

# KYLE T. DAVID

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## Current Appointment

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<b>Postdoctoral Scholar - Rokas Lab, Vanderbilt University</b>	2022 - present
Department of Biological Sciences	

## Education

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<b>PhD Biology - Halanych, Auburn University</b>	2017 - 2022
Department of Biological Sciences	
<b>BS Biology &amp; Marine Science - University of Miami</b>	2012 - 2016
Rosenstiel School of Marine & Atmospheric Science, Chemistry Minor	

## Awards & Honors

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<b>W. D. Hamilton Award, Finalist - \$500</b>	2022
<b>Antarctica Service Medal</b>	2021
<b>Editors' Choice, <i>Journal of Biogeography</i></b>	2021
<b>PacBio Plant and Animal Sciences SMRT Grant, Semifinalist</b>	2020
<b>Charlotte Magnum Student Support Award - \$115</b>	2020
<b>NSF Graduate Research Fellowship - \$138,000</b>	2019 - 2022
<b>Cover Article, <i>Molecular Biology and Evolution</i></b>	2019
<b>Wake Award for Best Student Oral Presentation - \$150</b>	2019
<b>Auburn Cellular &amp; Molecular Biosciences Fellowship - \$22,500</b>	2017 - 2018
<b>Departmental Honors</b>	2016
<b>Presidential Scholarship - \$64,000</b>	2012 - 2016

## Publications

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10. Tassia, M. G., **David, K.T.**, Townsend, J.P., & Halanych, K.M. (2021). TIAMMA: Leveraging biodiversity to revise protein domain models, evidence from innate immunity. *Molecular Biology and Evolution*.
  9. **David, K. T.**, Halanych, K. M. (2021). Spatial proximity between polyploids across South American frog genera. *Journal of Biogeography*, 48(5), 991-1000.
  8. Zhang, Y., Yap, K. N., **David, K. T.**, & Swanson, D. L. (2021). The high-energy aerial insectivore lifestyle of swallows does not produce clear thermogenic side effects. *Ornithology*.

7. Li, Y.\*, **David, K. T.\***, Shen, X. X., Steenwyk, J. L., Halanych, K. M., & Rokas, A. (2020). Feature frequency profile-based phylogenies are inaccurate. *Proceedings of the National Academy of Sciences*, 117(50), 31580-31581.
6. **David, K. T.**, Oaks, J. R., & Halanych, K. M. (2020). Patterns of gene evolution following duplications and speciations in vertebrates. *PeerJ*, 8, e8813.
5. Li, Y., Tassia, M.G., Waits, D.S., Bogantes, V. E., **David, K.T.**, & Halanych, K.M. (2019). Genomic adaptations to chemosymbiosis in the deep-sea seep-dwelling tubeworm *Lamellibrachia luymesii*. *BMC Biol* 17, 91.
4. **David, K.T.**, Wilson, A. E., & Halanych, K. M. (2019). Sequencing disparity in the genomic era. *Molecular Biology and evolution*, 36(8), 1624-1627.
3. **David, K. T.**, & Halanych, K. M. (2017). Mitochondrial genome of *Dinophilus gyrotilatus* (Annelida: Dinophilidae). *Mitochondrial DNA Part B*, 2(2), 831-832.
2. McMahan, C. D., Ginger, L., Cage, M., **David, K. T.**, Chakrabarty, P., Johnston, M., & Matamoros, W. A. (2017). Pleistocene to holocene expansion of the black-belt cichlid in Central America, *Vieja maculicauda* (Teleostei: Cichlidae). *PLOS ONE*, 12(5), e0178439.
1. **David, K. T.**, Tanabe, P., & Fieber, L. A. (2016). Resource availability drives mating role selection in a simultaneous hermaphrodite *Aplysia californica*. *The Biological Bulletin*, 231(3), 199-206.

\*these authors contributed equally to the work

## Invited Seminars

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5. Reading the Tree of Life: a Primer of Phylogenetics and Evolutionary Theory. Tutwiler Talks series at the Julia Tutwiler Prison for Women. March 2022.
4. Importance of Open Data in Scientific Research. Brooklyn College. October 2021.
3. Invited panel member at the Envision Ecology, Evolution, and Behavior Graduate Preview Weekend at Michigan State University. September 2021.
2. Environment and Ploidy in South American Frogs. Polyploid Webinar organized by Dr. Mike Barker of the University of Arizona. September 2021.
1. Evolutionary Consequences of Gen(om)e Duplication in Animals. Vanderbilt University. August 2021.

