

ALI J. BERENS

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EDUCATION

Iowa State University, Ames, IA

July 2015

Ph.D. Bioinformatics and Computational Biology, Minor in Statistics
Advisor: Amy Toth

St. Olaf College, Northfield, MN

May 2010

B.A. Mathematics, *Cum Laude*

RESEARCH EXPERIENCE

Georgia Institute of Technology, Atlanta, GA

August 2015-Present

Postdoctoral Research Fellow

Advisor: Joseph Lachance

- Developed hierarchical, reference free chromosome painting method that uses a Hidden Markov Model to estimate local genetic ancestry
- Identified which global populations have the greatest genetic risk of prostate cancer and classified regions of the human genome based on contributions to prostate cancer health disparities
- Assessed health of ancient hominids based on estimated genetic risk at known disease associated regions of the genome

Iowa State University, Ames, IA

August 2010-July 2015

Graduate Research Assistant

Advisor: Amy Toth

Dissertation: *Sociogenomics of social organization: Mechanistic and evolutionary underpinnings of caste development and facial recognition in paper wasps*

- Investigated genetic mechanisms underpinning caste development across three major social insect lineages (bees, ants, wasps) using comparative transcriptomics
- Tested nourishment as an environmental factor driving developmental plasticity of wasp castes
- Compared brain gene expression during staged social interactions for two paper wasp species with (*Polistes fuscatus*) and without (*Polistes metricus*) facial recognition
- Conducted the first transcriptome-wide analysis of facial learning in any animal

Virginia Polytechnic Institute and State University, Blacksburg, VA

June 2009-August 2009

Research Experience for Undergraduates (REU) Intern

Advisors: John Burns, Eugene Cliff, and Lizette Zietsman

- Used international flight data and epidemiological data to develop two compartmental models for the simulation of the spread of Pandemic H1N1/09 virus between continents and age groups
- Analyzed vaccination strategies to effectively distribute vaccine dosages among continents and age groups

PUBLICATIONS

- Standage D.S., **Berens A.J.**, Glastad K.M., Severin A.J., Brendel V.P., Toth A.L. Genome, transcriptome, and methylation sequencing of a primitively eusocial wasp reveal a greatly reduced DNA methylation system in a social insect. *Molecular Ecology*. 2016. 25(8):1769-1784.
- Berens A.J.**, Tibbetts E.A., Toth A.L. Candidate genes for individual recognition in *Polistes fuscatus* paper wasps. *Journal of Comparative Physiology A*. 2016. 202(2):115-129.
- Durant D.R., **Berens A.J.**, Toth A.L., Rehan S.M. Transcriptional profiling of overwintering gene expression in the small carpenter bee, *Ceratina calcarata*. *Apidologie*. 2016. 47(4):572-582.
- Berens A.J.**, Hunt J.H., Toth A.L. Comparative transcriptomics of convergent evolution: Different genes but conserved pathways underlie caste phenotypes across lineages of eusocial insects. *Molecular Biology and Evolution*. 2015. 32:690-703.
- Berens A.J.**, Hunt J.H., Toth A.L. Nourishment level affects caste-related gene expression in *Polistes* wasps. *BMC Genomics*. 2015. 16:235.
- Rehan S.M., **Berens A.J.**, Toth A.L. At the brink of eusociality: transcriptomic correlates of worker behaviour in a subsocial bee. *BMC Evolutionary Biology*. 2015. 14:260.

Submitted and In Preparation

- Berens A.J.**, Tibbetts E.A., Toth A.L. Cognitive specialization for learning faces is associated with shifts in the brain transcriptome of a social wasp. *Submitted*.
- Berens A.J.**, Cooper T.L., Lachance J. The genomic health of ancient hominins. *In preparation*.
- Lachance J., **Berens A.J.**, Teng A., Hansen M.E.B., Tishkoff S.A., Rebbeck T.R. Population and evolutionary genomics of prostate cancer-associated variants: implications for health disparities in men of African descent. *In preparation*.
- Lachance J., Quiver M.H., Mullen K., Hansen M.E.B., **Berens A.J.**, Chen M.A., Hsieh P., Veeramah K.R., Tishkoff S.A. Evidence of sex-biased migration and selection against recessive X-linked alleles in human populations. *Submitted*.
- Toepp A., Schaut R., Scott B., Mathur D., Berens A.J., Petersen C. A prospective study of Leishmania incidence in U.S. hunting hounds following reported outbreak. *Submitted*.

