Juan Manuel Vazquez

PhD Candidate at the University of Chicago, Department of Human Genetics
CLSC Room 317-18, 920 E 58th St · Chicago · IL 60637
juan@vazquez.bio docmanny vazquez.bio TheMainManManny juanvazquezbio
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RESEARCH INTERESTS

I have always been fascinated by aging and cancer; in particular, I am interested in the genetic and epigenetic basis underlying the wide diversity in lifespans across mammals. I study how large and/or long-lived species, such as African Elephants, the Bowhead Whale, and the Little Brown Bat respond to stress relative to closely-related smaller, shorter-lived species; and how their unique evolutionary histories have led to genetic adaptations that enhance their stress response and lower their per-cell cancer risk. Using primary cell culture models and functional genomics, I aim to explore next how differences in transcritomic and epigenetic responses to stress and aging contribute to differences in lifespan.

EDUCATION

University of Chicago, Ph.D. Human Genetics **2015 -**

Laboratory of: Vincent J Lynch, Department of Human Genetics
Dissertation title: *The Role of Gene Duplicates in Resolving Peto's Paradox*
Committee Members: Marcelo Nobrega, Joseph Thorton, Yang Li, Vincent J Lynch, Yoav Gilad

University of Rochester, B.S. Biology, Molecular Genetics **2011 - 2015**

University of Rochester, B.A. Chemistry **2011-2015**

RESEARCH EXPERIENCE

Graduate Research Assistant, Vincent J Lynch, University of Chicago **2016 -**

Studying Peto's Paradox and the duplication of tumor suppressor genes in large, long-lived species such as the African Elephant (*Loxodonta africana*), the Bowhead Whale (*Balaena mysticetus*), and the Little Brown Bat (*Myotis lucifugus*). The project involves searching for tumor suppressor homologues in other genomes using a custom Reciprocal Best-Hit BLAT pipeline I designed and programmed, followed by functional characterization of functional duplicates *in cellula*.
Developed a clade of recently-diverged bats as a model for Peto's Paradox research.
Mentored various undergraduate and graduate students rotating in the lab. As students all worked on subsets of my project, a major mentorship component was frequent informal journal clubs of papers related to our work. Additionally, students were all taught both basic skills like cell culture, and advanced skills like qPCR, Western blotting, and flow cytometry.

Rotation, Alex Ruthenberg, University of Chicago **Summer 2016**

Worked on optimizing an Internally Calibrated ChIP (ICeChip) methodology in *C. elegans* to study H3K4me3 patterns at the onset of sexual maturity.

Research Assistant, Vera Gorbunova and Andrei Seluanov, University of Rochester **January 2014 - May 2015**

Analyzed the oxidative stress tolerance across various rodent species by culturing cells in high and low oxygen condition, using statistical analysis of growth rates to determine tolerance. Studied the effects of MEF SIRT6-KO cells in cancer cultures compared to wild-type MEF, and the role of the ADP-ribosylation function of SIRT6 in tumorigenesis. Created self-assembly hydrogels using hyaluronic acid derived from naked mole rat cells, and experimented with their use in maintaining

3D cell cultures, especially in the context of cancer and pluripotent stem cells. Studied the role played by RHAMM in the cancer resistance of the naked mole rat (*Heterocephalus glaber*).

SCHOLARSHIP

Journal Articles

Vazquez JM, Sulak M, Chigurupati S, Lynch VJ (2018). "A Zombie LIF Gene in Elephants Is Upregulated by TP53 to Induce Apoptosis in Response to DNA Damage." Cell Reports, 24(7), 1765-1776.

Patrick A, Seluanov M, Hwang C, Tam J, Khan T, Morgenstern A, Wiener L, **Vazquez JM**, Zafar H, Wen R, Muratkalyeva M, Doerig K, Zagorulya M, Cole L, Catalano S, Ladd A, Coppi A, Coşkun Y, Tian, X, Ablaeva J, Nevo E, Gladyshev V, Zhang Z, Vijg J, Seluanov A, Gorbunova V (2016). "Sensitivity of primary fibroblasts in culture to atmospheric oxygen does not correlate with species lifespan.", Aging, 8 (5), 841-847.