## Presentations

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7. Global Gradients in the Distribution of Animal Polyploids. **David, K.T.** Talk presented at the *Evolution* meeting in Columbus, Ohio. June 2022.
6. Bad Role Models: Can Deep Learning Save Us From the Tyranny of Mouse, Worm, and Fly? **David, K.T.**, Halanych, K.M. Talk presented at the virtual *Evolution* meeting. June 2021.

5. Are Two Genomes Better Than One? Ploidy Correlated Species' Distributions in South American Frogs. **David, K.T.**, Fan, Z., Halanych, C., Halanych, K.M. Talk presented at the *Society of Integrative and Comparative Biology* meeting in Austin, Texas. January 2020.
4. Sequencing Disparity in the Genomic Era. **David, K.T.**, Wilson, A. E., & Halanych, K. M. Talk presented at the *Evolution* meeting in Providence, Rhode Island. June 2019.
3. Much Ado About Orthologs: Consequences of Duplication and Speciation in Gene Evolution. **David, K. T.**, Oaks, J. R., Halanych, K. M. Talk presented at the *Society of Integrative and Comparative Biology* meeting in Tampa, Florida. January 2019.
2. Orthologs vs. Paralogs, What's the Difference? **David, K. T.**, Oaks, J. R., Halanych, K. M. Talk presented at the *Society of Systematic Biologists* standalone meeting in Columbus, Ohio. June 2018.
1. Mating Role Choice in a Simultaneous Hermaphrodite. **David, K. T.**, Tanabe, P., & Fieber, L. A. Poster presented at the *Undergraduate Research, Creativity, and Innovation Forum* in Miami, Florida. June 2016.

## Research History

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### **Antonis Rokas Lab - Vanderbilt University**

2022 - present

Genotype-phenotype maps and diversification gradients across budding yeasts.

### **Kenneth M. Halanych Lab - Auburn University**

2017 - 2022

Comparative phylogenomics and the evolution of gene duplicates. Leveraging bioinformatic methods and high-throughput sequence data to develop methods and explore trends across the animal tree of life, with a focus on gene duplication and polyploidization events.

### **Jamie R. Oaks Lab Rotation - Auburn University**

2018

Testing the ortholog conjecture. Using custom bioinformatic scripts and pipelines this project explored divergence between orthologs and paralogs through models of gene evolution.

### **Caleb McMahan Lab - Field Museum of Natural History**

2016 - 2017

Phylogenetic and biogeographical analyses of diadromous fishes utilizing museum collections.

### **Douglas L. Crawford & Marjorie Oleksiak Labs - University of Miami**

2015 - 2016

Used an adapted genotyping by sequencing (GBS) protocol to examine species and population structure between the two coral morphospecies across regions of high and low upwelling.

### **Lynne A. Fieber Lab - University of Miami**

2013 - 2016

Independently designed and ran a senior thesis on mating role selection in the California sea hare. Collected data on food intake, growth, egg yield, fertilization, as well as records of sexual history for a cohort of 22 animals for ~200 days over the course of their mature lives.

## Skills & Experience

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### Computational

- Proficiency in Julia, Python, R, Bash
- Machine Learning: Proficient with PyTorch, experience with unsupervised learning, variational autoencoders, residual neural networks
- Phylogenomics: Genome and transcriptome scale alignment, assembly, and annotation, homology/orthology inference, tree building, phylogenetic comparative methods, biological databases
- Population Genomics: SNP processing, population delimitation, variant calling

### Lab

- C. elegans culture
- DNA/RNA extraction, PCR, nanodrop/Qubit quantification, gel electrophoresis
- Library prep for high-throughput and Sanger sequencing
- Experience with preserving, cataloguing, and extracting tissue and DNA from museum collections, including historical specimens

