

# Nathan V. Whelan

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## Lab Address

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## Research Interests

Animal conservation genomics, systematics, and life history evolution; genome evolution of invertebrates; genomic adaptation to brackish and freshwater habitats; genomic basis of ecophenotypic plasticity and rapid adaptation, especially in mollusks; theoretical phylogenetics and the performance of substitution models in phylogenomic inference.

## Education

- 2013** Ph.D. Biological Sciences—The University of Alabama, Tuscaloosa, AL  
**Dissertation:** Systematics, Life History and Conservation of *Leptoxis* (Gastropoda: Cerithioidea: Pleuroceridae).  
**Advisor:** Phillip M. Harris
- 2008** B.S. Biology. Cum Laude. Chemistry Minor, Spanish Minor—Truman State University, Kirksville, MO.

## Current Positions

- July 2016-present** *Director Southeast Conservation Genetics Lab*  
**US Fish and Wildlife Service**-Warm Springs, GA
- Principal investigator of government research lab.
  - My lab studies conservation genetics, systematics, and evolution of aquatic organisms with an emphasis on mollusks and other species of conservation concern.
- November 2013-present** *Research Associate*  
**Smithsonian Institution; National Museum of Natural History**-Washington, DC
- Collaborating on research projects involving the systematics and genomics of freshwater gastropods, primarily Pleuroceridae and Semisulcospiridae.

## Previous Positions

- February 2014-July 2016** *Postdoctoral Fellow*  
**Auburn University**-Auburn, AL **Advisor:** Kenneth Halanych
- Researched the evolution of non-bilaterian metazoans and other marine invertebrates using genomic tools. Also exploring performance of amino acid substitution models with phylogenomic sized datasets in simulation and with empirical data. Instructor of record for graduate-level bioinformatics class.
- May 2011-August 2011** *Mollusk Research Assistant*  
**May 2013-August 2013**  
**Alabama Department of Conservation and Natural Resources**-Marion, AL
- Designed and implemented novel captive propagation and conservation protocols for freshwater snails.
  - Curated collections from state-wide mollusk surveys.

**May 2012-August 2012**      *Predoctoral Fellow*      **Advisor:** Ellen Strong

**Smithsonian Institution; National Museum of Natural History**-Washington, DC

- Performed a research project on the population genetics, phylogeny, and species boundaries of imperiled freshwater snails including the federally threatened Round Rocksnail (*Leptoxis ampla*)

### Peer-Reviewed Articles

18. Tassia, M.G., **N.V. Whelan**, K.M. Halanych. (2017) Toll-like receptor pathway evolution in deuterostomes. *Proceedings of the National Academy of Sciences*. 114: 7055–7060. doi: 10.1073/pnas.1617722114.
17. Costa-Paiva E.M., **N.V. Whelan**, D.S. Waits, S. Santos, C.G. Schrago, K.M. Halanych. (2017) Discovery and evolution of novel hemerythrin genes in annelid worms. *BMC Evolutionary Biology*. 17: 85. DOI: 10.1186/s12862-017-0933-z
16. **Whelan, N.V.**, K.M. Halanych. (2017) Who let the CAT Out of the Bag? Accurately dealing with substitutional heterogeneity in phylogenomics. *Systematic Biology*. 66: 232-255. DOI: 10.1093/sysbio/syw084
15. Yuanning, Li, K.M. Kocot, **N.V. Whelan**, S.R. Santos, D.S. Waits, D.J. Thornhill, K.M. Halanych. (2017) Phylogenomics of tubeworms (Siboglinidae, Annelida) and comparative performance of different reconstruction methods. *Zoologica Scripta*. 46: 200-213. DOI: 10.1111/zsc.12201
14. **Whelan, N.V.**, K.M. Halanych, K.M. Kocot, A.B. Kohn, L.L. Moroz. Miscues misplace sponges. *Proceedings of the National Academy of Sciences*. 113: E946-E947. DOI: 10.1073/pnas.1525332113
13. **Whelan, N.V.**, E.E. Strong. (2016) Morphology, molecules and taxonomy: extreme incongruence in pleurocerids (Gastropoda, Cerithioidea, Pleuroceridae). *Zoologica Scripta*. 45: 62-87. DOI: 10.1111/zsc.12139
12. **Whelan, N.V.** (2016) Radular morphology of extinct pleurocerids (Gastropoda: Cerithioidea: Pleuroceridae). *American Malacological Bulletin*. 33: 221-226. DOI: 10.4003/006.033.0202
11. **Whelan, N.V.**, K.M. Kocot, K.M. Halanych. (2015) Employing phylogenomics to resolve the relationships among cnidarians, ctenophores, sponges, placozoans, and bilaterians. *Integrative and Comparative Biology*. 55: 1084-1095. DOI: 10.1093/icb/icv037
10. **Whelan, N.V.**, K.M. Kocot, L.L. Moroz, K.M. Halanych. (2015) Error, signal, and the placement of Ctenophora sister to all other animals. *Proceedings of the National Academy of Sciences*. 112: 5773-5778. DOI: 10.1073/pnas.1503453112
9. **Whelan, N.V.**, P.D. Johnson, P.M. Harris. (2015) Life-history traits and shell morphology in the genus *Leptoxis* Rafinesque, 1819 (Gastropoda: Cerithioidea: Pleuroceridae). *Journal of Molluscan Studies*. 81: 85-95. DOI: 10.1093/mollus/EYU058
8. **Whelan, N.V.**, K.M. Kocot, S.R. Santos, K.M. Halanych. (2014) Transcriptome sequencing of nemerteans reveals a diverse suite of toxin genes. *Genome Biology and Evolution*. 6: 3314-3325. DOI: 10.1093/gbe/evu258

