

CURRICULUM VITAE:
MICHAEL G. TASSIA
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EDUCATION & APPOINTMENTS

Postdoctoral Fellow, McCoy Lab
Johns Hopkins University – Baltimore, MD
January 2022 to Current

Ph.D., Halanych Lab
Auburn University – Auburn, AL
Dissertation: “*Hemichordate & Deuterostome Immunity Evolution*”
August 2015 to December 2021

B.S. in Biology (General), Minor in Marine Biology
University of Washington – Seattle, WA
Fall 2011 to Summer 2014

Bellevue College – Bellevue, WA
Fall 2009 to Summer 2011

PUBLICATIONS & PRESENTATIONS

Publications:

13. DeBoy EA*, **Tassia MG***, Schratz KE, Yan SM, Cosner ZL, McNally EJ, Gable DL, Xiang Z, Lombard DB, Antonarakis ES, Gocke CD, McCoy RC, Armanios M. 2023. Familial Clonal Hematopoiesis in a Long Telomere Syndrome. *New England Journal of Medicine* 388(26):2422-2433
*Authors contributed equally to this work.
12. Gershman A, Huack Q, Dick M, Jamison JM, **Tassia M**, Agirrezabala X, Muhammad S, Ali R, Workman RE, Valle M, Wong GW, Welch Jr. KC, Timp W. 2023. Genomic insights into metabolomic flux in ruby-throated hummingbirds. *Genome Research* 33(5):703-714
11. **Tassia MG**, Hallowell HA, Waits DS, Range RC, Lowe CJ, Graze RM, Schwartz EH, Halanych KM. 2023. Induced immune reaction in the acorn worm, *Saccoglossus kowalevskii*, informs the evolution of antiviral immunity. *Molecular Biology & Evolution* msad097.
10. Vandepas LE, **Tassia MG**, Halanych KM, Amemiya CT. 2023. Unexpected distribution of chitin and *chitin synthase* across soft-bodied cnidarians. *Biomolecules* 13(5).
9. **Tassia MG**, David KT, Townsend JP, and Halanych KM. 2021. TIAMMA: Leveraging biodiversity to revise protein domain models, evidence from innate immunity. *Molecular Biology & Evolution* 38(12): 5806-5818

8. Townsend JP, **Tassia MG**, Damian-Serrano A, Whelan NV, Halanych KM, and Sweeney AM. 2020. A mesopelagic ctenophore representing a new family, with notes on family-level taxonomy in Ctenophora: *Vampyroctena delmarvensis* gen. nov. sp. nov. (Vampyroctenidae, fam. nov.). *Marine Biodiversity* 50(34)
7. Li Y, **Tassia MG**, Waits DS, Bogantes VE, David KT, & Halanych KM. 2019. Genomic adaptations to chemosymbiosis in the deep-sea seep-dwelling tubeworm *Lamellibrachia luymesii*. *BMC Biology* 17(91)
6. Halanych KM, JT Cannon, **Tassia MG**. 2018. Hemichordate: Pterobranchia. In Ed A. Schmidt-Rhaesa, *Handbook of Zoology, Miscellaneous Invertebrates*. Vol 9. Pp 267- 282.
5. **Tassia MG**, JT Cannon, Halanych KM. 2018. Hemichordate: Enteropneusta. In Ed A. Schmidt-Rhaesa, *Handbook of Zoology, Miscellaneous Invertebrates*. Vol 9. Pp 283-311.
4. Li Y, Kocot MK, **Tassia MG**, Cannon JT, Bernt M, & Halanych KM. 2018. Mitogenomics reveals a novel genetic code in Hemichordata. *Genome Biology & Evolution* envy254.
3. Kocot KM, **Tassia MG**, Halanych KM, and Swalla BJ. 2018. Phylogenomics offers resolution of major tunicate relationships. *Molecular Biology & Evolution* 121: 166-173.
2. **Tassia MG**, Whelan NV, and Halanych KM. 2017. Toll-like receptor pathway evolution in deuterostomes. *Proceedings of the National Academy of Science*: 10.1073/pnas.1617722114
1. **Tassia MG**, Cannon JT, Konikoff CE, Shenkar N, Halanych KM, and Swalla BJ. 2016. The Global Diversity of Hemichordata. *PLoS ONE* 11(10): e0162564.

