

## Matthew B. Toomey – Curriculum Vitae

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Washington University School of Medicine  
Department of Pathology and Immunology  
Saint Louis, MO 63110  
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### Education

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**Ph.D. Arizona State University, Tempe, AZ** **2011**  
College of Liberal Arts and Sciences, School of Life Sciences

**B.S., University of Vermont, Burlington, VT** **2002**  
College of Arts and Sciences, Department of Biology  
Graduated Cum Laude with College Honors  
Major: Biology, Minors: Chemistry & Physics

### Postdoctoral Training

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**Research Fellow/Associate** **2011- present**  
Lab of Dr. Joseph Corbo  
Washington University School of Medicine  
Department of Pathology and Immunology  
Saint Louis, MO 63110

### Publications

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**Citation metrics:** (via google scholar)

Total citations: 651

*h*-index: 15

32. Koch, R. E., Kavazis, A., Hasselquist, D., Hood, W., Zhang, Y., **Toomey, M.B.**, Hill, G. E. 2018. No evidence that carotenoid pigments boost either immune or antioxidant defenses in a songbird. *Nature Communications*. 9: 491
31. **Toomey, M. B.** & Corbo, J. C. 2017 Evolution, Development and Function of Vertebrate Cone Oil Droplets. *Frontiers in Neural Circuits*. 11, 97.
30. Morshedjian A. \*, **Toomey, M.B.\***, Pollock, G.E., Frederiksen, R., Enright, J.M., McCormick, S.D., Cornwall, M.C., Fain, G.L., Corbo, J.C. 2017 Cambrian origin of the CYP27C1-mediated vitamin A<sub>1</sub>-to-A<sub>2</sub> switch, a key mechanism of vertebrate sensory plasticity. *Royal Society Open Science*. 4: 170362.  
\*contributed equally
29. **Toomey, M. B.**, Lopes, R. J., Araújo, P. M., Johnson, J. D., Gazda, M. A., Afonso, S., Mota, P. G., Koch, R. E., Hill, G. E., Corbo, J. C., Carneiro, M. 2017. High-density lipoprotein receptor SCARB1 is required for carotenoid coloration in birds. *Proceedings of the National Academy of Science of the United States of America*. 114, 5219–5224.