7. **Whelan, N.V.**, E.E. Strong. (2014) Seasonal reproductive anatomy and sperm storage in pleurocerid gastropods (Cerithioidea: Pleuroceridae). *Canadian Journal of Zoology*. 92: 989-995. DOI: 10.1139/cjz-2014-0165
6. Benstead, J.P., J.M. Hood, **N.V. Whelan**, M.R. Kendrick, D. Nelson, A.F. Hanninen, L.M. Demi. (2014) Dietary P-growth coupling across diverse fish taxa: a meta-analysis of experimental aquaculture studies. *Ecology*. 95: 2768-2777. DOI: 10.1890/13-1859.1
5. Johnson, P.D., A.E. Bogan, K.M. Brown, N.M. Burkhead, J.R. Cordeiro, J.T. Garner, P.D. Hartfield, D.A. Lepitzki, G.L. Mackie, E. Pip, T.A. Tarpley, J.S. Tiemann, **N.V. Whelan**, E.E. Strong. (2013) Conservation status of freshwater gastropods of Canada and the United States. *Fisheries*. 38: 247-282. DOI: 10.1080/03632415.2013.785396
4. **Whelan N.V.**, P.D. Johnson, P.M. Harris. (2012) Rediscovery of *Leptoxis compacta* (Anthony, 1854) (Gastropoda: Cerithioidea: Pleuroceridae). *PLoS One*. 7:e42499. DOI: 10.1371/journal.pone.0042499
3. **Whelan, N.V.**, P.D. Johnson, P.M. Harris. (2012) Presence or absence of carinae between closely related populations of *Leptoxis ampla* (Anthony, 1854) (Gastropoda: Pleuroceridae) is not the result of ecophenotypic plasticity. *Journal of Molluscan Studies*. 78: 231-233. DOI: 10.1093/mollus/ey005
2. **Whelan, N.V.** (2011) Species tree inference in the age of genomics. *Trends in Evolutionary Biology*. 3:e5. DOI: 10.4081/eb.2011.e5
1. **Whelan, N.V.**, A. Geneva, D.L. Graf. (2011) Molecular phylogenetic analysis of tropical freshwater mussels (Mollusca: Bivalvia: Unionoida) resolves the position of *Coelatura* and supports a monophyletic Unionidae. *Molecular Phylogenetics and Evolution*. 61:504-514. DOI: 10.1016/j.ympev.2011.07.016

#### **Articles in Review or Revision**

2. **Whelan, N.V.**, K.M. Kocot, A.B. Kohn, T.P. Moroz, G. Paulay, C.E. Mills, L.L. Moroz, K.M. Halanych. Phylogenomics resolves relationships among major Ctenophora lineages. In review at *Nature Ecology and Evolution*.
1. **Whelan, N.V.**, P.D. Johnson, J.T. Garner, E.E. Strong. On the identity of *Leptoxis taeniata* – a misapplied name for the federally threatened Painted Rocksnail (Cerithioidea: Pleuroceridae). In review at *Zookeys*.