Preprints:

1. Taylor D, Chhetri SB, Biddanda A, **Tassia MG**, Battle A, and McCoy RC. 2023. Sources of gene expression variation in a globally diverse human cohort. *bioRxiv*. doi: <https://doi.org/10.1101/2023.11.04.565639>
2. Makova KD, Pickett BD, Harris RS, **et al.** 2023. The complete sequence and comparative analysis of ape sex chromosomes. *bioRxiv*. doi: <https://doi.org/10.1101/2023.11.30.569198>

Reports:

1. Abernath K, Banach M, Hudgell MAB, Blackmon LE, Breaux B, Brusch IV GA, Criscitiello MF, Deiss TC, Ding Y, Flowers E, Kenney E, Matz H, Modak T, Ott J, Rhoo KH, Rusnak ED, Shibasaki Y, **Tassia MG**, Weisel D, Yaparla A. 2019. Conference report: The 14th congress of the International Society of Developmental and Comparative Immunology. *DCI* 96

Presentations (Presented by M. Tassia unless otherwise noted):

Telomere shortening limits the evolution of somatic mutations in clonal hematopoiesis. **Tassia MG**, DeBoy EA, Schratz KE, Yan SM, McCoy RC, Armanios M. *Talk presented at Biology of Genomes, Cold Spring Harbor Laboratories, NY. May 2024.*

Telomere shortening limits the evolution of somatic mutations in clonal hematopoiesis. **Tassia MG**, DeBoy EA, Schratz KE, Yan SM, McCoy RC, Armanios M. Talk presented at SBE Satellite Meeting on Mechanisms of Cellular Evolution, Tempe, AZ. November 2023.

Long telomeres promote clonal hematopoiesis with aging by delaying replicative senescence. **Tassia MG**, DeBoy EA, Schratz KE, Yan SM, McCoy RC, Armanios M. Poster presented at ASGH2023, Washington D.C. November 2023.

Uncovering sources of human gene expression variation in a globally diverse cohort. Taylor D, **Tassia MG**, McCoy RC. Poster presented by D. Taylor at ASHG 2023, Washington D.C. November 2023.

Telomere shortening limits the evolution of somatic mutations in clonal hematopoiesis. **Tassia MG**, DeBoy EA, Schratz KE, Yan SM, McCoy RC, Armanios M. Virtual Poster presented at SBE 2023, Ferrara, Italy. July 2023.

Evolutionary simulations inform the origins of clonal hematopoiesis. Yan SM, **Tassia MG**, DeBoy EA, Armanios M, McCoy RC. Virtual Poster presented by S. Yan at SBE 2023, Ferrara, Italy. July 2023.

TIAMMA: Leveraging biodiversity to revise protein domain models. **Tassia M**. Invited workshop speaker for “Exploring -omics beyond assembly and general annotation for non-model organisms” at SICB 2023, Austin, TX. January 2023.

Uncovering sources of human gene expression variation in a globally diverse cohort. Taylor D, **Tassia M**, McCoy R. Poster presented by R. McCoy at ASHG 2022, Los Angeles, CA. October 2022.

Comparing genomic landscapes of introgression across the great ape phylogeny. **Tassia MG**, Pease JB, McCoy RC. Virtual Talk presented at Evolution 2022, Cleveland, OH. June 2022.

Uncovering sources of human gene expression variation in a globally diverse cohort. Taylor D, **Tassia M**, McCoy R. Poster presented by D. Taylor at Biology of Genomes, Cold Spring Harbor Laboratory. May 2022.

Hemichordates inform the evolution of deuterostome immunity. **Tassia MG**, Halanych KM. Talk presented at Virtual Evolution 2021.

Fieldwork Aboard the R/V Nathaniel B. Palmer. **Tassia MG**. Invited talk presented to the Dauphin Island Sea Lab Friday Seminar Series in February 2021.

TIR-Domain Containing Protein SARM1 Diversity in Deuterostomes and Lophotrochozoans. Briseno JL, **Tassia MG**, Waits DS, Halanych KM. Poster presented by J.L. Briseno at SICB 2020, Austin, TX. January 2020.

The Genome of the Deep-Sea Seep-Dwelling *Lamellibrachia luymesii* (Siboglinidae) and Clues on Chemosynthetic Symbiosis. Halanych KM, Li Y, **Tassia MG**, Waits DS, Bogantes VE, David KT. Talk presented by K.M. Halanych at SICB 2020, Austin, TX. January 2020.