28. Mitkus, M., Olsson, P., **Toomey, M.B.**, Corbo, J. C., & Kelber, A. 2017. Specialized photoreceptor composition in the raptor fovea. *Journal of Comparative Neurology*. 525, 2152-2163
27. **Toomey M.B.**, Lind O., Frederiksen R., Curley R.W., Riedle K.M., Wilby D., Schwartz S.J., Witt C.C., Harrison E.H., Roberts N.W., Vorobyev M., McGraw K.J., Cornwall M.C., Kelber A., Corbo J.C. 2016 Complementary shifts in photoreceptor spectral tuning unlock the full adaptive potential of ultraviolet vision in birds. *eLife*, 5:e15675.
- Popular press: [The Secret Superpowers of Birds, Revealed – Audubon Magazine](#)  
eLife podcast: <https://elifesciences.org/podcast/episode31>
26. Kramlinger V.M., Nagy L.D., Fujiwara R, Johnson K.M., Phan T.T.N., Xiao Y., Enright J.M., **Toomey M.B.**, Corbo J.C., Guengerich F.P. 2016. Human cytochrome P450 27C1 catalyzes 3,4-desaturation of retinoids. *FEBS Letters*. 590,1304–1312.
25. Lopes, R.J.\* , J.D.Johnson\* , **M.B.Toomey\***, M.Ferreira, J. Melo-Ferreira, L. Andersson. G.E. Hill, J.C. Corbo, M. Carneiro. 2016. Genetic Basis for Red Coloration in Birds. *Current Biology*. 26,1427–1434.  
\*contributed equally
- Popular press (selected of >60 articles):  
[The Gene That Paints Birds Red - The Atlantic](#)  
[How Birds Became Red - Forbes](#)  
[Two Studies Find One Gene for Red Beaks and Feathers - BBC News](#)  
[Where Birds Get Their Vibrant Hues - Smithsonian](#)
24. **Toomey, M.B.**, K.J. McGraw. 2016. The effects of sun exposure on carotenoid accumulation and oxidative stress in the retina of the House finch (*Haemorrhous mexicanus*). *Avian Research* 7:5
23. **Toomey, M.B.**, A.M. Collins, R. Frederiksen, M.C. Cornwall, J.A. Timlin, J.C. Corbo. 2015. A complex carotenoid palette tunes avian color vision. *Journal of the Royal Society Interface*. 12: 20150563
22. Wilby, D., **M.B. Toomey**, P. Olsson, R. Frederiksen, M.C. Cornwall, R. Oulton, A. Kelber, J.C. Corbo, N.W. Roberts. 2015. Optics of cone photoreceptors in the chicken (*Gallus gallus domesticus*). *Journal of the Royal Society Interface*. 12: 20150591
21. Enright, J.M., **M.B. Toomey**, S. Sato, S.E. Temple, J.R. Allen, R. Fujiwara, V.M. Kramlinger, L.D. Nagy, K.M. Johnson, Y. Xiao, M.J. How, S.L. Johnson, N.W. Roberts, V.J. Kefalov, F.P. Guengerich, J.C. Corbo. 2015. Cyp27c1 Red-Shifts the Spectral Sensitivity of Photoreceptors by Converting Vitamin A<sub>1</sub> into A<sub>2</sub>. *Current Biology* 25: 3048-3057.
- Dispatch: [Phototransduction: Making the Chromophore to See Through the Murk – Current Biology](#)  
Popular press: [How Salmon Switch on Infrared Vision When Swimming Upstream - The Atlantic](#)
20. Giraudeau, M., A. Chavez, **M.B. Toomey**, and K.J. McGraw. 2015. Effects of carotenoid supplementation and oxidative challenges on physiological parameters and carotenoid-based coloration in an urbanization context. *Behavioral Ecology and Sociobiology*. 69: 957-970
19. McGraw, K.J., Giraudeau, M., **Toomey, M.B.**, and M. Staley. 2013. Ketocarotenoid circulation, but not retinal carotenoid accumulation, is linked to eye disease status in a wild songbird. *Archives of Biochemistry and Biophysics*. 539:156-162
18. **Toomey M.B.**, McGraw K.J. 2012. Mate choice for a male carotenoid-based ornament is linked to female dietary carotenoid intake and accumulation. *BMC Evolutionary Biology* 12:3.