#### **Government Reports, Newsletter Articles, and Scientific Blogs**

7. Strong, E.E., **N.V. Whelan**, J.T. Garner, P.D. Johnson. (2015) Genetic diversity of the Black Mudalia, *Elimia melanoides* (Conrad 1834) (Caenogastropoda, Pleuroceridae). Report submitted to U.S. Fish and Wildlife Service.
6. **Whelan, N.V.** (2014) Classical methods shed new light on freshwater snail reproduction, with conservation implications. *No Bones About It: NMNH's Invertebrate Biology Blog*. [http://nmnh.typepad.com/no\\_bones/2014/11/classical-methods-shed-new-light-on-freshwater-snail-reproduction-with-conservation-implications.html](http://nmnh.typepad.com/no_bones/2014/11/classical-methods-shed-new-light-on-freshwater-snail-reproduction-with-conservation-implications.html)
5. Evans, R., **N.V. Whelan**. (2014) Recent observation of *Leptoxis* from the Rockcastle River, Kentucky. *Ellipsaria*. 16:4.

4. **Whelan, N.V.** (2014) Contemporary surveys and new explorations. *Cracking the Collections*.  
<https://crackingthecollections.wordpress.com/2014/07/10/new-explorations/>
3. **Whelan, N.V.** (2012) *Leptoxis compacta* (Gastropoda: Pleuroceridae) found for the first time in over 75 years. *Ellipsaria* (cover article). 14:3.
2. **Whelan, N.V.** (2010) Preliminary results of life history strategies of the freshwater snail genus *Leptoxis* (Cerithioidea: Pleuroceridae) from the southeastern United States. *American Malacological Society Newsletter*. 41:2.
1. **Whelan, N.V., P.M. Harris, P.D. Johnson.** (2010) Microsatellite DNA loci primers for *Leptoxis ampla* (Gastropoda: Pleuroceridae). Report submitted to Alabama Department of Conservation and Natural Resources.

#### **Grants and Fellowships**    \$198,471 awarded since 2008

- 2016 **Smithsonian Institution Global Genome Initiative Research Grant.** *Targeted sequencing and phylogenomics of the critically imperiled Pleuroceridae*. (listed as CO-PI) \$24,973
- 2016 **Alabama Department of Conservation Section 6 Grant.** *Population structure of the Round Rocksnail (*Leptoxis ampla*) in the Cahaba River*. (listed as CO-PI) \$24,933
- 2014 **Alabama Department of Conservation Section 6 Grant.** *Development of Nuclear Molecular Markers for Pleuroceridae Systematics and Conservation Assessment*. (listed as CO-PI) \$21,143
- 2013 **The University of Alabama Graduate Student Travel Award.** \$800
- 2012 **Smithsonian Institution Predoctoral Fellowship.** *Do extreme genetic differences translate to internal morphological differences within "species" of Pleuroceridae (Gastropoda: Cerithioidea)?* \$7,650
- 2012 **American Malacological Society Student Travel Award.** \$770
- 2012 **The University of Alabama Graduate Student Travel Award.** \$1150
- 2011 **National Science Foundation Doctoral Dissertation Improvement Grant.** *Remnants of a diverse past: assessing the phylogenetic position of recently extinct pleurocerid snails (Gastropoda: Pleuroceridae)*. DEB-1110638. (listed as CO-PI) \$14,996
- 2011 **The University of Alabama Graduate Council Fellowship.** \$36,356
- 2011 **The University of Alabama Graduate School Student Research Grant.** \$600
- 2010 **Alabama Department of Conservation and Natural Resources.** *Microsatellite Development Grant*. (listed as subcontractor) \$5,000
- 2010 **The University of Alabama Graduate Student Travel Award and International Travel Supplement.** \$900
- 2010 **Conchologists of America Student Research Award.** \$1,400
- 2010 **The University of Alabama Graduate Student Association Travel Grant.** \$400
- 2010 **The University of Alabama Graduate School Travel Grant.** \$600
- 2009 **Birmingham Audubon Society Walter F. Coxe Research Grant.** \$1,000
- 2009 **American Malacological Society Melbourne R. Carriker Student Research Award.** \$800
- 2008 **The University of Alabama, Ecology, Evolution and Systematics 2 year enhancement fellowship.** \$55,000