Manuscripts in preparation

Vazquez JM, Chen E, Miller RA, Lynch VJ. *ETA: Fall 2019*
"A TP53 Locus Duplication Enhances the Stress Response of the Little Brown Bat, *Myotis lucifugus*."

Vazquez JM, Lynch VJ. *ETA: Winter 2019*
"A Survey of Gene Duplications in Mammals Reveals Genes That May Contribute to the Resolution of Peto's Paradox."

Bulls SE, **Vazquez JM**, Lynch VJ, Chiari Y, Glaberman S. *ETA: Summer 2020*
"Long-Lived *Testudines* Demonstrate a High Tolerance to Various Forms of Cellular Stress."

Oral Presentations

Vazquez JM, Chen E, Miller RA, Lynch VJ. "Stress Response and a P53 Duplication in the Long-Lived Bat, *Myotis lucifugus*." North American Society for Bat Research, 24 October 2019, Kalamazoo, MI, USA.

Vazquez JM, Chen E, Miller RA, Lynch VJ. "Stress Response and a P53 Duplication in the Long-Lived Bat, *Myotis lucifugus*." Biology of Aging Gordon Research Conference, 16 July 2019, Sunday River, MA, USA.

Poster Presentations

Vazquez JM, Lynch VJ. "Gene Duplications and Peto's Paradox in the African Elephant and Paenungulates." 2018 SACNAS: The National Diversity in STEM Conference, 12 October 2018, San Antonio, TX, USA.

Vazquez JM, Lynch VJ. "A Role for Gene Duplication in Peto's Paradox." Biology of Aging Gordon Research Seminar and Conference, 8-14 July 2017, Les Diablerets, CH.

TEACHING AND MENTORING EXPERIENCE

Teaching

Teacher, Ideal Student Workshop and Test Prep, 8th Grade Class, Swift Elementary School. **Spring 2019**

Taught a 10-week, 1-hour series on executive life skills, study skills, and practice for taking standardize tests such as the NWEA-MAP exam. Classes were a combination of experiential, game-based learning; group work; and interactive lectures.

Teaching Assistant, BIOS 20235 Biological Systems, University of Chicago. **Winter 2019**

The second part of the introductory Biology course series for advanced students, focusing on developmental, ecology, and evolutionary biology. In addition to grading and organizing the course, TAs guided discussion sections for students to discuss weekly papers in a collaborative setting.

Volunteer Assistant Instructor, Introduction to Python with Real-World Applications, Rauner College Prep. **2018**

Taught data science to a class of 12 high school biology students in the context of genomics along with 4 other volunteers.

Teaching Assistant, BIOS 21306 Human Genetics and Evolution, University of Chicago. **Winter 2017**

Undergraduate course focusing on historic and modern advances in our understanding of human genetics at various scales. In addition to keeping attendance and organizing the course, he taught a lesson on classic and modern techniques for sequencing DNA & RNA; detecting epigenetic modifications in the genome; and on detecting signatures of selection in the genome.

Teaching Assistant, BIOS 21306 Human Genetics and Evolution, University of Chicago. **Winter 2017**

Undergraduate course focusing on historic and modern advances in our understanding of human genetics at various scales. In addition to keeping attendance and organizing the course, he taught a lesson on classic and modern techniques for sequencing DNA & RNA; detecting epigenetic modifications in the genome; and on detecting signatures of selection in the genome.

Tutor & Workshop Leader, Educational Endeavors. **2016 - Present**

Over 600 hours of experience teaching and tutoring students at the high school and undergraduate levels. Tutored in all subjects ranging from STEM fields (Biology, Physical Sciences, Math, Forensics), to language arts (English, Spanish, French) and social sciences (History, Economics) at regular, AP, and collegiate levels. Assisted with and led various tutoring workshops with students from the Daniel Murphy Scholarship Fund and LINK Unlimited.