17. Behbahaninia H, M.V. Butler, **M.B. Toomey**, K.J. McGraw 2012. Food color preferences against a dark, textured background vary in relation to sex and age in house finches (*Carpodacus mexicanus*). *Behaviour*. 149:51–65.
16. Giraudeau, M., **M.B. Toomey**, K.J. McGraw. 2012. Can house finches (*Carpodacus mexicanus*) use non-visual cues to discriminate the carotenoid content of foods? *Journal of Ornithology*. 153:1017-1023
15. **Toomey, M. B.**, K. J. McGraw. 2011 The effects of dietary carotenoid supplementation and retinal carotenoid accumulation on vision-mediated foraging in the house finch. *PLoS One*. 6: e21653.
14. Butler, M.W., **M.B. Toomey**, K.J. McGraw, M. Rowe. 2011. Ontogenetic immune challenges shape adult personality in mallard ducks. *Proceedings of the Royal Society B*. 279:326-333
13. Smith, C.L. , **M.B. Toomey**, B.R. Walker, E.J. Braun, B.O. Wolf, K.J. McGraw, K.L. Sweazea. 2011. Naturally high plasma glucose levels in mourning doves (*Zenaidura macroura*) do not lead to high levels of reactive oxygen species in the vasculature. *Zoology*. 114:171-6
12. Butler, M.W., **M.B. Toomey**, K.J. McGraw. 2011. How many color metrics do we need? Evaluating how different color-scoring procedures explain carotenoid pigment content in avian bare-part and plumage ornaments. *Behavioral Ecology and Sociobiology*. 65: 401-413
11. **Toomey, M. B.**, K. J. McGraw. 2010. The effects of dietary carotenoid intake on carotenoid accumulation in the retina of a wild bird, the house finch (*Carpodacus mexicanus*). *Archives of Biochemistry and Biophysics*. 504:161-168
10. **Toomey, M.B.**, M.W. Butler, K.J. McGraw. 2010. Immune-system activation depletes retinal carotenoids in house finches. *Journal of Experimental Biology*. 213:1709-1716
9. **Toomey, M.B.**, M.W. Butler, M.G. Meadows, L.A. Taylor, H.B. Fokidis, K.J. McGraw. 2010. A novel method for quantifying the glossiness of animals. *Behavioral Ecology and Sociobiology*. 64: 1047-1055.
8. McGraw, K. J., **M. B. Toomey**. 2010. Carotenoid accumulation in the tissues of zebra finches: predictors of integumentary pigmentation and implications for carotenoid allocation strategies. *Physiological and Biochemical Zoology*. 83:97-109
7. Bascunan, A. L., E. A. Tourville, **M. B. Toomey**, K. J. McGraw. 2009. Food color preferences of molting house finches (*Carpodacus mexicanus*) in relation to sex and plumage coloration. *Ethology*. 115: 1066-1073
6. Meadows, M.G., M. W. Butler, N. I. Morehouse, L. A. Taylor, **M. B. Toomey**, K. J. McGraw, R. L. Rutowski. 2009. Iridescence: views from many angles. *Journal of the Royal Society Interface*. 6:S107-S113
5. **Toomey, M.B.**, K.J. McGraw. 2009. Seasonal, sexual, and quality related variation in retinal carotenoid accumulation in the house finch (*Carpodacus mexicanus*). *Functional Ecology*. 23:321-329
4. **Toomey, M.B.**, K. J. McGraw. 2007. Modified saponification and HPLC methods for analyzing carotenoids from Japanese quail retina: implications for use as a nonprimate model species. *Investigative Ophthalmology and Visual Science*. 48:3976-3982
3. McGraw, K. J., **M. B. Toomey**, P. M. Nolan, N. I. Morehouse, M. Massaro, P. Jouventin. 2007. A description of unique fluorescent yellow pigments in penguin feathers. *Pigment Cell Research*. 20:301-304.
2. **Toomey, M.B.**, R. Bowman, G.E. Woolfenden. 2007. The effects of social context on food handling behavior of Florida Scrub-Jays. *Ethology*. 113:521-527
1. **Toomey, M.B.**, D. McCabe, J. E. Marsden. 2002. Factors affecting the movement of adult zebra mussels (*Dreissena polymorpha*). *Journal of the North American Benthological Society*. 21:468-475.

## Grants and Fellowships

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<b>Postdoctoral Research Fellowship</b> McDonnell Center for Cellular and Molecular Neurobiology At Washington University in St. Louis, \$30,000	<b>2015</b>
<b>Postdoctoral Research Fellowship in Biology</b> National Science Foundation Intersections of Biology with Math and Physical Sciences (#DBI-1202776), \$123,000	<b>2012</b>
<b>Postdoctoral Training Fellowship</b> National Institutes of Health, National Eye Institute, Vision Sciences Training Program At Washington University in St. Louis, \$37,740	<b>2011</b>
<b>Doctoral Dissertation Improvement Grant</b> National Science Foundation, "What you see is what you get: behavioral implications of retinal carotenoid accumulation" (#IOS-0910375), co-PI with Dr. Kevin McGraw, \$11,370	<b>2009</b>
<b>Grant</b> National Science Foundation, "Condition-dependent signal reception: limitations and functions of carotenoids in avian color vision" (#IOS-0923694), \$356,189 co-written with Dr. Kevin McGraw (PI) based upon and supporting dissertation research	<b>2009</b>
<b>Grant in Aid of Research</b> Society for Integrative and Comparative Biology , \$1,000	<b>2009</b>
<b>Student Research Grant</b> Arizona State University, Graduate and Professional Student Association, \$1,600	<b>2007</b>
<b>Student Research Award</b> American Ornithologist Union, \$1,800	<b>2007</b>
<b>Conference development grant</b> School Of Life Sciences, Research and Training Initiative, Frontiers in Life Sciences with Mike Butler, Nathan Morehouse, Jonathan Douglas, Lisa Taylor, and Melissa Meadows, \$29,000	<b>2007</b>
<b>Student Research Grant</b> Animal Behavior Society, \$1,000	<b>2006</b>
<b>Grant-In-Aid-of-Research</b> Sigma Xi, \$2,000	<b>2005</b>
<b>Undergraduate Research and Faculty Mentoring Grant</b> University of Vermont with Dr. J. E. Marsden, \$3,000	<b>2002</b>
<b>Undergraduate summer research internship</b> Vermont Experimental Program Stimulating Competitive Research (EPSCoR). \$5,000	<b>2000</b>
<b>Undergraduate Minigrant</b> Hughes Endeavor for Life Science Excellence at the University of Vermont, \$500	<b>1999</b>

