

Matthew B. Toomey Ph.D.

Assistant Professor
Department of Biological Science
University of Tulsa
Tulsa, OK, 74104, USA
Email: mbt6332@utulsa.edu
Google Scholar: <https://scholar.google.com/citations?user=48aHD6IAAAAJ&hl=en>

Summary

I am an integrative biologist. My goal is to discover the physical, biochemical, and molecular mechanisms of trait expression and use this knowledge to understand the evolution and adaptive potential of animals. By integrating genomic, transcriptomic, chemical and molecular functional analyses, my work has revealed essential mechanisms of animal coloration and vision. I am a principal investigator supported by state and federal grants. I supervise trainees from the undergraduate to postdoctoral levels and maintain long-term international collaborations. I am a dedicated educator with classroom experience ranging from large enrollment introductory molecular and cellular biology courses to graduate level seminars in neuroscience and sensory biology.

Current Position

Assistant Professor of Biology Department of Biological Science University of Tulsa Tulsa, OK 74104	2019-present
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Postdoctoral Training

Research Fellow/Associate Lab of Dr. Joseph Corbo Washington University School of Medicine Department of Pathology and Immunology Saint Louis, MO 63110	2011- 2018
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Education

Ph.D. Biology, Arizona State University, Tempe, AZ College of Liberal Arts and Sciences, School of Life Sciences Thesis: "Avian Retinal Carotenoid Accumulation: Ecophysiological Constraints and Behavioral Consequences"	2011
B.S., Biology, University of Vermont, Burlington, VT College of Arts and Sciences, Department of Biology Graduated <i>Cum Laude</i> with College Honors	2002

Major: Biology, Minors: Chemistry & Physics

Preprints

Foster, T. N., A. G. Williamson*, B. R. Foster, and **M. B. Toomey** (2024). Light environment and seasonal variation in the visual system of the red shiner (*Cyprinella lutrensis*). *bioRxiv*. <https://doi.org/10.1101/2024.05.02.592238> *undergraduate co-author

Publications

Citation metrics: (via google scholar)

Total citations: 2197

h-index: 28

45. Koch, R. E., C. Okegbe, C. Ramanathan, X. Zhu, E. Hare, **M. B. Toomey***, G. E. Hill*, and Y. Zhang* (2024). Captivity affects mitochondrial aerobic respiration and carotenoid metabolism in the house finch (*Haemorrhous mexicanus*). *The Journal of experimental biology* 227, jeb246980 *equal contributions
44. Khalil, S., E. D. Enbody, C. Frankl-Vilches, J. F. Welklin, R. E. Koch, **M. B. Toomey**, S. Y. W. Sin, S. V. Edwards, M. Gahr, H. Schwabl, M. S. Webster, and J. Karubian (2023). Testosterone coordinates gene expression across different tissues to produce carotenoid-based red ornamentation. *Molecular biology and evolution*. 40, msad056
43. Buchheim, M. A., A. Silver, H. Johnson*, R. Portman, and **M. B. Toomey** (2023). The description of *Haematococcus privus* sp. nov. (Chlorophyceae, Chlamydomonadales) from North America. *Algae*. 38, 1-22 *TU undergraduate co-authors
42. **Toomey, M.B.**, Marques, C.A., Araújo, P.M. Huang, D., Zhong, S. Liu, Y. Schreiner, G.D., Myers, C.A., Pereira, P., Afonso, S., Andrade, P., Gazda, M.A., Lopes, R.J., Viegas, I., Koch, R.E., Haynes*, M.E., Smith*, D.J., Ogawa, Y., Murphy, D. Kopec, R.E., Parichy, D.M., Carniero, M., and Corbo, J.C. 2022. A mechanism for red coloration in vertebrates. *Current Biology*. 32, 4201-4214 *undergraduate co-authors
- Dispatch: [Evolution: The biochemistry of honest sexual signaling](#)
41. **Toomey, M.B.**, Smith, D.J.*, Gonzales, D.M.* and McGraw, K.J. 2022. Methods for extracting and analyzing carotenoids from bird feathers. *Methods in Enzymology*. 670, 459-497 *TU undergraduate co-authors
40. Huang, D., Lewis, V. M., Foster, T. N., **Toomey, M. B.**, Corbo, J. C. and Parichy, D. M. 2021. Development and genetics of red coloration in the zebrafish relative *Danio albolineatus*. *Elife* 10, e70253
39. **Toomey, M. B.** and Ronald, K. L. 2021. Avian color expression and perception: is there a carotenoid link? *J. Exp. Biol.* 224, jeb.203844