Innate immunity evolution in underrepresented metazoans and the implications when opting for similarity-metrics vs. hidden Markov models. **Tassia MG**, David KT, Halanych KM. Talk presented at SICB 2020, Austin, TX. January 2020.

Use of genomics technologies to explore adaptations to chemosymbiosis in the deep-sea seep-dwelling siboglinid (Annelida) tubeworms. Halanych KM, Li Y, **Tassia MG**, Waits DS, Bogantes VE, David KT. *Talk presented by K.M. Halanych at AGU Fall Meeting 2019, San Francisco, CA. December 2019.*

Another story of database bias: Detecting protein domains beyond biomedical model-species. **Tassia MG**, David KT, Halanych KM. *Talk presented at Evolution 2019, Providence, RI. June, 2019.*

Evolution of pattern-recognition receptor pathways and the identification of novel domain architectures in Deuterostomia. **Tassia MG** & Halanych KM. *Poster presented at SICB 2019, Tampa Bay, FL. January 2019.*

Matrix metalloproteinase gene evolution in Ctenophora. Rashid SB, **Tassia MG**, Halanych KM, & Moss AG. *Talk presented by S.B. Rashid at SICB 2018, Tampa Bay, FL. January 2019*

Evolution of Toll-like receptor signaling pathways in deuterostomes. **Tassia MG**, Whelan NV, and Halanych KM. *Talk presented at ISDCI 2018, Santa Fe, NM. June 2018.*

State of the Imm-Union: Gaps and ambiguity in the evolution of metazoan immune systems. **Tassia MG**, Halanych KM. *Talk presented at SICB 2018, San Francisco, CA. January 2018.*

A colorful, deep sea ctenophore species from the Northwest Atlantic Ocean. Townsend JP, **Tassia MG**, Damian-Serrano A, Whelan NV, Halanych KM, and Sweeney AM. *Poster co-presented by J. P. Townsend and M. G. Tassia at SICB 2018, San Francisco, CA. January 2018.*

Phylogenomic resolution of major tunicate relationships. Kocot KM, **Tassia MG**, Halanych KM, and Swalla BJ. *Poster presented by K. M. Kocot at SICB 2018, San Francisco, CA. January 2018.*

Determining matrix metalloproteinase homology across phylum Ctenophora. Rashid SB, **Tassia MG**, Halanych KM, and Moss AG. *Poster presented by S. B. Rashid to ASCB 2017, Philadelphia, PA. December 2017.*

Evolution and conservation of deuterostome TLR pathways. **Tassia MG**, Whelan NV, and Halanych KM. *Talk presented at SICB 2017, New Orleans, LA. January 2017.*

Hemichordates inform the evolution of deuterostome Toll-like receptor pathways. **Tassia MG**, Whelan NV, & Halanych KM. *Talk presented at International Hemichordate Meetings, Pacific Grove, CA. October 2016.*

Molecular evolution of hemichordate toll-like receptors and their associated pathways. **Tassia MG** & Halanych KM. *Talk presented at Evolution 2016, Austin, TX. June 2016.*

Illuminating the Toll-like receptor pathways in hemichordates. **Tassia MG** & Halanych KM. *Talk presented at the Annual SICB Meeting, Portland, OR. January 2016.*

Illuminating the Toll-like receptor pathways in hemichordates. **Tassia MG** & Halanych KM. *Poster presented at the Developmental Biology Urchin Meetings XXIII, Woods Hole, MA. October, 2015.*

Determining the Presence of Mesoderm in the Ctenophore *P. bachei* through Gene Expression Analysis. Fodor A, Kohn A, Kocot K, Citarella M, **Tassia M**, McQuillen I, Moroz L, Swalla B. *Poster Presented by A. Fodor at Annual SDB Meeting, Seattle, WA. July, 2014.*

Hemichordata Global Diversity and Evolution. **Tassia M**, Cannon J, Konikoff C, Perry L, Kaur P, Dunn K, Shenkar N, Halanych K, Swalla BJ. *Poster presented at Annual SICB Meeting, West Palm Beach, FL, January, 2014.*

MAJOR GRANT PREPARATIONS

ASH Scholar Award (2023) - Telomere length influences the evolutionary landscape of clonal hematopoiesis.

