Pablo Cárdenas Ramírez

19—2 Hunting St, Cambridge, MA, USA • (+1) 857 756 2110 • pablocarderam@gmail.com
pablocarderam.github.io • orcid.org/0000-0001-7015-0512

Education

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

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

Awards and Honors

***Summa Cum Laude* in Microbiology** (Uniandes) **Mar 2018**
Awarded to graduates with GPA in top 1% of the past 5 years who demonstrate personal integrity in an interview

Top score in 2016 Saber Pro, Biology (Ministry of Education, Colombia) **Nov 2017**
Awarded to nation-wide top scores on the Colombian ICFES-Saber Pro *exam for university graduates*

Excellence Distinction (Uniandes) for the semester's highest GPA in a program **Mar 2014–Oct 2017**
Won in Microbiology (4) , Biomedical Engineering (1) , and Biology (3) programs

Ramón de Zubiría Distinction (Uniandes) for the highest cumulative GPA in a program **Nov 2015–Oct 2017**
Won in Microbiology (1) and Biomedical Engineering (3) programs

Alberto Magno Distinction (Uniandes) for the top ten applicant scores in a semester **Oct 2013**
Based on the Colombian ICFES–Saber 11 *state exam*

Research Experience

Graduate Research Assistant, MIT Department of Biological Engineering, Cambridge, MA **Sep 2018–Present**
- → *Designing molecular and computational tools for transcriptional control and synthetic modulation of pathogenesis in the malarial parasite* Plasmodium falciparum *(Prof. Jacquin C. 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 J. Collins)*

Undergraduate Researcher, Harvard Medical School Dept. of Systems Biology, Boston, MA **Feb–Jul 2018**
- → *Constructed and applied microfluidic systems to study bacterial physiology and persister cell formation*
- → *Helped develop computational workflows for analysis of single-cell imaging (Prof. Johan Paulsson)*

Research Intern in Synthetic Biology, Eligo Bioscience, Paris, France **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 (Dr. Jesús Fernández-Rodríguez)*

Undergraduate Researcher, Arizona State University (ASU), Tempe, AZ **Jun–Jul 2017**
- → *Created a 3D, spatially explicit computational model of bacterial resistance to antibiotics in a biofilm*

Undergraduate Researcher, Uniandes Dept. of Biological Sciences, Bogotá, Colombia **Aug 2016-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)*

Undergraduate Researcher, MIT Department of Biological Engineering **May–Aug 2016**
- → *Assembled Cas9 constructs to insert synthetic RNA devices in the malaria parasite (Prof. Jacquin Niles)*
- → *Created a webpage that automates the design of the genome-editing plasmids being assembled* in vitro
- → *Developed software for a genome-wide scan and analysis of Cas9 and Cpf1 edition sites in* P. falciparum

Undergraduate Researcher Uniandes Dept. of Biomedical Engineering, Bogotá, Colombia **May 2015–May 2016**
- → *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 (Uniandes)*

Team Member, Uniandes Synthetic Biology Team **Jan 2014–May 2017**
- → *Presented the team's Gold-category project,* Sherlock coli*, at iGEM 2014 (Prof. Juan Manuel Pedraza)*
- → *Helped develop open-source, low-cost alternative protocols for molecular biology in low-resource labs*
- → *Participated in outreach activities at Maloka Science Museum in Bogotá, Colombia*

Teaching Experience

Teaching Assistant, Uniandes Dept. of Biomedical Engineering, Bogotá, Colombia **Jan–Dec 2016**
- → *Assignment design and grading, review sessions, and main lectures during professor absences for 100 students (Quantitative Human Physiology I and II, Prof. Juan Manuel Cordovez)*

Teaching Assistant, Uniandes Student Deanship, Bogotá, Colombia **Jul–Dec 2015**
- → *Trained, guided, and evaluated 60 Uniandes students serving as tutors for low-income high school students (Social Practice Program, Profs. David Parga and María del Pilar Pérez)*

Teaching Assistant, Uniandes Dept. of Biological Sciences, Bogotá, Colombia **Jan–Jun 2015**
- → *Prepared microscope slides, helped develop and grade assignments and provided review sessions and tutoring (Parasitology Laboratory course, Profs. Laura Tamayo and Camila González)*

Leadership Experience

Volunteer Tutor, Biological Engineering Application Assistance Program **Oct 2018–Present**
- → *Providing mentorship for MIT PhD program applicants from underrepresented backgrounds after participating in the program as an applicant*

Volunteer Academic Tutor, Uniandes Social Practice Program **Jul–Dec 2014**
- → *Semester curriculum design, academic tutoring, review sessions three hours a week for 10 low-income high school students in Bogotá (Social Practice Program, Profs. David Parga and María del Pilar Pérez)*

Program Co-Leader, Uniandes Association of Students with Financial Aid (ANDAR) **Jan 2016–May 2017**
- → *Oversaw 4–8 teams of 5–10 Uniandes students mentoring incoming students receiving financial aid through their first semester*

Volunteer Mentor, Uniandes Association of Students with Financial Aid (ANDAR) **Jan–Dec 2015**
- → *Mentored 20 students receiving financial aid through their first semester at Uniandes*

Volunteer Academic Tutor, Uniandes Association of Students with Financial Aid (ANDAR) **Jul–Dec 2014**
- → *Provided individual tutoring and Calculus review sessions for Uniandes students receiving financial aid*

Skills

Experimental: Classical microbiological culturing techniques for bacteria and fungi, phage workflows (induction, isolation, transduction, spotting), phagemid production, cloning workflows, PCR, DNA assembly (3A, Gibson, iPCR, fusion PCR, and Golden Gate/Type II), CRISPR-Cas9 genome editing, library multiplex workflows. Experience with fieldwork in vector-borne diseases (CDC, hen, blanket trap setting; *Lutzomyia*, *Culex*, *Anopheles*, *Aedes*, and triatomine identification).

Mathematical: Dynamical system analysis and ODE models in epidemiology, ecology, and systems biology, stochastic models of gene expression (Kolmogorov equations, Langevin approach, Gillespie algorithm Monte Carlo methods), Hidden Markov Chain methods, statistical data clustering and analysis.

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 anything from classical to jazz to metal on a violin. Occasional illustrator and comic artist.

Publications

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

Akman, D.*, Callaway III, L.*, **Cárdenas, P.***, Nieve-Silva, J*, Chen, J., Espinoza, B., Arriola, L., Castillo–Garsow, C. (2018). *Cheating the Cheaters: Spatial Dynamics in the Evolutionary Stability of Antibiotic Resistance.* Technical report available from the Mathematical and Theoretical Biology Institute, Arizona State University. **The authors contributed equally to the work.*