Laboratory and Lecture Teaching Assistant, CHM 210H Honors Organic Chemistry Lab, University of Rochester. **Spring 2013**

Assisted in the instruction of the lab lecture, lead workshop-style discussions to create the experimental procedures for the labs with students. Oversaw and administered the proper functioning of the lab. Aided and taught students, as well as assessed them for quality work and analytic skills in lab work and in lab reports.

Laboratory and Lecture Teaching Assistant, CHM 173Q Freshman Organic Chemistry Lab, University of Rochester. **Fall 2012**

Oversaw an organic chemistry lab of 16 freshmen students, grading reports and ensuring the proper functioning of the lab. Ran weekly workshops and lectures for students to design their experiments for the week.

Mentoring

Supervisor for Stephanie E. Bulls, M.S, University of South Alabama. **2019 -**

Masters student in the Biology Department at the University of South Alabama. She visited the University of Chicago from 01-07/2019 for me to teach and direct her investigation on Peto's Paradox and stress response in *Testudines*. The manuscript in preparation which summarizes our findings - "Long-Lived Testudines Demonstrate a High Tolerance to Various Forms of Cellular Stress" - will be released on BioRxiv at the start of 2020.

Supervisor for Eric Chen, B.s, University of Chicago. **2018 - 2019**

Undergraduate student in the Colllege of Arts and Science at the University of Chicago. Under my leadership, he performed various molecular biology experiments characterizing a TP53 duplication in *Myotis lucifugus*. His results are featured in the manuscript in progress "A TP53 Locus Duplication Enhances the Stress Response of the Little Brown Bat, *Myotis lucifugus*," to be released on BioRxiv shortly. I have written various letters of recommendation for him, in addition to assisting him with poster and oral presentations.

Mentor for Nadya Ali, Ph.D, University of Chicago. **2018 -**

Ph.D. Candidate in the Committee on Evolutionary Biology at the University of Chicago. Her thesis is focused on the endangered Black-Footed Ferret, and how epigenetic factors contribute to infertility in this species. She has been working with to learn how to perform COMET assays to test for DNA damage in single cells, as well as for general expertise in DNA damage and other aging-related pathologies in sperm.

MEDIA, SERVICE, AND OUTREACH

Interviews

NPR, Science Friday: Flatow, Ira. "How A 'Zombie Gene' Helped Elephants Evolve Protection From Cancer." Audio blog post. Science Friday. NPR, 08/17/2018. https://www.sciencefriday.com/segments/how-a-zombie-gene-helped-elephants-evolve-protection-from-cancer/.

Public Outreach Events

Volunteer Demonstrator, *Science Works*, Museum of Science and Industry. **2016 - 2018**

Science Works is an event hosted by the Museum of Science and Industry of Chicago that showcases real-life scientists and science to the general public.
Alongside other Human Genetics personnel, the team organized and participated in a variety of scientific demonstrations.

Volunteer Demonstrator, *Stand Up for Science*, Field Museum. **2018**

Organized and participated in various demonstrations, and spoke about science to members of the general public at the Field Museum.

Panels and Presentations

Panelist, Discover UChicago*, University of Chicago* **2018**

The *Discover UChicago* program provides undergraduates with an opportunity to come to the University for a week and learn about campus life and research. At the program's conclusion, current students come to give attendees general advice about professional skills, applying to graduate programs, and selecting mentors and programs.

FUNDING, AWARDS, AND FELLOWSHIPS

Grants

Conference Grant for 2019 Biology of Aging Gordon Research Conference (NIA U-13 Supplement), Harvard University. $13,757.11 **2019**

Wrote a supplement to the U13 Conference Grant by Marcia Haigis and Thomas Rando for the 2019 Biology of Aging Gordon Research Conference.
Funding covered the Registration fee for all 48 attendees, and travel costs for all 15 speakers. Full grant was awarded $36,242.89, of which the Gordon Research Seminar supplement was allocated $13,757.11.