Contribution: *Proposal author*

Status: *Awarded*

Award amount: **\$100,000**

NSF-IOS (2017) – Comparative functional genomics of innate immunity in deuterostomes.

Contribution: *Major contributor to proposal preparation; primary research personnel*

Co-authors: K.M. Halanych (PI), R.M. Graze (Co-PI), E.S. Shwartz (Co-PI)

Status: *Awarded (#1755377)*

Award amount: **\$535,278.00**

NSF-IOS Preproposal (2016) – Comparative functional genomics of innate immunity in deuterostomes.

Contribution: *Preproposal coauthor & primary research personnel*

Status: *Not invited for full proposal*

NSF GRFP (2016) – Evolution of antiviral immunity in Deuterostomia.

Contribution: *Proposal author*

Status: *Not awarded*

NSF GRFP (2015) – Characterizing innate immunity in hemichordates.

Contribution: *Proposal author*

Status: *Not awarded*

NSF GRFP (2014) – Variation in Antarctic meiofaunal diversity as a response to a changing ocean.

Contribution: *Proposal author*

Status: *Not awarded*

AWARDS & HONORS

2019: American Microscopical Society Buchsbaum Photomicroscopy Winner	\$100
2018: NSF Travel Award for ISDCI 2018	\$620
2018: AU Department of Biological Sciences Kenneth Ottis Distinguished Graduate Fellowship	\$200
2017: AU College of Science and Mathematics Travel Award	\$500
2017: AU Department of Biological Sciences Service Award	
2017: Cell and Molecular Biosciences Summer Research Fellowship	\$5,300
2016: Society of Developmental Biology Travel Award	\$550
2016: Auburn University College of Science and Mathematics Travel Award	\$250
2015-2016: Cellular and Molecular Biology Departmental GRA	\$22,500
2014: Friday Harbor Labs Fernald Fellowship	\$2,500

2014: University of Washington Biology Departmental Award – “Friday Harbor Award”	\$1,250
2014: Mikimoto-Morse Fund	\$3,000
2013-2014: Washington State Opportunity Scholarship	\$5,000
2013: University of Washington Friday Harbor Lab’s Adopt-a-Student recipient	\$2,000
2012-2013: Washington State Opportunity Scholarship	\$1,000
University of Washington’s Dean’s List – Autumn 2011, Winter - Autumn 2013, Summer 2014	

RESEARCH AND LAB EXPERIENCE

McCoy Lab, Johns Hopkins University – January 2022 to Present

Post-doctoral Fellow; PI: Dr. Rajiv McCoy

Application of computational biology techniques to investigate evolution at multiple timescales. Current projects include examining the somatic evolution hematopoietic progenitors in the context of telomere biology, developing comparative phylogenetic methods to investigate the evolution of somatic lineages, and characterizing gene expression variation across a global human cohort.

Halanych Lab, Auburn University – May 2015 to December 2021

Research Technician & PhD Student; PI: Dr. Ken Halanych

Immunity evolution in deuterostomes. Utilizing bioinformatics and molecular approaches, this project aims to reveal conserved and novel immunity molecular programs in invertebrate deuterostomes. Methods include invertebrate upkeep, embryology, microinjection, RNA-seq, differential expression, RT-qPCR, phylogenetics, and bioinformatic development.

Swalla Lab, University of Washington – September 2013 to January 2015

Undergraduate Researcher & Research Scientist; PI: Dr. Billie Swalla

Performed DNA extractions, PCR gene amplification, and PCR product purification for the purposes of identifying unknown species. Also assisted in the feeding and upkeep of regenerating marine invertebrates (hemichordate, *Ptychodera flava*) + upkeep and fixing of *Pleurobrachia bachei* (ctenophore), preparation of manuscripts, general molecular lab maintenance, and editing for the WoRMS Hemichordata & Ascidiacea databases.

Friedman Lab, University of Washington – August 2013 to August 2014

Undergraduate Researcher; PI: Dr. Carolyn Friedman

Worked on the isolation and purification, through iron-based chemical flocculation, of phage particles associated with suppression of a pathogen in the California abalone, *Haliotis rufescens*. Animal care, tank upkeep and maintenance, and water quality tests were among my responsibilities.

