Jasmin Camacho

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EDUCATION

Harvard University Cambridge, MA
Ph.D. in Organismic and Evolutionary Biology May 2020

- National Science Foundation Graduate Research Fellowship
- Dissertation: "*Bats: A Model for Mammalian Craniofacial Diversification"*
- Advised by: Drs. Arhat Abzhanov and Cliff Tabin

University of California, Davis Davis, CA
B.S. in Evolution, Ecology, and Biodiversity May 2008

- Project: *"RNAi Analysis of Pierce's Disease affecting Grapevines"*
- Advised by: Drs. David Gilchrist and James Lincoln

AWARDS AND FELLOWSHIPS

American Fellowship 2018 - 2019
Dissertation completion support from American Association of University Women

Merit Fellowship
Harvard University award *(Declined in favor of AAUW)* 2018

Gross Anatomy for Graduate Students Certificate Summer 2018
Harvard Medical School

Molecular Evolution Award
Completion of 2-week workshop from Marine Biological Laboratory Summer 2016

Embryology Award Summer 2015
Scholarship and completion of 6-weeks of training from Marine Biological Laboratory

Graduate Research Fellowship 2014 - 2018
National Science Foundation

RESEARCH EXPERIENCE

Harvard Medical School, Dept of Genetics Boston, MA
Department of Genetics May 2017 - present
Visiting Scientist and Postdoctoral Research Fellow with Clifford Tabin

- Strategically planned 3 undergraduate summer student research projects focused on histological and *in situ* hybridization analysis of fixed and frozen bat tissues in 2019, resulting in 2 publications
- Discovered molecular pattern of craniofacial development and evolution in bats by applying and optimizing multiplex immunofluorescent and imaging techniques in non-model organisms, resulting in 2 awards totaling $3,300 from the Harvard Center for Biological Imaging
- Experienced analyzing large datasets as demonstrated by ability to automate high-throughput image data analysis with *FIJI*

- Developed embryonic 3D-models of bat molecular expression from confocal imaging data

Harvard University Cambridge, MA
Department of Organismic & Evolutionary Biology Aug 2012 - April 2019
Graduate Researcher with Arhat Abzhanov

- Discovered evolutionary developmental mechanism underlying phyllostomid bat skull diversity using micro-CT imaging, 3D landmark-based geometric morphometrics, and phylogenetic comparative methods, resulting in 1 publication
- Excellent relationship builder demonstrated by managing research on 4 collaborative projects, resulting in $40,000 in grant funds for fieldwork and mobile molecular laboratory in Trinidad, West Indies
- Able to innovate using a data-driven, candidate gene approach as evidenced by 3 research awards totaling $172,100 and discovery of molecular signaling pathway that modulates facial diversity

Smithsonian Tropical Field Research Institute Gamboa, Panama
National Science Foundation Internship June 2017

- Captured bats to find fungi on batflies, a collaborative project with Dr. Danny Haelewaters, resulting in one publication from data collected in eight days

Museum of Comparative Zoology Cambridge, MA
Visiting Graduate Researcher with Hopi Hoekstra May 2016 - May 2017

- Creative educator with advanced skills generating high-resolution micro-CT images and constructing 3D surface models of bone and cartilage development for 3D printing
- Forward-thinking biomedical research scientist with successful generation of bat tissue libraries by skilled microdissections for next generation sequencing of RNA

Marine Biological Laboratory Woods Hole, MA
Visiting Embryology and Molecular Evolution Intern Summer 2015, 2016

- Devised genetic and experimental models to explore and analyze metazoan evolution and presented outcomes of experiments every two weeks
- Applied a variety of microscopy techniques using model and non-model organisms, including light sheet, confocal, slide scanning, differential interference contrast, widefield, and tissue clearing

Institute for Pediatric Regenerative Medicine Sacramento, CA
Laboratory Manager with Verónica Martínez-Cerdeño June 2009 - June 2012

- Excellent communication skills on complex scientific concepts, demonstrated by training 24 students and visiting scientists with various backgrounds
- Strong leadership skills and experience in managing research projects, resulting in 6 publications
- Analyzed human brain tissue using stereology on *Nissl*-stained microtome sections

RESEARCH GRANTS

Harvard Integrated Life Sciences Grant 2017 - 2018
Co-PI awarded $3,750 with SACNAS at Harvard and with the Ivy League Project for diversity outreach efforts

