

**Elizabeth I. Cash**

## CURRICULUM VITAE

**Personal Information**

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POSITION: Biology PhD Candidate | Graduate Teaching Associate

ADDRESS: Arizona State University

School of Life Sciences

Tempe, AZ 85287-4601

E-MAIL: [Elizabeth.Cash@asu.edu](mailto:Elizabeth.Cash@asu.edu)WEBSITE: <http://www.elizabethcash.com>**Education**

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**Arizona State University**

Ph. D., Biology (expected)

Advanced to Candidacy

Advisors: Jürgen Gadau (chair) and Jürgen Liebig

Additional Committee Advisors: Jennifer Fewell, Bert Hölldobler, and Kenro Kusumi

Dissertation: Nestmate recognition in the red harvester ant, *Pogonomyrmex barbatus*.**Tempe, AZ**

Spring 2016

Fall 2013

**The Ohio State University**B. Sc., Biology, graduated *cum laude*

Advisors: Steven Rissing, John Wenzel, and Joseph Raczkowski

Independent Research: The function of pheromones in socially parasitic *Lasius* ants.**Columbus, OH**

2009

**University of Cincinnati**

Design, Foundation Coursework

**Cincinnati, OH**

1999

**Research Experience**

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**Graduate Research Associate | Arizona State University**

Advisor: Jürgen Gadau

**Tempe, AZ**Collection of *Pogonomyrmex barbatus* foundresses for rearing lab colonies, and studying lineage differences in cuticular hydrocarbons (CHCs), mating behavior, and colony growth.

Summer 2012 – Present

Behavioral assays of nestmate recognition, & cuticular hydrocarbon (CHC) analyses of *P. barbatus*.

Spring 2011 – Present

Desaturase gene annotation and analyses in seven ant species &amp; two bumble bee species.

Spring 2010 – 2013

Genetic analyses of hybrid incompatibility in *Nasonia*.

Fall 2009 – 2010

**Undergraduate Research Assistant | The Ohio State University**

Advisors: Steven Rissing and Joseph Raczkowski

Behavioral studies of socially parasitic ants (*Lasius sp.*), chemical ecology studies of pheromones, and rearing lab colonies.**Columbus, OH**

2007 – 2009

**Field Assistant | The Ohio State University**

Advisor: John Harder

Sampling and analysis of arthropod diversity in a wetland habitat.

Flora sampling in a restored prairie grassland &amp; freshwater mussel sampling.

**Columbus, OH**

Fall 2008

**Peer-Reviewed Publications**

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**Cash, E.**<sup>†</sup>, Helmkamp, M.<sup>†</sup>, and Gadau, J. (2014). Evolution of the insect desaturase gene family with an emphasis on social Hymenoptera. *Molecular Biology and Evolution* **32**, 2366–2372. <sup>†</sup>These authors contributed equally to this work.

Simola, D. F., ...**Cash, E.** (18/38 authors), ...Gadau, J. (2013). Social insect genomes exhibit dramatic evolution in gene composition and regulation while preserving regulatory features linked to sociality. *Genome Research* **23**, 1235–1247.

Gibson, J.D., Niehuis, O., Peirson, B.R.E., **Cash, E.I.**, and Gadau, J. (2013). Genetic and developmental basis of F2 hybrid breakdown in *Nasonia*. *Evolution* **67**, 2124–2132.

Smith, C. R., ...**Cash, E.** (11/45 authors), ...Gadau, J. (2011). A draft genome of the red harvester ant, *Pogonomyrmex barbatus*: a model for reproductive division of labor and social complexity. *Proceedings of the National Academy of Sciences of the United States of America* **108**, 5667–5672.

Smith, C. D., ...**Cash, E.** (6/50 authors), ...Tsutsui, N. D. (2011). The draft genome of the globally widespread and invasive Argentine ant (*Linepithema humile*). *Proceedings of the National Academy of Sciences of the United States of America* **108**, 5673–5678.

Suen, G., ...**Cash, E.** (9/49 authors), ...Currie, C. R. (2011). The genome sequence of the leaf-cutter ant *Atta cephalotes* reveals insights into its obligate symbiotic lifestyle. *PLoS Genetics* **7**, e1002007.

**Academic Presentations and Talks**

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**Cash, E. I.**, and Gadau, J. 17 November 2014. Developing the Gestalt: Nestmate recognition cues in the red harvester ant, *Pogonomyrmex barbatus*. (Poster) 62<sup>nd</sup> annual Entomological Society of America meeting, Portland, OR.

