ERIN E. VAUGHN, PHD

Areas of Research Expertise

Population and Conservation Genetics, Genomics, Molecular Biology, Evolutionary Biology

Academic Qualifications

PhD **2016**
Genetics, University of Arizona
Tucson, Arizona, USA
- Advisor: Dr. Melanie Culver
- Dissertation: Conservation genetics and epigenetics of pronghorn, *Antilocapra americana*

Bachelor of Science **2008**
Biology, University of New Mexico
Albuquerque, New Mexico, USA
- Graduated summa cum laude
- Honors Thesis: Direct interactions between pre-mRNA and the DEAD-box Prp5 protein in the commitment complex of the *Saccharomyces cerevisiae* spliceosome

Research Experience

Postdoctoral Fellow **2017-present**
Adamska Lab, Research School of Biology, Australian National University
ARC Centre of Excellence for Coral Reef Studies

I am currently studying developmental biology in poriferan and cnidarian systems. I am researching the evolutionary history of the Wnt pathway, defining the role of β-catenin in Wnt pathway mediation in the calcareous sponge, *Sycon capricorn*. My research involves both wet lab (DNA, RNA, protein isolation, protein analyses, cell culture, etc.) and computational work (genome sequencing and assembly, transcriptome and ChIP-Seq analyses). Concurrently, I am supervising diverse PhD and Honours student projects focusing on the identification of Wnt pathway gene targets as well as genetic regulation of coral regeneration.

Dissertation Work **2011 – 2016**
Culver Lab, Graduate Interdisciplinary Program in Genetics, University of Arizona

My dissertation elucidated population genetic and ecological epigenetic structure of pronghorn populations. I provided genetic diversity and inbreeding estimates for the captive endangered Sonoran pronghorn, assessed the subspecies status of extirpated pronghorn populations in California, and performed the first survey of epigenetic diversity in an endangered mammal. I employed microsatellite genotyping, mitochondrial sequencing, and MS-AFLP epigenotyping of blood, buccal swabs, and museum specimens in these pursuits.

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Research Experience (continued)

Genomics Traineeship **2011-2014**

NSF Integrative Graduate Education and Research Traineeship, University of Arizona

IGERT is a traineeship program designed to facilitate interdisciplinary collaborations. As an IGERT fellow, I engaged in intensive coursework studying functional, computational, and evolutionary genomics.

Research Rotation **March – June 2011**

Whiteman Lab, Department of Ecology and Evolutionary Biology, University of Arizona

I studied the genomics of species interactions. I performed hiTAIL PCR to sequence the allene oxide synthase gene in *Cardamine cordifolia* and 3'5' RACE PCR to sequence the glutathione S-transferase transcript in *Scaptomyza flava*.

Research Rotation **February – May 2010**

So Lab, Department of Immunology, University of Arizona

I studied the evolution of pathogenesis in the bacterial genus *Neisseria*. I explored the genomes of two pathogenic species, *N. meningitidis* and *N. gonorrhoeae*, to find DNA uptake sequences (DUSs). I then calculated the relative prevalence of DUSs within newly acquired genes.

Research Technician **August 2009 – January 2011**

Cordes Lab, Department of Chemistry and Biochemistry, University of Arizona

I studied the evolution of protein structure. I worked to verify a putative "evolutionary code" behind direct interactions between nucleotides and amino acids. I adapted a bacterial one-hybrid system for determining Cro protein substrate specificity.

Research Technician **January – June 2009**

Ruby Lab, Department of Molecular Genetics and Microbiology, University of New Mexico

Extending my honors thesis work, I developed a purification scheme for His-tagged Prp5p.

Undergraduate Honors Researcher **August 2006 – December 2008**

Ruby Lab, Department of Molecular Genetics and Microbiology, University of New Mexico

I studied pre-mRNA splicing in yeast, specifically, the role of Prp5p. I developed an *in vitro* UV cross-linking assay for detection of direct binding of Prp5p and radiolabeled pre-mRNA in yeast.

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Publications

Vaughn, E.E., and M. Culver (in prep) Maintenance of epigenetic diversity in the face of genetic diversity loss in endangered Sonoran pronghorn, *Antilocapra americana sonoriensis*

Vaughn, E.E., and M. Culver (Pending response regarding edits made to address reviewer comments) Genetics of Arizona pronghorn, *Antilocapra americana*

Vaughn, E.E., and M. Culver (in prep) Subspecies assignment of extirpated California pronghorn populations from museum sample analyses

Vaughn, E.E., and M. Culver (in prep) Conservation Epigenetics: review and future directions

Vaughn, E.E., J. F. Dwyer, M. Culver, and J. Morrison (2015) Development and characterization of polymorphic microsatellite markers for the crested caracara, *Caracara cheriway*. *Conservation Genetics Resources* 7(2):557-559.