#### **Professional Service**

- 2013-present **Chair.** Gastropod Distribution and Status Committee, Freshwater Mollusk Conservation Society.

- 2012-present** **Appointed Member.** Alabama State Gastropod Conservation Priority Committee.
- 2012-present** **Invited Reviewer.** *Biological Invasions, Freshwater Mollusk Biology and Conservation, Freshwater Science, Hydrobiologia, Journal of Molluscan Studies, PLoS One, Southwestern Naturalist, Systematic Biology, Toxicon*, US Fish and Wildlife Service Mollusk Recovery Plans and Threat Assessments, *Zoological Studies*.
- 2011-2014** **Appointed Member.** Endangered Species Committee, American Fisheries Society.
- 2011-2013** **Student Councilor at Large.** American Malacological Society Executive Council.

### Awards and Honors

- 2016** **Pi Kappa Phi's 30 under 30 award for exceptional young professionals.**
- 2014** **The Malacological Society of London's Annual Award for Outstanding Initial Contribution to Malacology.**
- 2012** **Ralph L. Chermock Prize for Most Outstanding Graduate Student.** The University of Alabama, Department of Biological Sciences.
- 2012** **Selected to attend Bodega Bay Phylogenetics Workshop.**
- 2010** **2<sup>nd</sup> Prize, Best Student Talk.** The Systematics Association.
- 2010** **Best Student Oral Presentation.** American Malacological Society.
- 2009** **Honorable Mention, Best Oral Presentation.** Association of Southeastern Biologists.
- 2008** **Presidents Academic Achievement Award.** Truman State University.
- 2004** **President's Combined Ability Scholarship.** Truman State University.
- 2004** **Foreign Language Scholarship.** Truman State University.
- 2004** **Missouri Bright Flight Scholarship.**
- 2004** **National Eagle Scout Association Scholarship.**

### Invited Talks

- 10. Whelan, N.V.** Modeling substitutional heterogeneity and its impact on inferring relationships. [www.phyloseminar.org](http://www.phyloseminar.org). Recorded at <https://www.youtube.com/watch?v=VLcn-jQq5CQ>
- 9. Whelan, N.V.** Gastropod and ctenophore phylogenetics, difficult questions require fresh perspectives. **Academy of Natural Sciences Research Seminar Series.** Philadelphia, PA. September 2016.
- 8. Whelan, N.V.** Is everything we think we know about animal phylogeny and snail life history wrong? **Auburn University Fisheries and Aquaculture Seminar Series.** Auburn, AL. August 2016.
- 7. Whelan, N.V.** (speaker), K.M. Kocot, A.B. Kohn, T.P. Tatiana, K. Mukherjee, P. Williams, C. Mills, G. Paulay, L.L. Moroz, K.M. Halanych. Body plan and lifestyle evolution of ctenophores. **Ctenopalooza.** St. Augustine, FL. March 2016.
- 6. Whelan, N.V.** Utilizing genomics to understand aquatic invertebrate evolution. **Field Museum, A. Watson Armour Seminar Series** . Chicago, IL. December 2015.
- 5. Whelan, N.V.** (speaker), K.M. Kocot, K.M. Halanych. Resolving the metazoan tree of life with advanced bioinformatics pipelines and phylogenetic methods. *Society for Integrative and Comparative Biology Annual Meeting.* **Origins of neurons and parallel evolution of nervous systems: the dawn of neuronal evolution symposium.** West Palm Beach, FL. January 2015.