Harvard Open-Access Publishing Equity Grant 2018
Awarded $1,125 from Harvard Library Office for Scholarly Communication

Simmons Grant 2016 - 2017
Awarded $3,300 from Harvard Center for Biological Imaging

Graduate Research Internship Program Grant 2016 - 2017
Awarded $5,000 from National Science Foundation

Doctoral Dissertation Improvement Grant 2015 - 2017
Co-PI awarded $22,000 from National Science Foundation

Conference Travel Grant 2014
Awarded $300 from Society for Developmental Biology

Summer Research Grant 2014
Awarded $1,000 from Harvard Graduate Student Council

PUBLICATIONS

*undergraduate author; **high school student

1. **Camacho J**, Lin J*, McCormack M*, Smith S*, Moon R, Rasweiler J IV, Behringer R, Tabin C, Abzhanov A. BMP signaling underlies the craniofacial heterochrony in phyllostomid bats, a hyperdiverse mammal group. *In preparation*

2. **Camacho J**, Moon R, Lin J**, Smith S*, Randolph C, Rasweiler J IV, Behringer R, Abzhanov A. 2020. Differential cellular proliferation underlies heterochronic generation of cranial diversity in phyllostomid bats. *EvoDevo* 11:11

3. **Camacho J**, Heyde A*, Haelewaters D, Bhullar BAS, Simmons N, Abzhanov A. 2019. Peramorphosis, an evolutionary developmental mechanism in neotropical bat skull diversity. *Developmental Dynamics* doi: 10.1002/dvdy.90

4. Walker MJ, Dorrestein A, **Camacho J**, Meckler LA, Silas KA, Hiller T, Haelewaters D. 2018. A tripartite survey of hyperparasitic fungi associated with ectoparasitic flies on bats (Mammalia:Chiroptera) in a neotropical cloud forest in Panama. *Parasite*: 25:19

5. Martínez-Cerdeño V, **Camacho J,** Ariza J, Rogers H, Kreutz A, Behringer R, Rasweiler J, Noctor SC. 2017. A bat model of cortical development: length of neurogenesis and cell cycle dynamics impact cortical growth. *Cerebral Cortex* doi: 10.1093/cercor/bhx251

6. Bhullar BAS, Fabbri M, Koch N, Pritchard A, Hanson M, Hoffman E*, Bever G, Balanoff A, Morris Z, Field D, **Camacho J**, Rowe T, Norell M, Roger Smith, Arhat Abzhanov. 2017. The skull roof tracks the brain evolutionarily and ontogenetically in the deep history of Archosauria. *Nature Ecology and Evolution* 1 (10): 1543

7. Haelewaters D, Pfliegler WP, Szentiványi T, Földvári M, Sándor AD, Barti L, **Camacho J**, Gort G, Estók P, Hiller T, et al. 2017. Parasites of parasites of bats: Laboulbeniales (Fungi: Ascomycota) on bat flies (Diptera: Nycteribiidae) in central Europe. *Parasites & Vectors* 10 (1):96

8. Martínez-Cerdeño V, Cunningham CL, **Camacho J,** Keizer JA, Ariza J, Lovern M, and Noctor SC. 2016. Evolutionary Origin of Tbr2-expressing precursor cells and the subventricular zone in the developing cortex. *Journal of Comparative Neurology* doi:10.1002/cne.23879

9. Bhullar BAS, Morris Z, EM Sefton, Tok A, Tokita M, Namkoong B, **Camacho J**, Burnham DA, and Abzhanov A. 2015. A molecular mechanism for the origin of a key evolutionary innovation, the bird beak and palate, revealed by an integrative approach to major transitions in vertebrate history. *Evolution* 69: 1665-1677

10. Kim E*, **Camacho J**, Combs Z, Ariza J, Lechpammer M, Noctor S, and Martínez-Cerdeño V. 2015. Preliminary findings suggest the number and volume of supragranular and infragranular pyramidal neurons are similar in the anterior temporal area of control subjects and subjects with autism. *Neuroscience Letters* 589: 98-103

11. Martínez-Cerdeño V, **Camacho J,** Fox E, Miller E*, Ariza J, Kienzle D*, Plank K*, Noctor S, and Van de Water J. 2014. Prenatal exposure to autism-specific maternal autoantibodies alters proliferation of cortical neural precursor cells, enlarges brain, and increases neuronal size in adult animals. *Cerebral Cortex*: bhu291