**Cash, E. I.**, Helmkamp, M., and Gadau, J. 24 May 2014. Evolution of desaturases in ants. (Talk) ASU - UWü International Symposium and Workshop on Frontiers in Insect Behavior, Social Organization, and Evolution. Würzburg, Germany.

**Cash, E. I.,** Helmkampf, M., and Gadau, J. 13 November 2013. The evolution of desaturase genes in ants. (Talk) 61<sup>st</sup> annual Entomological Society of America meeting, Austin, TX.

**Cash, E. I.,** and Gadau, J. 13 November 2013. Nasty neighbors: The effect of cuticular hydrocarbons and prior experience on nestmate recognition behavior in the red harvester ant, *Pogonomyrmex barbatus*. (Poster) 61<sup>st</sup> annual Entomological Society of America meeting, Austin, TX.

**Cash, E. I.** 18 March 2012. Capturing That Air of Distinction: Desaturase gene diversity as a contributor to nestmate recognition in seven newly sequenced ant species. (Talk) Gordon Research Seminar on Genes & Behavior, Galveston, TX.

**Cash, E. I.,** Helmkampf, M., and Gadau, J. 20 June 2011. Uncovering the genetic basis of colony recognition: desaturase gene diversity in seven newly sequenced ant species. (Poster) Evolution Meeting, Norman, OK.

**Cash, E. I.,** Helmkampf, M., and Gadau, J. 20 June 2010. The genetic basis of colony recognition: desaturase genes in the newly sequenced genomes of *Pogonomyrmex barbatus* and *Linepithema humile*. (Poster) Fourth Annual Arthropod Genomics Symposium, Kansas City, MO.

**Cash, E. I.,** Raczkowski, J., and Rissing, S. 13 May 2009. The function of pheromones in worker ants: the parasitism of *Lasius alienus* by *Lasius claviger*. (Poster) The Richard J. and Martha D. Denman Undergraduate Research Forum, Ohio State University, Columbus, OH.

**Cash, E. I.** 02 December 2008. Comparison of annual changes in arthropod abundance and diversity in a central Ohio oldfield community. (Talk) Conservation Biology, Ohio State University, Columbus, OH.

## Teaching Experience

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Arizona State University   Graduate Teaching Associate	Tempe, AZ
InnovationSpace (IND 464 & 465), Biomimicry TA	Spring 2013 - Present
Organic Evolution (BIO 345), Lecture TA	Summer 2014 & 2013
General Entomology (BIO 386), Laboratory TA	Fall 2012 & 2011
General Biology II (BIO 182), Laboratory TA	Spring 2012
General Biology I (BIO 181), Laboratory TA	Spring 2011
General Genetics (BIO 340), Lecture TA	Fall 2010
Introductory Biology (BIO 100), Laboratory TA	Fall 2009

## Honors and Awards

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<b>Graduate Dissertation Fellowship   Arizona State University</b> Awarded funding for final year of dissertation - <b>\$17,000.00</b>	<b>Tempe, AZ</b> Spring 2015
<b>Graduate Training Fellowship   School of Life Sciences, ASU</b> Awarded funding to receive training at the Ant Course - <b>\$1,150.00</b>	<b>Tempe, AZ</b> Spring 2015
<b>62<sup>nd</sup> Annual Meeting   Entomological Society of America</b> Awarded 2 <sup>nd</sup> place in graduate student poster competition - <b>\$50.00</b>	<b>Portland, OR</b> Fall 2014
<b>Conference Travel Grant   School of Life Sciences, ASU</b> Awarded funding to present research at the 62 <sup>nd</sup> annual Entomological Society of America Meeting - <b>\$400.00</b>	<b>Tempe, AZ</b> Fall 2014
<b>ESA Conference Travel Grant   NAS-IUSSI</b> Awarded funding to present research at the 61 <sup>st</sup> annual Entomological Society of America Meeting - <b>\$500.00</b>	<b>Tempe, AZ</b> Summer 2013
<b>Conference Travel Grant   School of Life Sciences, ASU</b> Awarded funding to present research at the 4 <sup>th</sup> annual Arthropod Genomics Symposium - <b>\$300.00</b>	<b>Tempe, AZ</b> Spring 2010
<b>Denman Undergraduate Research Forum   The Ohio State University</b> Awarded 3 <sup>rd</sup> place in biological sciences (poster presentation) - <b>\$200.00</b> Invited to join the scientific research society, Sigma Xi.	<b>Columbus, OH</b> Spring 2009
<b>National SMART Grant   The Ohio State University</b> Awarded for academic achievement in the life sciences - <b>\$8,000.00</b>	<b>Columbus, OH</b> 2007 –2009
<b>Dean's List   The Ohio State University</b> Earned academic distinction during 9 quarters of enrollment.	<b>Columbus, OH</b> 2005 –2009