38. Gazda, M. A., P. M. Araújo, R. J. Lopes, **M. B. Toomey**, P. Andrade, S. Afonso, C. Marques, L. Nunes, P. Pereira, S. Trigo, G. E. Hill, J. C. Corbo, M. Carneiro 2020. A genetic mechanism for sexual dichromatism in birds. *Science* 368, 1270–1274.
- Perspective: [A gene for color differences between the sexes - Science](#)
37. Gazda*, M. A., **M. B. Toomey***, P. M. Araújo, R. J. Lopes, S. Afonso, C. A. Myers, K. Serres, P. D. Kiser, G. E. Hill, J. C. Corbo, and M. Carneiro 2020. Genetic Basis of De Novo Appearance of Carotenoid Ornamentation in Bare Parts of Canaries. *Mol. Biol. Evol.* 37, 1317–1328.
*contributed equally
36. Saunders, L. M., A. K. Mishra, A. J. Aman, V. M. Lewis, **M. B. Toomey**, J. S. Packer, X. Qiu, J. L. McFaline-Figueroa, J. C. Corbo, C. Trapnell, and D. M. Parichy 2019. Thyroid hormone regulates distinct paths to maturation in pigment cell lineages. *Elife* 8, e45181.
35. Koch, R.E., Staley, M., Kavazis, A.N., Hasselquist, D. **Toomey, M.B.** and Hill, G.E. 2019. Testing the resource trade-off hypothesis for carotenoid-based signal honesty using genetic variants of the domestic canary. *Journal of Experimental Biology*. 222. doi:10.1242/jeb.188102.
34. **Toomey***, **M.B.** Marques*, C.I., Adrade, P., Araujo, P.M., Sabtino, S. Gazda, M.A., Afonso, S., Lopes, R.J., Corbo, J.C. Carneiro, M. 2018. A non-coding region near *Follistatin* controls head colour polymorphism in the Gouldian finch. *Proceedings of the Royal Society B* 285: 20181788. *contributed equally
33. Giraudeau, M, **Toomey M.B.**, Hutton P, McGraw KJ 2018. Expression of and choice for condition-dependent carotenoid-based color in an urbanizing context. *Behavioral Ecology* 29(6):1307–1315.
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. Morshedean 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 A₁-to-A₂ 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 A₁ into A₂. *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 (*Zenaida 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

Submitted

Grant

pending review

United States National Science Foundation – pending review “Collaborative Research: Understanding the production of red carotenoid ornaments from organelle to organism”, \$859,046 to Toomey co-PI with Dr. Geoff Hill, Auburn University and Yufeng Zhang, University of Memphis

Funded

Interdisciplinary Project Grant

2022-present

University of Tulsa, Office of Research and Sponsored programs “Engineering enhanced astaxanthin production in *Haematococcus*”, \$17,326, co-PI with Dr. Mark Buchheim and Dr. Ty Johannes, University of Tulsa

Grant

2021-present

United States National Science Foundation - IOS 2037739 “Collaborative Research: Understanding the rules of honest signaling”, \$609,980 to Toomey co-PI with Dr. Geoff Hill, Auburn University and Yufeng Zhang, University of Memphis

Oklahoma Plant Science Research Grant

2020

Oklahoma Center for the Advancement of Science, “Bioprospecting Oklahoma's Algal Diversity for High Value Products.” (PS20-021) \$89,657 co-PI with Dr. Mark Buchheim, University of Tulsa

Postdoctoral Research Fellowship

2015

McDonnell Center for Cellular and Molecular Neurobiology
At Washington University in St. Louis, \$30,000

Postdoctoral Research Fellowship in Biology

2012

National Science Foundation

Intersections of Biology with Math and Physical Sciences (#DBI-1202776), \$123,000

Postdoctoral Training Fellowship 2011

National Institutes of Health, National Eye Institute, Vision Sciences Training Program
At Washington University in St. Louis, \$37,740