PRESENTATIONS

- Berens A.J.** and Lachance J. Painting by evolutionary history: Inference of local ancestry in admixed populations. *SMBE Satellite Meeting on the Genetics of Admixed Populations*. 2016. Poster presentation.
- Berens A.J.** Transcriptomics in Social Insects: An interdisciplinary approach. *St. Olaf College*. 2014. Invited seminar.
- Berens A.J.** Interdisciplinary Approach to Understanding Social Evolution in Insects. Truman State University. 2014. Invited seminar.
- Berens A.J.** Comparative Transcriptomics of Queen and Worker Castes in Hymenoptera. *Society for Systemic Biologists Symposium at Evolution on Phylogenomics, transcriptomics, the evolution of gene expression*. 2014. Invited talk.

- Berens A.J.**, Hunt J.H., Toth A.L. Comparative Transcriptomics of Queen and Worker Castes in Hymenoptera. *Gordon Research Seminar and Conference on Genes and Behavior*. 2014. Oral and poster presentations.
- Berens A.J.**, Hunt J.H., Toth A.L. Transcriptomics of caste development and differential nourishment in primitively social *Polistes* wasps. *University of Iowa Bioinformatics Retreat*. 2013. Oral and poster presentations.
- Berens A.J.**, Tibbetts E.A., Toth A.L. Development of Next Generation Sequencing Resources to Study Behavior in Social Wasps. *New Mexico Bioinformatics, Science, and Technology Symposium on Functional Genomics*. 2012. Oral and poster presentations.
- Berens A.J.** and Toth A.L. Development of Next Generation Sequencing Resources to Study Behavior in Social Wasps. *Statistical Analyses for Next Generation Sequencing Conference*. 2011. Poster presentation.

GRANTS AND AWARDS

Research Excellence Award, Iowa State University	2015
Doctoral Dissertation Improvement Grant, National Science Foundation, IOS-1311512 (\$19,223, Co-PI: Amy Toth)	2013-15
James Cornette Fellowship, Bioinformatics and Computational Biology (BCB) Program, Iowa State University (\$1200)	2014
George Knaphus College Teaching Fellowship, Iowa State University (\$5600)	2014
BCB Laboratory Graduate Learning Community, Iowa State University (\$800)	2013-14
Teaching Excellence Award, Iowa State University	2013
Print and Grace Powers Hudson Scholarship in Agriculture, College of Agricultural and Life Sciences, Iowa State University (\$1000)	2012-13
EEOB Graduate Student Research Award, EEOB Department, Iowa State University (\$500)	2012
Scholarship to attend the i5K Community Workshop, Kansas City, MO	2012
Professional Advancement Grant, Graduate and Professional Student Senate, Iowa State University	2011

TEACHING EXPERIENCE

Evolution (Biol. 315, Online Section), Iowa State University	Summer 2015
Co-Instructor	
<ul style="list-style-type: none"> Oversaw online delivery of course material, assignments, and exams Facilitated discussion forum on selected topics in evolution 	
Principles of Biology I and II Lab (Biol. 211/2L), Iowa State University	2011-2015
Teaching Assistant	
<ul style="list-style-type: none"> Presented short introductory lectures, demonstrated and facilitated laboratory activities, interacted with students, and provided feedback to students on assignments and exams Co-designed laboratory module on macroevolution in hominids that focused on both traditional morphological approaches and new phylogenetic techniques 	
Genome Perspectives in Biology (Gen. 349X), Iowa State University	2014-2015
Guest Lecturer	

- Introduced students to RNA-sequencing experiments and applications followed by a hands-on activity where students performed differential expression analyses using R packages

Introduction to Biology for Non-majors (Biol. 101), Iowa State University

Summer 2014

Instructor

- Developed and delivered foundational biological course material on the diversity of life, principles of inheritance, evidence of evolution, and ecological relationships
- Highlighted impacts of evolution and ecology on public health, agriculture, and conservation

Software Carpentry Bootcamp, Iowa State University

2014

Workshop Assistant

- Supported students and instructors for the workshop series hosted at Iowa State which aims to teach basic software skills to researchers in science, engineering, and medicine.