## Awards

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<b>Outstanding Poster</b> , Gordon Research Conference on Carotenoids	<b>2016</b>
<b>Outstanding Poster</b> , Gordon Research Conference on Carotenoids	<b>2013</b>
<b>Graduate Research Fellowship</b> , National Science Foundation, Honorable Mention	<b>2006</b>
<b>University Graduate Scholar Award</b> , Recruitment Award, Arizona State University	<b>2005</b>
<b>George Perkins Marsh Award in Ecology and Evolution</b> , Department of Biology College of Arts and Sciences, University of Vermont	<b>2002</b>
<b>Vermont Scholar</b> , University of Vermont	<b>1998-2002</b>

## Travel Funding

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FASEB, Biology and Chemistry of Vision Meeting, \$1500	<b>2013</b>
Arizona State University, School of Life Sciences Travel Grant, \$300	<b>2011</b>
Arizona State University Graduate and Professional Student Association, Travel Grant, \$950	<b>2011</b>
Society for Integrative and Comparative Biology, Charlotte Mangum Student Support Conference Housing Award	<b>2010</b>
Arizona State University Graduate and Professional Student Association, Travel Grant, \$710	<b>2010</b>
Arizona State University, Graduate College, Travel Grant, \$326	<b>2010</b>
Arizona State University, School of Life Sciences Travel Grant, \$300	<b>2010</b>
Animal Behavior Society, Student travel grant, \$1,000	<b>2009</b>
Arizona State University Graduate and Professional Student Association, Travel Grant, \$300	<b>2008</b>
Arizona State University Graduate and Professional Student Association, Travel Grant, \$250	<b>2006</b>
Arizona State University, School of Life Sciences Travel Grant, \$300	<b>2006</b>

## Invited presentations

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**Toomey, M.B.** A pigment's-eye view of visual ecology: understanding functional adaptation through carotenoid metabolism.

2017: Department of Biology, Stanford University, Palo Alto, CA

2016: Department of Zoology, University of British Columbia, Vancouver, British Columbia, CANADA  
Department of Biology, Indiana State University, Terre Haute, IN  
Department of Biology, Maryville University, St. Louis, MO  
Department of Biology, University of Cincinnati, Cincinnati, OH

**Toomey, M.B.** 2016. Selective carotenoid metabolism enhances avian color vision. Carotenoids Gordon-Kenan Research Seminar, Barga, ITALY

**Toomey et al.** 2015 Photoreceptor coevolution enhances ultraviolet vision in birds. James L. O'Leary Prize for Excellence in Neuroscience Research Competition, Washington University School of Medicine, St. Louis, MO

**Toomey et al.** 2014. Carotenoid metabolism and opsin tuning have co-evolved to facilitate avian color discrimination. Departmental Seminar Genetics. Washington University School of Medicine, St. Louis, MO

**Toomey et al.** 2014. Selective apocarotenoid metabolism facilitates avian color vision. Carotenoid Interest Research Group, American Society for Nutrition, San Diego, CA

**Toomey et al.** 2013. Complementary shifts in carotenoid metabolism and opsin tuning facilitate avian color vision. Symposium: Physiological and functional advances in avian coloration. American Ornithologists Meeting, Chicago, IL