4. Halanych, K.M. (speaker), K.M. Kocot, **N.V. Whelan**. Early animal relationships: alternative hypotheses and character inference. *Society for Integrative and Comparative Biology Annual Meeting. Origins of neurons and parallel evolution of nervous systems: the dawn of neuronal evolution symposium*. West Palm Beach, FL. January 2015.
3. **Whelan, N.V.** Systematics and Life History Evolution of Pleurocerid Snails (Cerithioidea: Pleuroceridae). **Truman State University Biology Seminar Series**. Kirksville, MO. April 2014.
2. **Whelan, N.V.** Systematics and Life History Evolution of Freshwater Mollusks. **Arkansas State University Biology Seminar Series**. Jonesboro, AR. January 2014.
1. **Whelan, N.V.** Systematics and egg laying evolution of Pleuroceridae (Gastropoda: Cerithioidea). *Annual Meeting of the American Malacological Society. Conchologists of America grant winners symposium*. Philadelphia, PA. June 2012.

### **Oral Presentations**

20. Johnson, P.D (speaker), **N.V. Whelan**, J. Archambault. Identification of research priorities for North American freshwater gastropods. *Society for Freshwater Science Annual Meeting*. Raleigh, NC. June 2017.
19. Abdelrahman, H.A. (speaker), M. Clay, C. Figiel, **N.V. Whelan**, B.S. Helms, J. Stoeckel. Use of environmental DNA (eDNA) and the electron transport system (ETS) assay to assess current and future spread of invasive *Orconectes virilis* in the southeastern United States. *Society for Freshwater Science Annual Meeting*. Raleigh, NC. June 2017.
18. **Whelan, N.V.** (speaker), P.D. Johnson, J.T. Garner, K.M. Halanych, B.S. Helms, E.S. Strong. Applying genomics to advance our understanding of freshwater mollusks. *Freshwater Mollusk Conservation Society Biennial Symposium*. Cleveland, OH. March 2017.
17. Strong, E.S. (speaker), **N.V. Whelan**. Filling the gaps: the importance of dense geographic sampling for assessing the diversity of western North American *Juga* (Gastropoda: Semisulcospiridae). *Freshwater Mollusk Conservation Society Biennial Symposium*. Cleveland, OH. March 2017.
16. **Whelan, N.V.** (speaker), K.M. Halanych. Who Let the CAT Out of the Bag? Handling substitutional heterogeneity with data partitioning results in more accurate phylogenies. *Evolution*. Austin, TX. June 2016.
15. **Whelan, N.V.** (speaker), K.M. Kocot, A.B. Kohn, T.P. Tatiana, K. Mukherjee, P. Williams, C. Mills, G. Paulay, L.L. Moroz, K.M. Halanych. Phylogenomics resolves relationships among major Ctenophora lineages. *Society for Integrative and Comparative Biology*. Portland, OR. January 2016.
14. **Whelan, N.V.** (speaker), K.M. Halanych. Model choice and metazoan phylogenomics: model complexity does not ensure accurate phylogenetic hypotheses. *The Origins of Metazoa International Workshop*. Giens, France. October 2015.
13. Johnson, P.D. (speaker), A.E. Bogan, K.M. Brown, N.M. Burkhead, J.R. Cordeiro, J.T. Garner, P.D. Hartfield, D.A.W. Lepitzki, G.R. Mackie, E. Pip, T.A. Tarpley, J.R. Tiemann, **N.V. Whelan**, E.E. Strong. Update to the conservation status of freshwater gastropods of Canada and the United States. *American Malacological Society Annual Meeting*. Pellston, MI. August 2015.
12. **Whelan, N.V.** (speaker), K.M. Kocot, L.L. Moroz, K.M. Halanych. Error, signal, and the placement of Ctenophora sister to all other animals. *Evolution*. Guarujá, Brazil. June 2015.



