

# ABIGAIL LEAVITT LABELLA

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## EDUCATION

### **Duke University, Durham NC**

PhD from the University Program in Genetics and Genomics

March 2017

### **American University, Washington DC**

Bachelor of Science with University Honors in Biology

May 2010

## HONORS AND AWARDS

### **Duke University**

Sigma Xi research grant

2017

Graduate School Travel Award

2014, 2016

University Program in Genetics and Genomics Conference Travel Award

2014, 2016

Honorable Mention: NSF Graduate Research Fellowship Program

2013

Student Science Outreach Grant: \$500

2012

### **American University**

Summa Cum Laude

2010

University Honors Program: Honors Capstone Research Conference Award Winner

2010

Phi Beta Kappa Society

2010

Golden Key Society

2010

## RESEARCH EXPERIENCE

### **Vanderbilt University, Nashville, TN**

**2017-Present**

Postdoctoral Research in the lab of Dr. Antonis Rokas

Study patterns of codon usage bias in the genomes of 300+ fungi in the subphylum

Saccharomycotina. Subsequently use these patterns to test the relationship between codon usage bias and metabolic gene expression or ecological niche.

Use evolutionary genomics to infer the function of putatively casual variants associated with preterm birth and investigate the evolutionary forces shaping modern human traits.

### **University Program in Genetics and Genomics, Duke University, Durham, NC**

**2011-2017**

Doctoral thesis research conducted with Dr. Clifford Cunningham

Used DNA amplicon sequencing to study genetic connectivity between multiple populations of deep-sea mollusks. Research expeditions were conducted using HOV Alvin and ROV Jason. Two new deep-sea clam species were discovered during this research.

**Genetic Medicine Research, Children's National Medical Center, Washington, DC** 2010-2011

Research Technician II in the lab of Dr. Mendel Tuchman

Conducted a bioinformatic analysis of transcriptional regulation of urea cycle proteins using cis-element over representation (CLOVER) software. Verified transcription factor binding using DNA pull-down assays.

**Biology Department, American University, Washington, DC** 2008-2010

Honors thesis research conducted with Dr. David Angelini

Used RNA-interference experiments to study the link between insulin receptor pathway proteins and allometric development in beetles.

## PUBLICATIONS

*Submitted:* J.L. Steenwyk, M.E. Mead, P. Alves de Castro, C. Valero, A. Ricardo de Lima Damásio, R.A.C. dos Santos, **A.L. LaBella**, Y. Li, S.L. Knowles, H.A. Raja, N.H. Oberlies, X. Zhou, O.A. Cornely, P. Koehler, F. Fuchs, G.H. Goldman, A. Rokas. (2021) *Genomic and phenotypic analysis of coronavirus-associated pulmonary aspergillosis isolates of Aspergillus fumigatus*. (Available on bioRxiv)

*Accepted in principle at PLoS Biology:* **A.L. LaBella**, D.A. Opulente, J.L. Steenwyk, C.T. Hittenger, A. Rokas. (2021) *Signatures of optimal codon usage predict metabolic ecology in budding yeasts*. (Available on bioRxiv)

*Accepted at Bioinformatics:* J.L. Steenwyk, T.J. Buida III, **A.L. LaBella**, Y. Li, X.X. Shen, A.R. Rokas. (2021) *PhyKIT: a UNIX shell toolkit for processing and analyzing phylogenomic data*. (Available on bioRxiv)

M.L. Benton, A. Abraham, **A.L. LaBella**, P. Abbot, A. Rokas, J. Capra. (2021) *The Influence of Evolutionary History on Human Health and Disease*. *Nature Reviews Genetics*: 1-15

M.A.B. Haase, J. Kominek, D. Opulente, X.X. Shen, **A.L. LaBella**, X. Zhou, J. DeVirgilio, A. Hulfachor, C.P. Kurtzman, A. Rokas, C.T. Hittinger (2020) *Repeated horizontal transfer of GALactose metabolism genes violates Dollo's law of irreversible loss*. *Genetics*: iyaa012

A. Rokas, S. Mesiano, O. Tamam, **A.L. LaBella**, G. Zhang, L.J. Muglia. (2020) *Developing a Theoretical Evolutionary Framework to Solve the Mystery of Parturition Initiation*. *eLife*: 9: e58343