12. **Camacho J**, Ejaz E*, Ariza J, Noctor S, and Martínez-Cerdeño V. 2014. RELN-expressing Neuron Density in Layer I of the Superior Temporal Lobe is Similar in Human Brains with Autism and in Age-Matched Controls. *Neuroscience Letters* 579: 163-167

13. **Camacho J**, Jones K, Miller E*, Ariza J, Noctor S, Van de Waters J, and Martínez-Cerdeño V. 2014. Embryonic intraventricular exposure to autism-specific maternal autoantibodies produces alterations in autistic-like stereotypical behaviors in offspring mice. *Behavioral Brain Research* 266: 46-51

14. Martínez-Cerdeño V, Cunningham CL, **Camacho J**, Antczak JL*, Prakash AN, Cziep ME, Walker AI, and Noctor S. 2012. Comparative analysis of the sub-ventricular zone in rat, ferret, and macaque: Evidence that rats possess an outer subventricular zone. *PLoS ONE* 7(1):e30178

SELECTED PRESENTATIONS

Camacho, J. The truth about bats and SARS-CoV-2. *Clubes de Ciencia Mexico.* Webinar presentation on May 27, 2020. ***invited talk**

Camacho, J. Mechanisms of adaptive craniofacial evolution in New World leaf-nosed bats. *Biology Department Seminar.* U Mass Lowell, February 13, 2019. ***invited talk**

Camacho, J, Tabin C.J., Abzhanov A. Exploring adaptive and novel traits of bat faces through morphometrics and developmental genetics. *Society for Integrative and Comparative Biology Annual Meeting.* San Francisco, CA, January 6, 2018.

Camacho, J. Biology of Bats. *Harvard University*. Guest lecture on October 26, 2017. ***invited talk**

Camacho J, Heyde A., Abzhanov A. The evolution and development of diverse and adaptive skull shapes in New World leaf-nosed bats. *Society for Integrative and Comparative Biology Annual Meeting.* Complementary

Symposium: A bigger picture: organismal function at the nexus of development, ecology, and evolution. Portland, OR, January 6, 2016. ***invited talk**

TEACHING EXPERIENCE

University of West Indies St. Augustine, Trinidad
Founder, Risk Modeling of Disease in the Caribbean Islands Summer 2020

- In development with Dr. Janine Seetahal
- Designing lectures and exercises for introductory programing (R) workshop for students in biology, veterinary medicine, and public health
- Seeking funding to support students and staff

Harvard University Cambridge, MA
Teaching Fellow, Cellular Biology in the World Spring 2020

- Taught weekly discussion section and designed exams
- Generated original course content on LabXchange.org
- Transitioned to online teaching via *Zoom*

Harvard Allston Education Portal Allston, MA
Course Instructor, Lab Skills for High School Students Spring 2019

- Designed curriculum and taught a lab-based course to six motivated high school students for introductory molecular biology and programming (Python)

Universidad Autónoma de Baja California Ensenada, Mexico
Course Instructor, Clubes de Ciencia Summer 2018

- Designed a week-long workshop on introductory immunology and evolution for Mexican students in biology and medicine
- Taught and interacted with students in Spanish

Harvard University Cambridge, MA
Teaching Fellow, Biology of Mammals Fall 2017 - 2018

- Designed and taught weekly labs on mammalian diversity, wrote and graded assignments, and supervised field trips

Teaching Fellow, Genetics, Genomics, and Evolution Spring 2015

- Taught weekly freshmen-level labs and exercises focused on in-class problem solving

Teaching Fellow, Evolutionary Human Physiology and Anatomy Fall 2013

- Taught, guided, and supervised upper-level class on comparative anatomy with dissections on lamprey, shark, sheep, cow, and cat

FIELDWORK EXPERIENCE

Trinidad, West Indies

- Collected bat specimens for evolutionary developmental studies of craniofacial diversification in New World Leaf-Nosed bats

- Collaborated with scientists from University of West Indies, bat conservation group Trinibats (trinibats.com), SUNY Downstate, University of Texas, MD Anderson Cancer Center, Idaho State University, and NIH National Cancer Institute

Lamanai, Belize

- Collected bats for the American Museum of Natural History and dissertation research
- Collaborated with scientists from the AMNH Richard Gilder Graduate School