11. **Whelan, N.V.** (speaker), P.D. Johnson, E.E. Strong. Draft genome assembly of *Leptoxis ampla* (Pleuroceridae): a resource for conservation studies. *Freshwater Mollusk Conservation Society Biennial Symposium and Joint Meeting with the Upper Mississippi River Conservation Committee*. St. Charles, MO. March 2015
10. Johnson, P.D. (speaker), A.E. Bogan, K.M. Brown, N.M Burkhead, J.R. Cordeiro, J.T. Garner, P.D. Hartfield, D.A.W. Lepitzki, G.R. Mackie, E. Pip, T.A. Tarpley, J.R. Tiemann, **N.V. Whelan**, E.E. Strong. Update to the conservation status of freshwater gastropods of Canada and the United States. *Freshwater Mollusk Conservation Society Symposium and Joint Meeting with the Upper Mississippi River Conservation Committee*. St. Charles, MO. March 2015.
9. **Whelan, N.V.** Modeling life history evolution of a critically imperiled family of freshwater gastropods. *Evolution*. Snowbird, UT. June 2013.
8. **Whelan, N.V.** (speaker), E.E. Strong, P.D. Johnson. Morphology, molecules, and taxonomy: the pleurocerid problem. *Freshwater Mollusk Conservation Society Symposium*. Guntersville, AL. March 2013.
7. Strong, E.E. (speaker), J.T. Garner, P.D. Johnson, **N.V. Whelan**. Divergent haplotypes and implications for phylogeny of the Pleuroceridae using mitochondrial markers. *Freshwater Mollusk Conservation Society Biennial Symposium*. Guntersville, AL. March 2013.
6. **Whelan, N.V.** Systematics of *Leptoxis* (Gastropoda: Pleuroceridae). *American Malacological Society Annual Meeting*. Pittsburgh, PA. July 2011.
5. **Whelan, N.V.** (speaker), P.M. Harris, P.D. Johnson. Conservation and systematics of *Leptoxis* (Gastropoda: Pleuroceridae). *Freshwater Mollusk Conservation Society Biennial Symposium*. Louisville, KY. April 2011.
4. **Whelan, N.V.** Life history evolution of *Leptoxis* (Gastropoda: Pleuroceridae). *Young Systematists Forum*. London, UK. December 2010.
3. **Whelan, N.V.** Life history of *Leptoxis* (Gastropoda: Pleuroceridae). *Joint Meeting of the American Malacological Society and the Western Society of Malacologists*. San Diego, CA. July 2010.
2. **Whelan, N.V.** (speaker), B. Hartwig, T. Blasingame, D.R. DeCock, J.C. Gering. Advances in the statistical methodology of phylogenetic community ecology. *Association of Southeastern Biologists Annual Meeting*. Birmingham, AL. April 2009.
1. **Whelan, N.V.** Team katydid: the math-bio experience. *21<sup>st</sup> Annual Student Research Conference*. Truman State University, Kirksville, MO. April 2008.

#### **Poster Presentations (\*Undergraduate Student)**

4. Webster, K.J. \*, **N.V. Whelan**, K.M. Halanych. A molecular investigation into the biodiversity and biogeography of Antarctic *Thouarella* (Cnidaria: Octocorallia: Primnoidae). *Society for Integrative and Comparative Biology Annual Meeting*. West Palm Beach, FL. January 2015.
3. **Whelan, N.V.**, E.E. Strong. Extreme mitochondrial and nuclear phylogenetic discordance in Pleuroceridae (Gastropoda: Cerithioidea). *Evolution*. Snowbird, UT. June 2013.
2. **Whelan, N.V.**, A. Geneva, D.L. Graf. What if anything is a Unionid? *Ceolatura* Conrad 1852 and the monophyly of the Unionidae (Mollusca: Bivalvia: Unionoida). *London Malacological Society's Malacology Forum*. London, UK. November 2010.

1. Whelan, N.V., B. Hartwig, T. Blasingame, D.R. DeCock, J.C. Gering. Effects of phylogenetic tree topology and local and regional species richness on NRI and NTI distributions. *Annual Conference for the Society of Mathematical Biology*. San Jose, CA. August 2007.