X.X. Shen, J.L. Steenwyk, **A.L. LaBella**, D.A. Opulente, X. Zhou, Y. Li, M. Groenwald, C.T. Hittinger, A. Rokas (2020) *Genome-scale phylogeny and contrasting modes of genome evolution in the fungal phylum Ascomycota*. *Science Advances*: 6: eabd0079

**A.L. LaBella\***, A. Abraham\*, Y. Pichkar, S.L. Fong, G. Zhang, L. Muglia, P. Abbot, A. Rokas, J.A. Capra (2020) *Accounting for diverse evolutionary forces reveals mosaic patterns of selection on human preterm birth loci*. *Nature Communications*: 11:3731 \*co-first

Z.A. Ely, J.M. Moon, G.R. Sliwoski, A.K. Sangha, X.X. Shen, **A.L. LaBella**, J. Meiler, J.A. Capra, A. Rokas. (2019) *The impact of natural selection on the evolution and function of placentally expressed galectins*. *Genome Biology and Evolution*: evz183

**A.L. LaBella**, D.A. Opulente, J.L. Steenwyk, C.T. Hittinger, A. Rokas. (2019) *Variation and selection on codon usage bias across an entire subphylum*. *PLoS Genetics*: 15(7): e1008304

S. Plouviez\*, **A.L. LaBella\***, D.W. Weisrock, F.A.B. von Meijenfeldt, B. Ball, J.E. Neigel, C.L. Van Dover. (2019) *Amplicon sequencing of 42 nuclear loci supports directional gene flow between South Pacific populations of a hydrothermal vent limpet*. *Ecology and Evolution*: Volume 9. Issue 11. \*co-first

J. Steenwyk, D.A. Opulente, J. Kominek, X.X. Shen, X. Zhou, **A.L. LaBella**, N.P. Bradley, B.F. Eichman, N. Čadež, D. Libkind, J. DeVirgilio, A.B. Hulfachor, C.P. Kurtzman, C.T. Hittinger, A. Rokas. (2019) *Extensive loss of cell-cycle and DNA repair genes in an ancient lineage of bipolar yeasts*. PLoS Biology: Volume 17, Issue 5.

JJ. Yoon, **AL LaBella**, T.P. Feeney, N. Braverman, M. Tuchman, H. Morizono, N. Ah Mew, L. Caldovic (2017) *Disease-causing mutations in the promoter and enhancer of the ornithine transcarbamylase gene*. Human Mutation: Volume 39, Issue 4.

**A.L. LaBella**, C.L. Van Dover, D. Jollivet, C.W. Cunningham. (2016). *Gene flow between Atlantic and Pacific Ocean basins in three lineages of deep-sea clams (Bivalvia: Vesicomysidae: Pliocardiinae) and subsequent limited gene flow within the Atlantic*. Deep Sea Research II: Topical Studies in Oceanography.

## TEACHING EXPERIENCE

**Certificate in College Teaching, Vanderbilt University** **Expected Completion: Spring 2021**  
The certificate is designed to craft more effective educators and who wish to gain a clearer, deeper, more active approach to teaching and learning in higher education. It includes a seminar and practicum.

**Foundations of Bioinformatics, Guest Lecturer, Vanderbilt University** **September 2020**  
Guest lecture entitled "Harnessing genomic data to link Genotype with Phenotype and Environment"

**Introduction to Microbiology, Guest Lecturer, Vanderbilt University** **February 2019**  
Guest lecture on microbial genetics to the Introduction to Microbiology class.

**Organismal Evolution, Teaching Assistant, Duke University** **Spring 2017**  
Designed test questions, held office hours and graded assignments for class of 45 students. Guest lecture given on the evolution of deep-sea organisms.

**Certificate in College Teaching, Duke University** **Completed 2017**  
Program developed to ensure students have a sustained and systematic teaching pedagogy that promotes current teaching best practices, appropriate use of technology and assessment of student learning outcomes. It includes 2 graded courses, peer observation and the development of a teaching portfolio.

**General Biology, Teaching Assistant, Duke University** **Springs 2014, 2015, 2016**  
Taught two lab sections each semester for 3 semester of the course "Introduction to Biology through the lens of Molecular Biology." Short lecture, in-class activities and lab exercise. Graded homework and designed lectures and activities.

