia) **Nov 2017**
Ramón de Zubiría Awards (4), top program GPA (Uniandes) **Nov 2015–Oct 2017**
Excellence Awards in Microbiology, Biomedical Engineering, and Biology (Uniandes) **Mar 2014–Oct 2017**
Best Project in Biomedical Engineering, ExpoAndes Innovation Fair (Uniandes) **May 2015**
Alberto Magno Award for incoming students (Uniandes) **Oct 2013**

Skills

Experimental: Culturing and molecular biology for bacteria, fungi, phage, and P. *falciparum*; PCR, cloning, (3A, Gibson, iPCR, fusion PCR, and Golden Gate/Type IIA), CRISPR-Cas9 genome editing, library multiplex workflows. Experience with fieldwork in vector-borne diseases.

Mathematical: Dynamical system analysis and ODE models, stochastic models (Kolmogorov equations, Langevin approach, Gillespie algorithm Monte Carlo methods), Hidden Markov Chain methods, statistical data clustering and analysis, supervised and unsupervised learning method application.

Programming and Computer: Proficient in C/C++, Python, R, MATLAB, Mathematica, Java, Javascript, HTML5/CSS, LaTeX, Bash/Unix Shell script for cluster computing, and Actionscript 3. Basic Apache web server administrator abilities. Image edition (GIMP raster and Inkscape vector).

Languages: Native fluent English and Spanish, working knowledge of French.

Other: Will play classical to jazz to metal on a violin. Occasional illustrator and comic artist.