Doctoral Dissertation Improvement Grant 2009

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

Grant 2009

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

Grant in Aid of Research 2009

Society for Integrative and Comparative Biology, \$1,000

Student Research Grant 2007

Arizona State University, Graduate and Professional Student Association, \$1,600

Student Research Award 2007

American Ornithologist Union, \$1,800

Conference development grant 2007

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

Student Research Grant 2006

Animal Behavior Society, \$1,000

Grant-In-Aid-of-Research 2005

Sigma Xi, \$2,000

Undergraduate Research and Faculty Mentoring Grant 2002

University of Vermont with Dr. J. E. Marsden, \$3,000

Undergraduate summer research internship 2000

Vermont Experimental Program Stimulating Competitive Research (EPSCoR). \$5,000

Undergraduate Minigrant 1999

Hughes Endeavor for Life Science Excellence at the University of Vermont, \$500

Awards

Junior (faculty) Research Award, Oxley College of Health and Natural Sciences, 2024

University of Tulsa	
Fellow , International Carotenoid Society	2023
<i>“This Honorary recognition of members is bestowed for longstanding and consistent contributions.”</i>	
Outstanding Poster , Gordon Research Conference on Carotenoids	2016
Outstanding Poster , Gordon Research Conference on Carotenoids	2013
Graduate Research Fellowship , National Science Foundation, Honorable Mention	2006
University Graduate Scholar Award , Recruitment Award, Arizona State University	2005
George Perkins Marsh Award in Ecology and Evolution , Department of Biology College of Arts and Sciences, University of Vermont	2002
Vermont Scholar , University of Vermont	1998-2002

Invited Presentations

- Toomey, M.B.** 2023. The Mechanisms and Meaning of Ketocarotenoid-based Signals in Animals. The International Carotenoid Society, Distinguished Speakers Series
- Toomey, M.B.** 2020. Colorful canaries reveal the mechanisms of avian coloration. Science and Technology Seminar Series, Northeastern State University, Tahlequah, OK
- Toomey, M.B.** 2020. The shared chemistry of coloration and vision in birds. Department of Ecology and Evolution, University of Chicago, Chicago, IL
- Toomey, M.B.** 2019. The shared chemistry of coloration and vision in birds. Plenary Presentation, Sensorium 2019 Conference in Sensory Biology at the University of Illinois, Urbana-Champaign
- Toomey, M.B.** 2019 Colorful canaries unlock the mysteries of avian coloration and vision. STEM seminar Series, Tulsa Community College, Tulsa, OK
- Toomey, M.B.** 2019. Transcriptome profiling of avian cone photoreceptor subtypes reveals mechanisms of development and spectral tuning. Color Vision: Circuits and Behavior, Howard Hughes Medical Institute, Janelia Research Campus, Ashburn, VA
- Toomey, M.B.** 2018. Evolutionary co-option of carotenoid metabolic pathways from the visual system underlie avian color diversification. Gordon research conference: Carotenoids. Sunday River, ME
- Toomey, M.B.** A pigment's-eye view of visual ecology: understanding functional adaptation through carotenoid metabolism.
 2018: Department of Biological Sciences, Florida International University, Miami, FL
 Department of Biological Sciences, Loyola University, New Orleans, LA
 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

US Government Reports

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

Instructor of Record, University of Tulsa, Tulsa, OK, USA

Introduction to Cell and Molecular Biology (2 sections, 132 total students)

Principles of Neuroscience (45 students)

Graduate Seminar - Data Science for Biology (11 students)

Introduction to Cell and Molecular Biology (2 sections, 122 total students)

Sensory Biology (20 students)

Principles of Neuroscience (45 students)

Introduction to Cell and Molecular Biology (2 sections, 124 total students)

Graduate Seminar in Sensory Biology (9 students)