## INVITED TALKS

**MSA Students' Mycology Colloquium** **February 22<sup>nd</sup> 2021**  
Harnessing Synonymous Codon Usage for Reverse Ecology in Budding Yeasts

**Villanova Biology Department Seminar** **November 12<sup>th</sup> 2020**  
The P.G.E. Tour of evolutionary analyses

**Vanderbilt Department Biological Sciences Weekly Seminar** **November 2<sup>nd</sup> 2020**  
The P.G.E. Tour of evolutionary analyses

**International Society for Evolution, Medicine & Public: Club EvMed** **September 10<sup>th</sup> 2020**  
An evolutionary lens on analyzing human birth timing – presented with Dr. Lou Muglia, Abin Abraham, Dr. Antonis Rokas and Dr. Tony Capra

## CONFERENCE PRESENTATIONS

- The Allied Genetics Conference – TAGC 2020 Online** April 2020  
From Codons to Ecology – Using codon optimization as a proxy for gene expression to identify ecologically adapted metabolic pathways.
- 30<sup>th</sup> Fungal Genetics Conference, Pacific Grove, California** March 2019  
Using codon usage bias to predict ecologically adaptive metabolic pathways in budding yeasts.
- International Mycological Congress, San Juan, Puerto Rico** July 2018  
Using codon usage bias to predict ecologically adaptive metabolic pathways in the budding yeast subphylum.
- Cellular and Molecular Fungal Biology GRS, Holderness, New Hampshire** June 2018  
Using codon usage bias to predict ecologically adaptive metabolic pathways in the budding yeast subphylum.
- Evolution 2016, Austin, Texas** June 2016  
Population Structure and Migration Assessed using 45 Discordant Gene Regions in the Deep-Sea Limpet *Lepetodrilus* aff. *schrolli*.
- Deep Sea Biology Symposium, Porto, Portugal** September 2015  
Using species histories to contextualize modern genetic connectivity in the vesicomid genera *Abyssogena* and *Calyptogena*.
- International Conference on Arginine and Pyrimidines Washington, DC** July 2010  
Comprehensive Bioinformatic Analysis of Urea Cycle Protein Transcription Regulation using Cis-element Over Representation (CLOVER) Software.
- Honors Capstone Research Conference American University** May 2010  
Allometry and Insulin: The Insulin Receptor Pathway and Its Contribution to the Development of Allometry in Beetles.

## CONFERENCE POSTERS

- 30<sup>th</sup> Fungal Genetics Conference** March 2019  
Using codon usage bias to predict ecologically adaptive metabolic pathways in budding yeasts.
- International Mycological Congress, San Juan, PR** July 2018  
Using codon usage bias to predict ecologically adaptive metabolic pathways in the budding yeast subphylum.
- Cellular and Molecular Fungal Biology GRC, Holderness, New Hampshire** June 2018  
Using codon usage bias to predict ecologically adaptive metabolic pathways in the budding yeast subphylum.
- TOS/ASLO/AGU Ocean Sciences Meeting, Honolulu, Hawaii** February 2014  
The role of colonization and migration in the establishment of the Atlantic deep-sea clams *Abyssogena southwardae* and *Calyptogena* aff. *pacifica*.
- 5<sup>th</sup> International Symposium on Chemosynthesis-Based Ecosystems  
Victoria, British Columbia** August 2013  
Assessing connectivity between populations in deep-sea chemosynthetic habitats using next-generation multilocus sequence data.
- TOS/ASLO/AGU Ocean Sciences Meeting Salt Lake City, Utah** February 2012  
The Use of Next Generation Sequencing and Bioinformatics Pipelines to Build Informative Allelic Networks for Inferring Deep-Sea Migration.