- Toomey et al.** 2013. Fine-tuning of avian color vision by selective apocarotenoid metabolism. Carotenoid Interest Research Group, American Society for Nutrition, Boston, MA
- Toomey et al.** 2013. Fine-tuning of avian color vision by selective apocarotenoid metabolism. Carotenoids Gordon-Kenan Research Seminar, Ventura, CA
- Toomey, M.B.** 2011. Avian Retinal Carotenoid Accumulation: Ecophysiological Constraints and Behavioral Consequences. Department of Biology, Purdue University, West Lafayette, IN
- Toomey, M.B.** 2010. Colorful birds, colorful vision: physiology and function of avian color vision. Mathematics and Cognition seminar, School of Mathematical and Statistical Sciences, Arizona State University, Tempe, AZ

### **Contributed Presentations**

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- Toomey, M.B.** 2014. Carotenoid metabolism and opsin tuning have co-evolved to facilitate avian color discrimination. 15<sup>th</sup> International Behavioral Ecology Congress, New York, NY
- Toomey, M.B.** 2014. Testosterone influences the accumulation of carotenoids in the retina of a wild bird. Experimental Biology, San Diego, CA
- Toomey, M.B.** 2012. Color and vision: The influence of dietary supplementation on retinal carotenoid accumulation and female choice for male carotenoid-based coloration. Warder Clyde Allee Session, Annual meeting, Animal Behavior Society, Albuquerque, MN
- Toomey, M.B.** and K.J. McGraw. 2010. Dietary carotenoids affect color-vision based foraging in the house finch. Meeting of the American Ornithologist's Union, San Diego, CA
- Toomey, M.B.,** M.W. Butler, and K.J. McGraw. 2010. Long-term immune system activation depletes carotenoids from retina of house finches (*Carpodacus mexicanus*). Meeting of the Society for Integrative and Comparative Biology. Seattle, WA
- Toomey, M.B. & McGraw, K.J.** 2009. Is there a unique role for carotenoids in production and perception of avian color signals? Meeting of the Animal Behavior Society, Pirenópolis, Goiás, Brazil.
- Toomey, M.B. & McGraw, K.J.** 2008. Variation in and correlates of retinal carotenoid accumulation in wild house finches (*Carpodacus mexicanus*). 12<sup>th</sup> International Behavioral Ecology Congress, Ithaca, NY
- Toomey, M.B. & McGraw, K.J.** 2007. Carotenoid pigments in the tissues of zebra finches (*Taeniopygia guttata*): identity, distribution, and intercorrelations. Meeting of the Society for Integrative and Comparative Biology. Phoenix, AZ

### **Contributed Posters**

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- Toomey et. al.** 2013. Fine-tuning of avian color vision by selective apocarotenoid metabolism. FASEB Biology and Chemistry of Vision Meeting, Steamboat Springs, CO
- Toomey, M.B.** and K.J. McGraw. 2011. Female mate choice for a carotenoid-based ornament is linked to carotenoid availability and assimilation in the house finch (*Carpodacus mexicanus*). Meeting of the Animal Behavior Society, Bloomington, IN
- Toomey, M.B.** and K.J. McGraw. 2010. The effects of dietary carotenoid supplementation on retinal carotenoid accumulation and visual foraging behavior in the house finch (*Carpodacus mexicanus*). Gordon research conference: Carotenoids. Ventura, CA

- Toomey, M.B.**, K.J. McGraw, P.M. Nolan, N.I. Morehouse, and P. Jouventin. 2006. The first description of fluorescent yellow pigments in penguin feathers. Meeting of the North American Ornithological Council, Veracruz, Mexico
- Meadows, M.G., K.J. MCGraw, **M.B. Toomey**, and L.A.Taylor. 2006. Condition dependence of structural colors in birds: a meta-analysis. Meeting of the North American Ornithological Council, Veracruz, Mexico (honorable mention to M.G. M. - student poster competition)
- Toomey, M.B.**, R. Bowman, and G.E. Woolfenden. 2005. The effects of social context on food handling behavior of Florida Scrub-Jays. Meeting of the Animal Behavior Society, Snowbird, UT & Meeting of the American Ornithologist's Union, Santa Barbra, CA
- Toomey, M.B.**, J.E. Marsden, and D.J. McCabe. 2002. Factors affecting the movement of adult zebra mussels (*Dreissena polymorpha*). Meeting of the North American Benthological Society, Pittsburgh, PA