Mukilteo Research Station, NOAA – January 2014 to June 2014

Guest Researcher through the Friedman Lab, University of Washington

Assisting the Puget Sound Restoration Fund in the recovery of the native pinto abalone (*Haliotis kamtschatkana*). My responsibilities include performing water quality tests (temperature, pH, salinity, and alkalinity), larval and adult invertebrate care, and tank upkeep/maintenance.

PUBLIC PRESS

2023: [New York Times](#) – *Commentary/interview with Dr. Mary Armanios about DeBoy & Tassia et al. 2023 (NEJM).*

2017: **Opelika-Auburn News** – *Local newspaper press release/interview associated with Tassia et al. 2017 (PNAS).*

2017: **Auburn University College of Science and Mathematics Newsletter** – *College press release/interview associated with Tassia et al. 2017 (PNAS).*

2014: **University of Washington Biology Department Newsletter** – *Featured marine biology undergraduate.*

PUBLIC SERVICE

April 2024: Kindergarten Career Day

Alongside R. McCoy and S. Carioscia, I developed and presented an interactive session for ~20 kindergarteners (at their school) on evolution – focusing on how all organisms are related. This visit utilized stuffed animals and observable traits to group animals by similarity.

September 2023: Middle-school Question Writer for National Science Bowl

Wrote 30 original middle-school level biology questions for the National Science Bowl, a nationwide competition to test student's knowledge across a broad distribution of sciences and mathematics.

Spring 2017 - 2018: Auburn InSciTE

Co-founder and leadership position in a graduate student-led science communication group called Auburn Informal Science Teaching & Education (Auburn *InSciTE*) which aims to initiate dialogues between scientists and groups underrepresented in university outreach. Organization of informal science communication workshops at AU & outreach events at local community establishments.

Spring 2017: Be a Marine Biologist

Showed kids and their parents a glimpse of how science is performed upon a research vessel. This included setting up our netting, collecting apparatuses, and bringing samples from research cruises I have participated in. In total, our audience included 251 people from the Philadelphia, PA area (hosted by the Wagner Free Institute of Science).

October 2016: Auburn University Museum of Natural History

Volunteered for a public open house where I taught adults and kids about invertebrate biodiversity. Spoke one-on-one with children and taught them about the importance of marine invertebrate ecology and conservation.

May 2016: Middle School Outreach Event

Spent the day teaching six middle school classes (ranging from 6th-7th grade) about marine invertebrate biodiversity, Antarctic research, and research cruises. This event was held at Drake Middle School in Auburn, AL.

March 2016: Greater East Alabama Regional Science and Engineering Fair

As a part of the Intel International Science and Engineering Fair, I judged middle school science fair projects for potential invitation to the State Fair – ultimately allowing them the opportunity to compete internationally.

2013-2015: UW Marine Biology/Friday Harbor Labs (FHL) Information Sessions

Spoke and held Q&A's for the University of Washington's marine biology minor. Provided advice and guidance for seminars of undergraduates and incoming college-freshman on the opportunities provided by the university's Friday Harbor Marine Labs.

May 2014: FHL Open House

Spoke to the public about the marine biodiversity surrounding the San Juan Islands, WA and the current research being performed at FHL. Audience often included parents and their children.

August 2014: Friday Harbor Beach Walk

Led groups in an FHL-hosted beach walk at Roche Harbor, WA. Groups included ~20 members comprised of children and adults.

Spring 2014: American and Japanese Marine Biology Student Exchange

Participated in an exchange of Japanese and American scientists to promote scientific communication across cultures.

2011: Bellevue College Chemistry Club Outreach

Taught elementary school classes, 2nd & 3rd grade, about basic chemistry and its applications in every-day-life.

NOTABLE FIELD EXPERIENCE

Autumn 2020 (Research Cruise): Antarctic Peninsula, Antarctica – Three-month cruise from San Francisco, CA to the seas surrounding the Antarctic Peninsula. My role on this cruise was to assist in the collection and processing of Antarctic marine invertebrates for the goal of genome sequencing and population genetics. The timeline of this cruise was modified by COVID-19.

Autumn 2017, 2018, 2019: Marine Biological Labs, MA – Collection, upkeep, and spawning of acorn worms. Collection and maintenance of embryo cultures for use in molecular biology experiments. Microinjection and preparation of individuals for differential expression and immunity experiments.