B.M. Hall, **E.E. Vaughn**, A.R. Begaye and M.H. J. Cordes (2011) Reengineering Cro protein functional specificity with an evolutionary code. *Journal of Molecular Biology*, **413**, 914-928.

Academic Presentations

COMBIO **2018**
Brisbane, QLD, Australia; poster
Vaughn, E.E. and M. Adamska "Genome of *Sycon capricorn*, a model to investigate evolution of animal body plans."

Genetics Society of AustralAsia Conference **2018**
University of Canberra, Bruce, ACT, Australia; talk
Vaughn, E.E. and M. Adamska "Genome of *Sycon capricorn*, a model to investigate evolution of animal body plans."

Research School of Biology Early- and Mid-career Researcher Future Conference **2018**
Australian National University, Acton, ACT, Australia; talk
Vaughn, E.E. and M. Adamska "*Sycon capricorn* as a model to investigate early evolution of animal body plan development*."*

Joint Annual Meeting of the Arizona and New Mexico Wildlife Society **2016**
Flagstaff, AZ, USA; talk (delivered *in absentia* by M. Culver)
Vaughn, E.E. and **M. Culver** "Conservation Epigenetics: application of epigenetic analyses in the management of Sonoran pronghorn."

IGERT Population Genetics Symposium **2013**
Tucson, AZ, USA; poster
Vaughn, E.E., M. Culver. "Development of microsatellite markers for the crested caracara from next generation sequencing data."

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Academic Presentations (continued)

Joint Annual Meeting of the Arizona and New Mexico Wildlife Society **2012**
Albuquerque, NM, USA; talk
Vaughn, E.E. "Applications of "epigenetic" tools in wildlife management and conservation."

IGERT Population Genetics Symposium **2012**
Tucson, AZ, USA; poster
Vaughn, E.E., M. Culver. "Development of epigenetic biomarkers to assess aquatic toxicity."

Protein Society Meeting **2010**
San Diego, CA, USA; poster
Vaughn, E.E., B.M. Hall, and M.H.J. Cordes. "Reengineering lambda Cro specificity with an evolutionary code: evidence from a bacterial one-hybrid assay."

RNA Society Meeting **2008**
Berlin, Germany; poster
Hahn, E.E. and S.W. Ruby. "Mapping pre-mRNA interactions of Prp5 protein *in vitro* using TEV protease."

University of New Mexico Biology Research Day **2008**
Albuquerque, NM, USA; poster
Hahn, E.E. and S.W. Ruby. "Mapping pre-mRNA interactions of Prp5 protein *in vitro* using TEV protease."

University of New Mexico Biology Research Day **2007**
Albuquerque, NM, USA; poster
Hahn, E.E., M. Tsinnajinnie, and S.W. Ruby. "Mapping molecular interactions *in vivo* using targeted TEV protease cleavage."

Academic Associations

ARC Centre of Excellence for Coral Reef Studies **2018 – present**
Research Associate

Genetics Society of AustralAsia **2018 – present**
Member

Australia and New Zealand Society for Cell and Developmental Biology **2017 – present**
ACT representative

Tucson Women in STEM (TWiSTEM) **2013 – 2016**
Board member – January through May 2013

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Scholarships/Grants/Awards

IGERT in Comparative Genomics **2011 – 2014**

The prestigious Integrative Graduate Education and Research Traineeship (IGERT) is a National Science Foundation funded program providing a $30,000 stipend and training in functional, computational, and evolutionary genomics. I received three competitive one-year fellowships.

Summer Institute for Statistical Genetics Travel Award **2013 & 2014**

In the years of 2013 & 2014 combined, I was awarded funds ($2275) to cover attendance of 4 modules and travel assistance.

University of New Mexico S-CAP Travel Grant **2008**

The Student Conference Award Program (S-CAP) is awarded to undergraduate and graduate students to help cover travel costs associated with research presentation. I received $600 for travel to the 2008 RNA Society Meeting.

Honorable Mention for presentation of a poster at UNM Biology Research Day **2008**

NSF S-STEM Scholarship **2007 & 2008**

S-STEM is awarded to exceptional undergraduate students in STEM disciplines. The award provides $5000 towards tuition per academic year. S-STEM also provides career development opportunities in the form of workshops and career fairs. I received two S-STEM awards.

National Science & Mathematics Access to Retain Talent (SMART) Grant **2007**

The SMART grant is awarded to third and fourth year undergraduate students in STEM disciplines with GPAs above 3.0. I received $2000.

Teaching/Mentoring

Guest Lecturer – *Population Genetics for Non-Biologists, The Australian National University* **2018**

I delivered a lecture on basic population genetics aimed at non-biologists for a course called Linguistic History in Asia and the Pacific.