Spring 2023

Fall 2022

Fall 2022

Spring 2022

Fall 2021

Fall 2021

Spring 2021

Fall 2020

<i>Principles of Neuroscience</i> (37 students)	Fall 2020
<i>Introduction to Cell and Molecular Biology</i> (2 sections, 178 total students)	Spring 2020
<i>Principles of Neuroscience</i> (30 students)	Fall 2019
<i>Introduction to Cell and Molecular Biology</i> (co-taught, 2 sections, 143 total students)	Spring 2019
Graduate Fellowship Workshop Leader, Washington University, St. Louis, MO, USA	2014
Graduate Teaching Assistant, Arizona State University, Tempe, AZ, USA	
<i>Vertebrate Zoology</i>	2009
<i>Human Anatomy & Physiology</i>	2007-2008
<i>Introductory Biology</i>	2005

Pedagogical training

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

Graduate Committee Member

University of Tulsa, USA:

- Margaret Wagnon (M.S. student)
- Vivek Khanal (Ph.D. student)
- Alexander Hess (Ph.D. student)
- Madison Herrboldt (Ph.D. student)
- Amy West (Ph.D. student)
- Emily Ademic (Ph.D. student)
- Emily Bierbaum (Ph.D. student)
- Connor Ferguson (M.S. student)
- Rebekah Hansen (M.S. student)
- Tanner Mierow (Ph.D. student)
- Prasad Parab (Ph.D. student – Chemical Engineering)

Mentoring

Post-doctoral

Dr. Rebecca Koch	current
Postdoctoral research assistant on the NSF funds project IOS 2037739 - “Understanding the rules of honest signaling”	

Graduate

Hannah Reeb Master's Student, University of Tulsa, OK "Co-advised with Dr. Charles Brown, University of Tulsa	Current
Ashely B. Silver Master's Student, University of Tulsa, OK "Phylogenetic and biochemical diversity in <i>Haematococcus</i> algae" Co-advised with Dr. Mark Buchheim, University of Tulsa	2024
Tarah N. Foster Master's Student, University of Tulsa, OK "Visual ecology and plasticity in native Oklahoma fish species"	2022
Tulsa Undergraduate Research Challenge – 2-month full-time summer research program	
Elizabeth Scheer Undergraduate, University of Tulsa, OK "Functional characterization of carotenoid metabolizing enzymes in northern cardinal"	2024
Nathan Reed Undergraduate, University of Tulsa, OK "Functional characterization of carotenoid metabolizing enzymes in American goldfinch"	2024
Brian Nguyen Undergraduate, University of Tulsa, OK "Functional of ABC transporters in carotenoid-based color expression"	2024
Akshaya Pradhananga (TURC Junior) Highschool Student, Booker T. Washington High School, Tulsa, OK	2024
Hannah Reeb Undergraduate, University of Tulsa, OK "Evolution of an animal signal in relation to group size"	2023
Sarah Mason (TURC Junior) Highschool Student, Bixby Highschool "Investigating the role of transthyretin in avian color expression"	2023
Christy Truong Undergraduate, University of Tulsa, OK "Subcellular localization of color modifying enzymes in birds"	2022
Desirae Gonzales Undergraduate, University of Tulsa, OK "Ecology of visual pigment composition in <i>Lepomis</i> "	2021
Dustin Smith Undergraduate, University of Tulsa, OK "The role of Tetratricopeptide Repeat Domain 39B in the expression of carotenoid-based coloration"	2021

Honors Thesis

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

Independent projects

Hannah Reeb **2022-23**
 Undergraduate, University of Tulsa, Tulsa, OK
 "The Evolution of Animal Signals in Relation to Group Size"

Meadow Hansen-Gonzalez **2020-21**
 Undergraduate, STEM-UP program, University of Tulsa, Tulsa, OK
 "The role of ATP Binding Cassette Subfamily G Member 4 in the expression of carotenoid-based coloration"

Maureen Haynes **2019**
 Undergraduate, University of Tulsa, OK
 "Characterizing the metabolic pathway from yellow to red carotenoids in the avian visual system"

Malgorzata Gazda **2017**
 Visiting Graduate Student, Universidade do Porto, Portugal
 "The *cis*-regulation of β -carotene oxygenase expression and avian color variation"

Allison Loynd **2016**
 Undergraduate, Brown University, Providence, RI
 "Mechanisms of retinoid metabolism in the visual system of the sea lamprey"

Vineeth Thirunavu **2016**
 Undergraduate, Washington University, St. Louis, MO
 "The function of GSTA3 in avian retinal carotenoid metabolism"

Henry Lather **2013**
 Undergraduate, Washington University, St. Louis, MO
 "The Selective Elimination of Avian Photoreceptor Populations"

Amanda G. Elmore **2011-2013**
 Undergraduate Purdue University, West Lafayette, IN
 "The sensory basis of individual variation in color vision: a case study with house finches"

Hirbod Behbahaninia **2010-2011**
 Undergraduate, Arizona State University, Tempe, AZ
 "An experimental test of the effect of seed color contrast on food preferences of house finches."