Spring 2016 & Summer 2017 (Research Cruise): Northwest Atlantic Ocean – Spent a week at sea (in May & July, respectively) with Dr. Alison Sweeney's Lab from University of Pennsylvania. This opportunity targeted the collection of gelatinous zooplankton from the epipelagic and deep-sea. Collection gear included a surface plankton net and tucker-trawl.

Spring 2015: Keys Marine Lab, FL – A week of snorkeling experience as it relates to macroinvertebrate collection. Animals were collected and donated to the University of Florida's Natural History Museum. This experience additionally supported a class of undergraduates attending a field-biology course with Dr. Gustav Paulay.

Autumn 2014: Puget Sound, WA – Two days aboard the University of Washington's R/V Thompson. This included oceanic surveys of water chemistry (CTD operation and data processing) and plankton tows. This opportunity was provided via the Marine Biology program at the University of Washington.

Summers 2013, 2014: San Juan Island, WA – Extensive experience at field sites frequented by the University of Washington’s Friday Harbor Marine Laboratories. These included infaunal and epifaunal benthic sites, rocky intertidal, near shore plankton, dock-side nightlighting, and ship-time on the R/V Centennial for plankton tows and benthic beam-trawls.

TEACHING & MENTORING

Fall 2023: Guest lecturer *SOUL: Population Genetics Simulation & Visualization* (AS.360.111)

Spring 2023: PhD Rotation Student Mentor – Primary mentor to Tye Chicha during over three month rotation. Role focused on teaching scientific rigor and common methods pertaining to computational biology and evolutionary inference. This rotation project focused on applying phylogenetic least squares to account for evolutionary covariance in comparative differential expression across mammalian organogenesis.

Summer 2022: NSF-REU Mentor – Primary mentor to REU scholar, Katherine Gilbert, for her project on testing the evolutionary history of Y-chromosome replacement in Neanderthals. This project focuses on simulating a distribution of evolutionary forces that could yield a signal of incomplete lineage sorting (or Y-replacement) in a setting independent of strong positive selection that has been suggested in the literature (Petr et al. 2022)

Spring 2017 & 2021: Graduate Teaching Apprentice for Diversity of Life Course – Instructed four, two-hour lab sections per week for and early-undergraduate biology course focused on covering basic biological concepts including physiology, ecology, biodiversity, and genetics.

Fall 2017-Summer 2020: COSAM Drop-in Biology Tutor – Resident biology tutor for Auburn University’s College of Science, Arts, and Math. Involved working 1-on-1 or in groups to answer questions ranging from introductory biology courses to senior level course. This is a paid position.

Summer 2019: NSF-REU Mentor – Mentored REU scholar, John Briseno, through a bioinformatically-intensive research project which aimed to evaluate the evolution of TIR-domain-containing proteins among mollusk lineages, with focused interest within cephalopods. This mentoring experience has extended beyond the defined dates of the REU and J. Briseno aims to present this work at SICB 2020.

Summer 2019: STEM Summer Bridge Biology Instructor – Developed and co-instructed the biology curriculum with Viktoria Bogantes for the College of Sciences, Arts, and Math Summer Bridge program, a rigorous five-week workshop which provides incoming Auburn University STEM-field freshman from underrepresented backgrounds to STEM topics as they are presented in a college and career setting. One-hour courses were taught daily for five weeks, developed primarily in an active-learning format.

Spring 2018: Graduate Teaching Apprentice for Genetics – Lab instructor for two, two-hour lab sessions per week for mid-to-late undergraduates in biology. Course focuses on dry-lab techniques modeling and predicting genetic phenomena.

Summer 2017: Auburn University’s Bioinformatics Bootcamp – This course aimed to introduce and teach industry-standard bioinformatic practices as they relate to working with large, “next-generation” sequencing datasets. Assisted in instructing ~44 attendees ranging from REU students to faculty from other institutions.

Fall 2016, 2017: Graduate Teaching Apprentice for Invertebrate Biodiversity Course – Wrote and developed lab syllabus/schedule for an upper-level biology course at Auburn University. Primary instructor for lab period (including the design of lab practicals) as well as an invited speaker for several lecture periods.

Summer 2016: NSF-REU Mentor – Primary mentor for an NSF-REU scholar. Guided her through bioinformatic and molecular methods required for elucidating the molecular ancestry of neural-crest specification. This project and mentoring relationship extended past the program.

REFERENCES

Available upon request