Honours Student Co-supervisor – *The Australian National University* **2017-present**

I have co-supervised two honours students thus far during my postdoc. I have also served on an Honours student committee for another student.

HDR Mentoring Program – *The Australian National University* **2017-present**

I have participated in the Research School of Biology's HDR Mentoring Program for the last two years. As a postdoc, I regularly meet with a PhD student who has selected me as a mentor.

ANU Espresso Course **Fall 2018**

To continually improve my teaching approach and philosophy, I have participated in online courses hosted by the ANU's Espresso course program. I engage in discussion and reflection on topics including group learning and interactive learning.

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Teaching/Mentoring (continued)

College Teaching Certification Program **Fall 2015**

I received a graduate certificate in college teaching from the Office of Instruction and Assessment at the University of Arizona. The program prepares academics for teaching careers focusing on the learner-centered teaching philosophy.

Guest Lecturer – *Conservation Genetics; University of Arizona* **Fall 2015**

I prepared lessons for six class periods covering natural selection, mutation, migration, drift, neutral theory, and genomics. The course is cross-listed for undergraduate and graduate students. I re-engineered the content to implement learner-centered teaching methods.

Teaching Assistant – *Molecular and Cellular Biology, University of Arizona* **Fall 2015**

I was the teaching assistant for Dr. Lisa Elfring. My duties included facilitating group discussions, holding tutoring sessions, and grading.

Teaching Assistant – *Introductory Biology Lab, University of Arizona* **Fall 2014**

I was the primary lecturer for two introductory biology laboratory sections. I was also tasked with grading for this course.

Guest Lecturer – *Conservation Genetics; University of Arizona* **Fall 2014**

I presented a lecture on forensic genetic applications in conservation.

Mentor to Tucson High School Students **2013 – 2014**

I have guided several high school students through their senior research projects. They have learned genetic lab techniques and conservation theory.

Guest Lecturer – *Conservation Biology; University of Arizona* **Spring 2014**

I lectured on the applications of genetics in wildlife conservation to an undergraduate course.

Guest Lecturer – *Wildlife Management, University of Arizona* **Fall 2012**

I presented two lectures on the application of genetics in wildlife management and led students through laboratory exercises in this undergraduate course.

Graduate Student Guide for Visiting Middle School Students **2012 – 2015**

I have hosted several small groups of 8th graders interested in genetics. I discussed my project, took them on a tour of the lab, and engaged them in a small molecular genetics procedure, such as extracting DNA or setting up PCR reactions.

Arizona Science Teacher Advancement and Research Training **Summer 2010**

I mentored a Tucson middle school science teacher as part of the AZ-START program. Over 8 weeks, I taught her to perform typical biochemical assays, discussed ways to incorporate the scientific method into her curriculum, and assisted her in putting together a poster presentation.

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Software and Programming Experience

I have experience programming in Perl, Python, and R. I am proficient in operating UNIX systems and have experience utilizing super computing systems. I have utilized a wide variety of genome assembly, population genetic, RNA-Seq, and Chip-Seq algorithms and software packages in my research, including PAML, msatcommander, Structure, GeneLand, QDD, ClustDB, Bowtie2, BWA, HISAT, SamTools, Cufflinks, BEAST, GenAlEx, Velvet, SOAPdeNovo, CANU, miniasm/minimap, RACON, BUSCO, and MACS2.

Workshops Attended

MinION Long-Read Sequencing Workshop **2017**
The Australian National University; Acton, ACT Australia

Winter School in Mathematical and Computational Biology **2017**
University of Queensland; Brisbane, QLD Australia

Women in Computer Science Programming Workshop **2015**
University of Arizona; Tucson, AZ
Modules: Python, C

18th and 19th Summer Institute in Statistical Genetics **2013 & 2014**
University of Washington; Seattle, WA
Module: Probability and Statistical Inference, Population Genetics and Association Mapping, Bayesian Statistics for Genetics, and Introduction to R

Fieldwork Safety Workshop **2010**
University of Arizona; Tucson, AZ

Service

ACT State Representative & Regional Conference Planning Committee **2017 – present**
Australia and New Zealand Society for Cell and Developmental Biology

Early- and Mid- Career Researcher Conference Planning Committee Member **2017 – present**
Research School of Biology, The Australian National University

Selection Committee Member **2017**
John Curtin School of Medical Research; The Australian National University

HDR Conference Chair **2017**
Research School of Biology, The Australian National University

Graduate Student Guide for Visiting Middle School Students **2012-2015**
University of Arizona

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Additional Certifications

Certificate in College Teaching Program	**2015**
SCUBA: PADI Open Water Diver	**2009**