### Field

- NBP 20-10 Research Cruise (2020): a three month research cruise from California to the Antarctic Peninsula, assisted in the sampling, identification, and processing of Antarctic marine invertebrates.
- Galapagos Study Abroad (2015): Five accelerated fieldwork intensive courses concerning relevant scientific issues surrounding the Galapagos as well as its local ecology, including a research project on shoal dynamics in the Panamic sergeant major.
- Fieldwork experience in South Florida, South Carolina, the Caribbean, the Galapagos islands, and the Southern Ocean
- Sampling with quadrats and transects, collection via seining, cast netting, and straining
- Experience working with freshwater and saltwater aquarium systems from 10-150 gallon single tank setups to large scale fishery and hatchery operations
- Advanced SCUBA certified with nitrox, 50+ hours

## Teaching

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### Sparks Science and Mathematics Lecture Series Participant

2022

The Sparks series is a collaborative effort to bring STEM programming to people who are currently incarcerated in Alabama. Prepared and presented a 2hr lecture and lesson plan at the Julia Tutwiler Prison for Women.

### Evolution and Systematics Co-Instructor

2020

Units for Evolution and Systematics (BIOL 3030) were divided between myself and the primary instructor, Dr. Ken Halanych. Prepared and presented lectures, co-wrote, administered, and graded exams.

**Evolutionary Biology Guest Lecturer - Alabama Prison Arts + Education Project** 2019

Prepared and presented a 2.5hr lecture on metazoan diversity and phylogenetics to a class of inmates at Staton Correctional Facility as part of Auburn University's Alabama Prison Arts + Education Project.

**Organismal Biology Teaching Assistant** 2019

Managed five weekly lab sections for Organismal Biology (BIOL 1031). Presented weekly lectures, facilitated in-lab exercises, proctored and graded entrance and exit exams for each section in addition to lab midterms and finals.

**Invertebrate Biodiversity Teaching Assistant** 2018

Responsible for running lab sections for Invertebrate Biodiversity (BIOL 4010). Ordered living and preserved specimens for students to dissect and observe, created and presented weekly lectures, wrote, administered, and graded lab practicals. Also provided review sessions and occasionally lectured for class sections.

**Science Tutor** 2016 - 2017

Certified tutor for high school and college students in a variety of science fields, specializing in evolutionary biology.

## Service & Outreach

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### Interviews

All Things Considered, Hakai Magazine

### Reviews

*Journal of Heredity*, *Systematic Biology*, *Journal of Molecular Evolution*, *Journal of Biogeography*, *PeerJ*

**Summer Science Institute** 2021

Counselor for Auburn University's Summer Science Institute, a weeklong sleep away camp for 11th and 12th grade students with an aptitude and interest in science and math.

**Skype a Scientist** 2018 - Present

Engage in 30-60 minute Q&A and lecture sessions with k-12 classrooms 4-8 times each semester. Gives students the opportunity to get to know a "real scientist" in a semiformal setting.

**Auburn University Museum of Natural History** 2017 - Present

Participate in several engagement opportunities through the museum including open houses and outreach events with underprivileged schools. Display specimens and engage visitors with questions and informative talks.

**Curious Curators Camp** 2019

Counselor for 5th-6th grade summer camp that teaches the importance of natural history museums. Oversaw educational exercises and activities in addition to supervising "collection" trips in the field, exploring local swamps, streams, forests, and grasslands.

**Field Museum of Natural History Outreach** 2016 - 2017

Participated in "Talk to a Scientist Hour" and "Meet a Scientist" programs at the Field Museum's DNA Discovery Center, educating tour groups and the general public on the fundamentals of molecular biology as well as my own research.

### **Galápagos Tortoise Breeding Center**

2015

Fed, cleaned, and otherwise cared for a variety of captive-bred giant Galapagos tortoise subspecies for eventually repatriation back into the wild. Volunteered mornings while studying abroad in the Galapagos.

### **University of Miami Aquarium Club**

2013 - 2016

As president, managed dozens of freshwater and marine systems campus-wide as well as provided our 70+ members with the means to care for their own aquariums. Responsible for all the club's major events and projects including club trips to aquariums all across the country. Also managed social media profiles and email correspondence.

## **References**

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### **Dr. Ken Halanych**

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*Primary PhD Advisor*

### **Dr. Jamie Oaks**

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*Interim PhD Advisor*

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