Wiki Tutorial, EEOB Department, Iowa State University

2014

Instructor

- Created two-day interactive workshop focused on the design and customization of wiki websites for both administrators and users

TEACHING PROFESSIONAL DEVELOPMENT EXPERIENCE

Teaching and Learning in Higher Education Course, Georgia Tech

January –May 2016

Participant

- Non-credit course that gave postdoctoral scholars the opportunity to learn and apply principles of learner-centered teaching that are based on current research about how people learn
- Discussed course design, syllabi, assessment tools, and lessons grounded in alignment between learning objectives, instructional activities, and assessment methods
- Reviewed how to respond effectively to student and peer feedback about teaching
- Synthesized own experiences and views about the philosophy of teaching

UNDERGRADUATE MENTORING

Taylor Cooper, Georgia Institute of Technology

2016

- Project: How healthy were ancient hominids?
- Compared ancient hominid and modern human genomes at regions known to be associated with disease risk in order to determine how human health has changed over time
- Received Fast Track to Research Scholarship
- Invited for contribution to Human Biology special issue on “Anthropological genetics in the era of ancient and metagenomes”

Kane Patel, Georgia Institute of Technology

2015-16

- Project: Ascertainment bias in predicting genetic disease risks
- Assessed how much study population and evolutionary history biases the estimated genetic risks of human diseases to determine the generalizability of genome wide association studies
- Received President’s undergraduate research award
- Work to be presented at American Society of Human Genetics meeting, October 2016

Erin McCall, Iowa State University 2014-15

- Project: Social dominance in *Polistes fuscatus* paper wasps
- Analyzed wasp behavioral videos during staged dominance social interactions
- Behavioral data included in Berens et al. 2016. Journal of Comparative Physiology A.

Vera Wang, Amherst College 2011-13

- Project: Individual recognition in *Polistes fuscatus* paper wasps
- Reared field-caught wasps in the lab and staged social dominance contests between wasps
- Assisted with wasp brain dissections and RNA extractions from brain tissue
- Genetic data included in Berens et al. 2016. Journal of Comparative Physiology A.

ACADEMIC SERVICE

Reviewer for Biology Letters 2016

Reviewer for PLoS One 2014

Ecology, Evolution, and Organismal Biology (EEOB) Graduate Student Organization Treasurer 2012-14

Iowa State University EEOB Department external review Graduate student representative 2014

EEOB Department faculty search committee, Iowa State University Graduate student representative 2013

BCB Laboratory Graduate Student Organization Administrator 2012-13

Social Coordinator 2011-12

OUTREACH

Pollinator Fest at Reiman Gardens, Iowa State University 2015

- Educational program during national pollinator week that highlighted the agricultural, ecological, and evolutionary importance of local pollinators

Girls in Science Initiative, Science Center of Iowa 2015

- Promotes girls' early engagement in STEM to encourage pursuit of careers in these fields

Portal to the Public Program at the Science Center of Iowa 2014

- Completed program designed to increase interactions between scientists and the public to promote appreciation and understanding of current scientific research and applications
- Developed demonstrations that simulated our cognitive specialization for face recognition, a complex behavioral trait shared with paper wasps

Des Moines Central Campus 2011-12

- Guest lectured in extended educational course aimed to expose middle and high school students to current research in the biotechnology field early in their education
- Developed activity to illustrate how molecular sequences provide insights into evolutionary relationships, titled Social Evolution in Insects: Introduction to BLAST

Taking the Road Less Traveled Career Conference for Girls, Iowa State University 2011

- Presented research at program designed to expose high school girls to career paths in STEM