Arecibo, Puerto Rico

- Collected bats for broad evolutionary developmental studies in New World Leaf-Nosed bats
- Collaborated with the Sears Lab (University of California- Los Angeles)

Gamboa, Panama

- Non-destructive bat sampling for coevolution studies on host-parasite interactions
- Collaborated with scientists at the Smithsonian Tropical Research Institute

SCIENTIFIC AND SOCIETY SERVICE

Harvard University Cambridge, MA

Visiting Undergraduate Advisor, Department of Genetics

- Jacky Lin (SUNY) Summer 2019
- Michaela McCormick (Brandeis) Summer 2019
- Fatima Karina Mohammed (*Brighton High School) Summer 2019
- Charles Randolph (Goucher College) 2017 - 2018

Undergraduate Advisor, Department of Integrative Biology 2016 - 2108

- Rachel Moon, winner of the Alex G. Booth Traveling Fellowship ($5000) for travel to Panama to assist in bat collection at the Smithsonian Tropical Research Institute

Senior Thesis Advisor, Department of Integrative Biology 2013 - 2015

- Samantha Smith, Integrative Biology, thesis project nominated for the Thomas Temple Hoopes Prize "Craniofacial development in the fruit-bat, *Carollia perspicillata*"
- Alexander Heyde, Integrative Biology, winner of the Thomas Temple Hoopes Prize ($4000) for senior thesis project "Geometric morphometrics of adaptive cranial diversity in phyllostomid bats"

University of California, Davis Davis, CA

Undergraduate Mentor, research exchange program with BYU-Idaho

- Devin Crane (BYU-Idaho) 2012
- Matt Johnson (BYU-Idaho) 2012
- Uhsma Kc (BYU-Idaho) 2012
- Omid Roostaeyan (UC Davis) 2012
- Kaela Plank (UC Davis) 2011 - 2012
- Shelby Eichman (UC Davis) 2011 - 2012
- Elaine Miller (UC Davis) 2009 - 2012
- Brian Howen (UC Davis) 2011
- Charles Asbury (BYU-Idaho) 2011
- Rachel Ricks (BYU-Idaho) 2011
- Devon Kienzle (BYU-Idaho) 2011

- Ehsan Ejaz (UC Davis) 2011
- Jordan Tyler (UC Davis) 2009 - 2011
- Stephanie Chatterton (BYU-Idaho) 2010
- Greg McDavitt (BYU-Idaho) 2010
- Kyle Mecham (BYU-Idaho) 2010
- John Cornelius (BYU-Idaho) 2010
- Diego Colorado (UC Davis) 2010
2010

Scientific Training

- Esther Kim (Sacramento State University) 2011 - 2012
- Ai-Nhi Hoang (Harvard University) 2010 - 2011
- Valerie Tryon (Sacramento State University) 2010 - 2011
- Zachary Combs (University of California, Berkeley) 2009 - 2011
- Megan Mercado (*Victory Christian High School) 2010
- Tina Hedayat, MD 2010

OUTREACH

Harvard University, Department of Organismic and Evolutionary Biology — Cambridge, MA
Co-organizer, Evolution and Development Research Seminars — 2012 - 2019
Student Mentor, Broadening Participation at Harvard Committee — 2016 - 2017

Society for the Advancement of Chicanos and Native Americans in Science — Cambridge, MA
Vice-President, Harvard Chapter — 2016 - 2019

Harvard Medical School — Boston, MA
Mentor, Summer Honors Undergraduate Research Program — Summer 2018

Harvard Museum of Natural History — Cambridge, MA
Science Education Partner — 2013 - 2018

PROFESSIONAL MEMBERSHIP

Society for Integrative and Comparative Biology
North American Society for Bat Research
Society for Developmental Biology
Society for Craniofacial Genetics and Developmental Biology
Society for Advancement of Chicanos and Native Americans in Science
Pan-American Society for Evolutionary Developmental Biology
Society for Neuroscience
Integrative Comparative Vertebrate Morphology
American Association of Anatomists
California Scholarship Foundation

SKILLS

Language: Spanish (conversational written and spoken)
Computer: R, VG Studio Max (CT and other 3D Data), Imaris, FIJI (javascript), 3D printing

REFERENCES

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Clifford Tabin
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Verónica Martínez-Cerdeño
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Richard Behringer
Professor and Ben F. Love Chair for Cancer Research
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