## Professional Society Memberships

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International Union for the Study of Social Insects (IUSSI)	2013 – Present
The Society for the Study of Evolution (SSE)	2011 – Present
Association for Women in Science (AWIS)	2010 – Present
The Entomological Society of America (ESA)	2010 – Present
The National Society of Collegiate Scholars (NSCS)	2005 – Present

## Other Professional Experience | Design, Photography, & Videography

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<b>SOLS   Arizona State University</b> Biomimicry project consultant on architectural redesign of Life Sciences A-wing building lobby and courtyard space	<b>Tempe, AZ</b> Summer 2013
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**Gadau Lab | Arizona State University**  
 Lab website designer and administrator  
<http://gadau.lab.asu.edu>

**Tempe, AZ**  
 2012 – Present

**CLAS | Arizona State University**  
 Photography

**Tempe, AZ**  
 2011 – Present

[https://asunews.asu.edu/20130328\\_todd\\_innovationspace](https://asunews.asu.edu/20130328_todd_innovationspace)  
[http://asunews.asu.edu/20130213\\_wasppheromones](http://asunews.asu.edu/20130213_wasppheromones)  
[http://sols-archive.asu.edu/news/2012/02\\_news\\_12.php](http://sols-archive.asu.edu/news/2012/02_news_12.php)  
<http://places.designobserver.com/feature/biomimicry-and-design-education/32848/>

Videography

*InnovationSpace Alumni Profile* [http://innovationspace.asu.edu/students/SIRG\\_friends](http://innovationspace.asu.edu/students/SIRG_friends)  
*SIRG & friends* <http://vimeo.com/86664707>  
*Flight of the Sexuials* <http://vimeo.com/48173557>

**GLO jeans girls | Jones Apparel Group**

**New York City / Hong Kong**

Associate designer of denim & knit styles for a young girls, tween clothing line.

2004 – 2005

**Fetish | Ecko Unlimited**

**New York City**

Product development & design associate manager of knit styles for an urbanwear, junior (young women's) apparel line.

2004

**RocaWear Juniors | Nesi Apparel Group**

**New York City / Hong Kong**

Product development and design associate of knit styles for an urbanwear, junior (young women's) clothing line.

2002 – 2004

## Public Outreach

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**Summer Flashlight Tours | Desert Botanical Garden**

**Phoenix, AZ**

Volunteered as an expert entomologist to inform public attendees about insect diversity of the Sonoran Desert.

Summer 2014

<http://www.dbg.org>

**SOLS Takes a Hike | Arizona State University**

**Tempe, AZ**

Participate in guided hikes at the Gilbert Riparian Preserve to teach local attendees about insects of the Sonoran Desert.

Spring 2014

<http://sols.asu.edu/hike>

**BEST Summer Program | Arizona State University**

**Tempe, AZ**

Develop active learning exercises to teach camp attendees (grades 5-9) the process of using the scientific method while studying social insects.

Summer 2013

<http://engineering.asu.edu/summerprograms/best/index.html>

- Franz Insect Lab | Arizona State University** **Tempe, AZ**  
Design and build a live ant display colony for educational outreach  
and public viewing purposes. 2013
- InsectARium | Arizona State University** **Tempe, AZ**  
Edit insect images with Photoshop to create interactive, 3D graphical insect  
models for use in an online, technology based learning and research tool. Fall 2012  
<http://tblr.asu.edu/mtpd/insectarium/ar/flashcards3.php>
- Ask-a-Biologist | Arizona State University** **Tempe, AZ**  
Answer biology questions submitted online by K-12 students  
and connect Ask-a-Biologist resources with K-12 teachers. Spring 2010  
<http://askabiologist.asu.edu>
- CompuGirls | Arizona State University** **Tempe, AZ**  
Technology program for adolescent girls - graphic design project consultant. 2010  
<http://sst.clas.asu.edu/about/compugirls>
- Project Connect | Cincinnati Public Schools** **Cincinnati, OH**  
After school tutor for inner city, underrepresented students (K-6). 2000  
<http://www.cps-k12.org/Academics/ProjConnect/ProjConnect.htm>