Diversity and Inclusion Pilot Program Grant, University of Chicago. $5,000.00 **2019**

The Office of Diversity and Inclusion at the University of Chicago provides opportunities for members of the university to submit proposals for projects of various scales. At the largest scale, the Grant funds Pilot Programs at a maximum of $5000 for programs and projects that will further diversity and inclusion on campus.
Co-written with Lauren Blake, 2019 Treasurer for the *Society for the Advancement of Chicanos/Hispanics and Native Americans in Science* (SACNAS).
Funded in full for the 2019 Midwest Regional SACNAS Conference.

Diversity and Inclusion Small Projects Grant, University of Chicago. $2,000.00 **2019**

The Biological Sciences Division of the University of Chicago offers grants for competitve proposals that will enhance diversity and inclusion in the Division.
Grant was submitted on behalf of SACNAS for the 2018 Midwest Regional SACNAS Conference, and was awarded in full.

Diversity and Inclusion Pilot Program Grant, University of Chicago. $10,000.00 **2018**

The Office of Diversity and Inclusion at the University of Chicago provides opportunities for members of the university to submit proposals for projects of various scales. At the largest scale, the Grant funds Pilot Programs at a maximum of $10,000.00 for programs and projects that will further diversity and inclusion on campus.
Co-written with Christina Roman, 2018 President of SACNAS.
Funded in full for the 2019 Midwest Regional SACNAS Conference.

Diversity and Inclusion Small Projects Grant, University of Chicago. $2,000.00 **2018**

The Biological Sciences Division of the University of Chicago offers grants for competitve proposals that will enhance diversity and inclusion in the Division.
Co-written with Christina Roman, 2018 President of SACNAS.
Grant was submitted on behalf of SACNAS for the 2018 Midwest Regional SACNAS Conference, and was awarded in full.

Fellowships, Scholarships, and Training Grants

Yale Ciencia Academy Fellowship, Yale University *(Awarding Institution).* **2019**

The YCA Fellowship provides outstanding students in the Biological Sciences with professional development and scientific outreach training in a year-long program. The program requires the completion of a scientific outreach program that is designed by the Fellow, and executed in groups throughout the year.
Program pays for in-person training and attendance at the 2019 American Association for the Advancement of Science Meeting in Washington D.C, USA.

Initiative to Maximize Student Development Trainee (NIGMS R25), University of Chicago. **2015**

Pilot Program funded by the NIH to support and enhance the training, mentoring, and education of incoming graduate students, with the goal of improving diversity in the biological sciences.
Competitve entry into training grant cohort.

Dean's Scholarship, University of Rochester. **2011 - 2015**

Merit Scholarship.
"Winners of Dean's Scholarships have demonstrated both academic achievement and the potential to make unique contributions to Rochester student life. The Dean's Scholarship is a reward for students' hard work in high school and a statement of our trust in their continued success here on campus."

Howard Bryant Memorial Scholarship, University of Rochester. **2012 - 2014**

Merit Scholarship.
"The Fund was established in 2004 to honor Howard's legacy of caring and support by providing aid to students interested in pursuing a career in Sciences or Engineering. Two students are picked to receive the scholarship each year, beginning in their sophomore year for two years."

Awards and Recognitions

SACNAS Chapter of the Year Award, Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS). **2019**

The Chapter of the Year Award is presented to the SACNAS chapter which demonstrates exceptional leadership and aptitude in chapter development, professional development, recruiment and membership, community outreach, and fundraising.

SACNAS Chapter Role Model Award for Outstanding Professional Development, Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS). **2018**

In recognition of the UChicago SACNAS Chapter's exceptional work in organizing and executing the first-ever Midwest Regional SACNAS Conference.

PROFESSIONAL ACTIVITIES

Conferences

Chair, Gordon Research Seminar on the Biology of Aging, Sunday River, MA, USA. **2017 - 2019**

Organized the 2019 Biology of Aging Gordon Research Seminar, with 48 attendees.
Co-chair: Victor Bustos.
Raised $14,257.11, allowing reimbursements of registration and conference fees for all attendees; and travel reimbursements for speakers.

Chair, Midwest Regional SACNAS Conference, Chicago, IL, USA. **2019**

A full-day, 200-person, free conference with multiple panels, workshops, student speakers, poster session, and keynote address; target audience is underrepresented groups in STEM and STEM-allied fields.
Lead a team of 5 co-chairs.
Raised $14,000 for conference expenses, with $2000 of travel funding for attendees.