**Government Reports**

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Payne, K.J. Roth M. and **Toomey M.B.** Trip Report: Laysan Island, 18 February – 24 July 2003. Administrative report, U. S. Fish and Wildlife Service, Honolulu, HI.

**Teaching**

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**Teaching**

<i>Graduate Fellowship Workshop Leader, Washington University, St. Louis, MO</i>	<b>2014</b>
Graduate Teaching Assistant, Arizona State University, Tempe, AZ	
<i>Vertebrate Zoology</i>	<b>2009</b>
<i>Human Anatomy &amp; Physiology</i>	<b>2007-2008</b>
<i>Introductory Biology</i>	<b>2005</b>

**Pedagogical training**

<i>Teaching Students How to Read and Critically Evaluate Scientific Literature, STEM pedagogy workshop, Washington University, St. Louis, MO</i>	<b>2015</b>
<i>Entering Mentoring, Washington University, St. Louis, MO</i>	<b>2012</b>
<i>Vision, Change, and the Case Studies Approach, Workshop Animal Behavior Society Meeting, Bloomington, IN</i>	<b>2011</b>
<i>Scientific Teaching, Arizona State University, Tempe, AZ</i>	<b>2009</b>

**Mentoring**

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**Honors Thesis**

Ana L. Bascunan & Elizebeth. A. Tourville. Barrett Honors College, Arizona State University "Food color preferences of molting house finches ( <i>Carpodacus mexicanus</i> ) in relation to sex and plumage coloration"	<b>2009</b>
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**Independent projects**

Malgorzata Gazda Visiting Graduate Student, Universidade do Porto, Portugal "The <i>cis</i> -regulation of $\beta$ -carotene oxygenase expression and avian color variation"	<b>2017</b>
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Allison Loynd Undergraduate, Brown University, Providence, RI "Mechanisms of retinoid metabolism in the visual system of the sea lamprey"	<b>2016</b>
Vineeth Thirunavu Undergraduate, Washington University, St. Louis, MO "The function of GSTA3 in avian retinal carotenoid metabolism"	<b>2016</b>
Henry Lather Undergraduate, Washington University, St. Louis, MO "The Selective Elimination of Avian Photoreceptor Populations"	<b>2013</b>
Amanda G. Elmore Undergraduate Purdue University, West Lafayette, IN "The sensory basis of individual variation in color vision: a case study with house finches"	<b>2011-2013</b>
Hirbod Behbahaninia Undergraduate, Arizona State University, Tempe, AZ "An experimental test of the effect of seed color contrast on food preferences of house finches."	<b>2010-2011</b>
Chelsie K. Daniel Undergraduate, Arizona State University, Tempe, AZ "Seasonal and quality related variation in circulating antibody levels in the house finch ( <i>Carpodacus mexicanus</i> )."	<b>2009-2010</b>
Jon Miller Arizona Science Teacher Advancement and Research Training Program "The relationship between sex, plumage coloration, and grooming behavior in the house finch ( <i>Carpodacus mexicanus</i> )" Program details: <a href="http://www.biochem.arizona.edu/az-start/partners.htm">http://www.biochem.arizona.edu/az-start/partners.htm</a>	<b>2009</b>