### Teaching Experience

- 2017**      *Guest Lecturer*. Agriculture Genetics. Auburn University.
- 2017**      *Guest Lecturer*. Conservation Ecology of Freshwater Invertebrates. Auburn University.
- 2016**      *Guest Lecturer*. Conservation Biology Learning Community. Auburn University.
- 2016**      *Guest Lecturer*. Agriculture Genetics. Auburn University.
- 2016**      *Guest Lecturer*. Introduction to Bioinformatics. Auburn University.
- 2014**      *Instructor of Record*. Python for Bioinformatics. Auburn University.
- 2014**      *Guest Lecturer*. Phylogenetics. Auburn University.
- 2014**      *Guest Lecturer*. Invertebrate Biology. Auburn University.
- 2013**      *Graduate Teaching Assistant*. Anatomy and Physiology II Lab. The University of Alabama.
- 2013**      *Guest Lecturer*. Conservation Biology. The University of Alabama.
- 2012**      *Graduate Teaching Assistant*. Vertebrate Zoology. The University of Alabama.
- 2012**      *Guest Lecturer*. Principles of Systematics. The University of Alabama.
- 2012**      *Guest Lecturer*. Genomics. The University of Alabama.
- 2011**      *Graduate Teaching Assistant*. Introductory Biology II Lab. The University of Alabama.
- 2007-2008**      *Teaching Assistant*. Chemistry for Non-Majors I & II. Truman State University.
- 2006**      *Teaching Assistant*. Introductory Biology II. Truman State University.
- 2005**      *Teaching Assistant*. Introductory Biology I. Truman State University.

### Undergraduate Mentoring

- 2014-2015**      **Biogeography and population genetics of Antarctic *Thouarella* Octocorals.**  
I mentored an undergraduate researcher, Katie Webster, on DNA extraction, PCR, sequence analysis, and composing a scientific manuscript. This student is currently writing a first-authored manuscript that will be submitted to *Polar Biology*.
- 2014-2015**      **Population genomics of *Sterechinus* sea urchins.**  
I mentored an undergraduate student, Hallie McCarthy, as she worked on the population genomics of *Sterechinus* sea urchins from Antarctica using a 2bRAD approach. This project is currently in the RAD-associated SNP analysis stage.

### Outreach

- 2017**      **Gastropod Classification and Identification Workshop.** Freshwater Mollusk Conservation Society. Organized and led a full-day workshop on freshwater gastropods.
- 2016**      **Greater East Alabama Science and Engineering Fair Judge.** Auburn University. Judged science fair projects of middle school students from across eastern Alabama.
- 2015**      **NPR's Science Friday video feature.**  
I was interviewed for the weekly national broadcast. A video produced by Science Friday about my research was featured on their website:



<http://www.sciencefriday.com/video/08/03/2015/the-unlikely-tale-of-a-tenacious-snail.html>

- 2014-2016**     **Icy Invertebrates Outreach Team.** Auburn University.  
We make presentations to K-12 students in Alabama about Antarctic biology and our work on Antarctica's invertebrate fauna.
- 2014-2016**     **AU Explore.** Auburn University  
Annual science outreach program to middle school students in eastern Alabama.
- 2008-2012**     **Volunteer Elementary School Science Tutor.** Tuscaloosa's One Place.

**Published Bioinformatics Repositories**     Available from <http://github.com/nathanwhelan>

6. **Generate-Sequences** Python and bash scripts for simulating phylogenomic-like datasets using known trees and Indel-Seq-Gen
5. **Order-Genes-by-Evolutionary-Rate** Python script for ranking evolutionary rate of a set of genes using single-gene trees.
4. **Post-HaMStR-Orthology-Script** Shell script for initial orthology determination using homologous amino acid sequences inferred by HaMStR
3. **Split-Supermatrix-Into-Partitions** R script for splitting a sequence super matrix into individual genes; used primarily to aid analyses on published datasets that require alignments of each gene.
2. **Make-gene-list** Bash script to make a partition list for programs like PartitionFinder and BaCoCa from many single gene alignments.
1. **Automate-PAML-codeml** Python script that automates evolutionary rate analyses for hundreds or thousands of genes using the PAML package codeml.

**Research Cruises**

- 2016**     *Research Vessel Sharp*. Chief Scientist: Alison Sweeny. Atlantic Ocean  
Midwater sampling of invertebrates with an emphasis on ctenophores and mollusks.
- 2014**     *Research Vessel Oceanus*. Chief Scientist: Craig R. Smith. Pacific Ocean  
Recovery of deep-sea landers and processing of samples, particularly *Xylophaga* bivalves and *Osedax* annelids.