Co-chair, Inaugural Midwest Regional SACNAS Conference, Chicago, IL, USA. **2018**

A full-day, 220-person, free conference with multiple panels, workshops, student speakers, poster session, and keynote address; target audience is underrepresented groups in STEM and STEM-allied fields.
One of 5 co-chairs working with Conference Chair.
Raised $16,000 for conference expenses, with $2500 of travel funding for attendees.

Organizations

President, Society for the Advancement of Chicanos and Native Americans in Science, University of Chicago. **2018 -**

Received the SACNAS National Chapter of the Year Award.
Organized various monthly professional development workshops catering to undergraduates, graduates, and post-docs. Led the 2019 Midwest Regional SACNAS Conference Planning Team. Established the SACNAS Midwest Meeting Planning Commmittee for facilitating inter-chapter communication, organization, and conference planning.

Treasurer, Society for the Advancement of Chicanos and Native Americans in Science, University of Chicago. **2017 - 2018**

Raised over $16,000.00.
Received the SACNAS National Chapter Role Model Award for Outstanding Professional Development.
Assisted in organizing various workshops for a primarily undergraduate audience; assisted team with organizing the first-ever Midwest Regional SACNAS Conference.

Student Representative, Deparment of Human Genetics, University of Chicago. **2017 - 2018**

Planned and ran various events for Human Genetics students.
Assisted with recruitment activities and planning.

Assisted with the planning and running of the 2017 University of Chicago Molecular Biosciences Retreat.

Committees

Committee Member, Biological Sciences Division Diversity & Inclusion Representative Selection Committee, University of Chicago. **2017 - 2018**

Part of a 4-person committee tasked with designing the procedures for selecting a student representative for the nascent Diversity and Inclusion Committee.

Panels and Presentations

Panelist, "How to be an Effective Student Leader", Midwest Regional SACNAS Conference, Chicago, IL. **April 2019**

Part of a larger talk on how to start-up and lead an organization, panelists consisted of student leaders from across the Midwest answering questions from attendees.

Panelist, "How to Succeed in Grad School", Summer Graduate Research Program, University of Chicago. **August 2018**

Panel focused on the experiences of panelists as underrepresented minorities in STEM, and how they navigated life through their PhDs. Panelists shared their advice and stories about how they overcame various obstacles in academia.

CERTIFICATES AND MINI-COURSES

Successfully Managing Your Team of Scientists, University of Chicago myCHOICE program **Summer 2018**

16-hour workshop introducing concepts in team management in industry and academia. Attendees were able to apply knowledge from each session in practical exercises under various scenarios.

Introduction to Effective Teaching in STEM, University of Chicago myCHOICE program **Spring 2018**

Attendees honed their teaching skills through lectures and practical exercises in this evidence-based pedagogy course.

Beyond the Bench: The Business of Running a Lab, University of Chicago myCHOICE program **Fall 2017**

A rotating panel of primary investigators and heads of facilities at the University of Chicago taught students every week about the behind-the-scenes work that went into starting and running their labs.

PROFESSIONAL MEMBERSHIPS

American Aging Association **2019 -**
Society for the Advancement of Chicanos/Hispanics and Native Americans in Science **2018 -**
American Association for the Advancement of Science **2015 - 2016**

ADDITIONAL SKILLS

Languages: English (native), Spanish (native), French (fluent), German (conversational)
Programming: Python (expert), R (intermediate), Bash (expert), Julia (novice), Rust (novice)
Sequencing: *de novo* transcriptomics (study design, library prep, downstream analysis via Tuxedo Suite or Kalisto); ChIP-seq (IcE-ChIP, native, and denatured)
Microscopy: Confocal Microscopy (Leica SP6, SP8); live cell imaging (Olympus Viva View FL)
Flow Cytometry: Cell-cycle (EdU-Hoescht, Fucci), TUNEL

Molecular Biology: qPCR (RT, ChIP); Western Blot
Other skills and interests: Sailing, hiking, guitar, public speaking