**Research interns**

Sabrina Ho, Undergraduate, Washington University, St. Louis, MO	<b>2018</b>
David Corbo, High School volunteer, Washington University in St. Louis, MO	<b>2017</b>
Sarah Shen, High School volunteer, Washington University in St. Louis, MO	<b>2014</b>
James Allen, Graduate Rotation Student (IMSD program), Washington University in St. Louis, MO	<b>2013</b>
Eileen Zho, Undergraduate, Vanderbilt University, Nashville, TN	<b>2012</b>
Paula Sicsu, Undergraduate, Universidad de Brasília, Brasília, DF- Brasil	<b>2010</b>
Evan Pulsipher, Undergraduate, Arizona State University, Tempe, AZ	<b>2010</b>
Connor Murphy, Undergraduate, Arizona State University, Tempe, AZ	<b>2010</b>
Dustin Skarupa, Undergraduate, Arizona State University, Tempe, AZ	<b>2009-2010</b>
Ciara Maize, Undergraduate, Arizona State University, Tempe, AZ	<b>2009</b>
Renee Matthey, Undergraduate, Arizona State University, Tempe, AZ	<b>2009</b>
Dane Klett, Undergraduate, Arizona State University, Tempe, AZ	<b>2008</b>
Robert Campion, Undergraduate, Arizona State University, Tempe, AZ	<b>2008</b>
Craig Lowthrop, Undergraduate, Arizona State University, Tempe, AZ	<b>2007-2008</b>

**Manuscript Peer Review**

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<i>Behavioral Ecology and Sociobiology</i>	<b>2017</b>
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<i>Biological Journal of the Linnaean Society</i>	2016
<i>Journal of Experimental Biology (2), Evolutionary Biology, Ibis, PLoSOne (3), Lipids</i>	2014
<i>Behavioral Ecology and Sociobiology, Biology Letters</i>	2013
<i>Journal of the Royal Society Interface, Journal of Comparative Physiology-A, Raptor Research, PLoS ONE (2), Brain, Behavior and Evolution</i>	2012
<i>Evolution, Behavioral Ecology and Sociobiology</i>	2011
<i>PLoS ONE, BMC Ecology, Journal of Ornithology, Behavioral Ecology and Sociobiology</i>	2010
<i>Evolution, Behavioral Ecology, Auk</i>	2009
<i>Journal of Molluscan Studies</i>	2008
<i>Biochemistry</i>	2007
<i>Proceedings of the Royal Society of London B.</i>	2006

## Conference organization

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**Iridescence: More than meets the eye**, February 6-9th, 2008, In conjunction with four graduate student colleagues, we secured funding for, and organized every detail of this first ever international conference on iridescence. Participants included biologists, physicists, and artists from more than 10 countries on 5 continents. Proceedings of the conference are featured in a special issue of the *Journal of the Royal Society Interface* (Available at <http://rsif.royalsocietypublishing.org/site/misc/iridescence.xhtml>)

## Outreach

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Organizer, <a href="#">Rooted in STEM</a> , Adams Elementary School St. Louis, MO A hands-on, experiential project, with grade 4-6 students which integrates computer programming and automation into school garden management.	2017
Organizer, <a href="#">Sun Patch Community Garden</a> . Provides a garden and educational resources for elementary school students and the Boys and Girls Club of St. Louis.	2015-Present
Public Speaking Engagements:	
Webster Groves Nature Study Society, Webster Groves, MO	2017
Forest Park Forever, Birding Basics Class, St. Louis, MO	2016
McDowell Sonoran Conservancy, Scottsdale, AZ	2008
Three Rivers Audubon Society, Gilbert, AZ	2007
Judge, Central Arizona Regional Science and Engineering Fair	2006
Field trip leader, Maricopa Audubon Society, Phoenix, AZ	2006
Panelist, Ask a Biologist Program, Arizona State University, Tempe, AZ	2006-2011
Volunteer, Beginner Bird Walk, Maricopa Audubon Society, Phoenix, AZ	2005-2006

## Service

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External reviewer, Animal Behavior Society, Student Grant Program	2017
Steering Committee, Carotenoid Interest Research Group, American Society for Nutrition	2013-2015
Graduate Student Research Seminar Organizer, School of Life Sciences, Arizona State University, Tempe, AZ	2006-2007
Grant reviewer, Graduate and Professional Students Association Research Grant Competition Arizona State University, Tempe, AZ	2008, 2010
Laboratory Safety Liaison, McGraw Lab, Arizona State University, Tempe, AZ	2006-2011
Department chair review committee member Department of Biology, University of Vermont, Burlington, VT	2000