## SOCIETY MEMBERSHIPS

<b>Genetics Society of America (GSA)</b>	<b>2017-Present</b>
<b>Mycological Society of America (MSA)</b>	<b>2020</b>
<b>International Society for Evolution, Medicine &amp; Public Health (ISEMPH)</b>	<b>2020</b>
<b>American Society of Human Genetics (ASHG)</b>	<b>2020</b>
<b>American Association for the Advancement of Science (AAAS)</b>	<b>2019-2020</b>

## SCIENTIFIC SERVICE

<b>Evolution at Vanderbilt Organization for Students and Trainees (EVO<sup>ST</sup>)</b>	
Coordinator	2019-Present
Organize and run the EVO <sup>ST</sup> group to assist in accomplishing the goals of the Vanderbilt Evolution Center including event organization, speaker coordination and attendance at events.	
<b>3<sup>rd</sup> Base Thurs</b>	
Weekly Twitter Feature	2019-Present
Highlight current and landmark research on codon usage through short text and custom graphical abstracts.	
<b>Skype a Scientist</b>	
Listed in a database for remote video conferences with classrooms	2020
Discussed COVID-19 with a 9 <sup>th</sup> grade student at Garey High School (September 30th 2020)	
<b>MEGAmicrobes</b>	
Designed and led MEGAmicrobes activity for our lab group	October 2019
Created and prepared an activity on fungal diversity for a free community science event. Approximately 50 students built their own fungi out of paper while learning about the wide world of fungi.	
<b>Genetics Society of America</b>	
Early Career Scientist Leadership Program – Diversity Subcommittee	2018-2019
Work with GSA members to improve diversity and inclusion within the society through the development of mentorship programs (piloted in 2019), the promotion of inclusive conference programming and strategic planning for a more diverse and inclusive scientific climate.	
<b>Manuscript reviews</b>	
Reviewed manuscripts for the following journals: PLoS Genetics; BMC Evolutionary Biology; Genes, Genomics, Genetics; Marine Biology; PeerJ; and Plant Direct.	

## DUKE UNIVERSITY SERVICE

<b>Keep Exploring Pilot Mentorship Program</b>	<b>2020-2021</b>
Participating in a one-on-one mentorship pilot program. Mentoring a first-generation college student at Duke University	
<b>Board of Trustees Standing Committees</b>	<b>2014-2017</b>
Duke University Board of Trustees Standing Committee for Institutional Advancement	
Discussed and recommended action on issues and proposals involving development, public affairs, community affairs and alumni affairs. This also includes policies and practices concerning philanthropic giving, fundraising, alumni programming, and media and government affairs.	

## **Graduate and Professional Student Council**

President 2015-2016  
Led a 13-person executive committee and 110-person general assembly. Met with administrators and students campus-wide to address student issues.

Vice President 2015-2016  
Organized meetings for the executive committee and general assembly. Designed and led a retreat with general assembly members and university administrators.

Director of University Affairs 2014-2015  
Member of executive committee and in charge of organizing student groups. Automatic member of the finance committee that oversees financial decisions for the council.

## **University Wide Committees**

Duke Student Alumni Board 2016-2017  
Student board committed to bridging the alumni and student communities. Worked closely with the Duke Alumni Affairs Office and the Duke Alumni Board.

Graduate Student Affairs Advisory Committee 2014-2017  
Committee provided advice and direction to the Office of Graduate Student Affairs about student issues.

Student Affairs Advisory Committee 2014-2017  
Committee provided advice and direction to the Office of Graduate Student Affairs about student support services, student-faculty community building, recruitment activities and program developments.

Strategic Planning Working Group 2015-2016  
Worked with the Strategic Planning Steering Committee to review the written proposal for the graduate education portion of the Duke Strategic Plan submitted for approval in 2017

President's Council on Black Affairs 2015-2016  
Council assembled to ensure that University pursues its goals of increasing diversity and inclusion of faculty and students and guaranteeing excellent student experiences.

University Priorities Committee, *ex officio* 2015-2016  
Assessed university and academic priorities, ensured that the University's annual and long-term budgets reflect the priorities and made recommendations to the President.

Student Health Insurance Advisory Committee 2015-2016  
Reviewed student health insurance plans and made recommendations about coverage and benefits.

Selection Committee for the Task Force on Bias & Hate Issues 2015  
Reviewed 115 applications from students for the Task Force on Bias & Hate Issues. Selected 5 finalists with one other student and two faculty reviewers.

Provost's Academic Programs Committee 2014-2015  
Committee reviewed existing and proposed new programs. This included assessing programs' potential impact, viability and contribution to the strategic plan of Duke University.