Chelsie K. Daniel **2009-2010**

Undergraduate, Arizona State University, Tempe, AZ
 “Seasonal and quality related variation in circulating antibody levels in the house finch (*Carpodacus mexicanus*).”

Jon Miller 2009
 Arizona Science Teacher Advancement and Research Training program “The relationship between sex, plumage coloration, and grooming behavior in the house finch (*Carpodacus mexicanus*)”
 Program details: <http://www.biochem.arizona.edu/az-start/partners.htm>

Research interns

Mariah Moreland, Undergraduate, University of Tulsa, Tulsa, OK	2023
Olivia Knight, Undergraduate, University of Tulsa, Tulsa, OK	2022
Christy Truong, Undergraduate, University of Tulsa, Tulsa, OK	2022
Desirae Gonzales, Undergraduate, University of Tulsa, Tulsa, OK	2021-23
Brooke Joski, Undergraduate, University of Tulsa, Tulsa, OK	2021-23
Alyssa Williamson, Undergraduate, University of Tulsa, Tulsa, OK	2020-22
Ethan Chandler, Undergraduate, University of Tulsa, Tulsa, OK	2019
Meadow Hansen-Gonzalez, Undergraduate, University of Tulsa, Tulsa, OK University of Tulsa, STEM-UP program	2019-22
Dustin Smith, Undergraduate, University of Tulsa, Tulsa, OK	2019-22
Sabrina Ho, Undergraduate, Washington University, St. Louis, MO	2018
David Corbo, High School volunteer, Washington University in St. Louis, MO	2017
Sarah Shen, High School volunteer, Washington University in St. Louis, MO	2014
James Allen, Graduate Rotation Student (IMSD program), Washington University in St. Louis, MO	2013
Eileen Zho, Undergraduate, Vanderbilt University, Nashville, TN	2012
Paula Sicsu, Undergraduate, Universidad de Brasilia, Brasilia, DF- Brasil	2010
Evan Pulsipher, Undergraduate, Arizona State University, Tempe, AZ	2010
Connor Murphy, Undergraduate, Arizona State University, Tempe, AZ	2010
Dustin Skarupa, Undergraduate, Arizona State University, Tempe, AZ	2009-2010
Ciara Maize, Undergraduate, Arizona State University, Tempe, AZ	2009
Renee Matthey, Undergraduate, Arizona State University, Tempe, AZ	2009
Dane Klett, Undergraduate, Arizona State University, Tempe, AZ	2008
Robert Campion, Undergraduate, Arizona State University, Tempe, AZ	2008
Craig Lowthrop, Undergraduate, Arizona State University, Tempe, AZ	2007-2008

Visiting Researchers Hosted

Bethany Williams October 2021
 PhD candidate at the Ohio State University in the lab of Dr. Suzanne Gray
 Visited to analyze carotenoid pigmentation of *Pseudocrenilabrus multicolor* samples
 Supported by a Company of Biologists Travel Fellowship

Manuscript Peer Review

Biology Letters, Communications Biology, PNAS Nexus, Journal of Experimental Biology 2024

<i>Comparative Biochemistry and Physiology, Part B</i>	
<i>Ornithology, Developmental Cell, Frontiers in Ecology and Evolution, Communications Biology</i>	2023
<i>Behavioral Ecology and Sociobiology, Animal Behavior, Behavioral Processes, Developmental Cell, Evolution</i>	2022
<i>Current Biology, Scientific Reports, Bulletin of the British Ornithologists' Club, American Naturalist, Zoomorphology,</i>	2021
<i>Plos One, Vision Research, Journal of Experimental Biology, Biology Open, Electronic Journal of Biotechnology, Molecular Ecology</i>	2020
<i>PLoS One (2), Proceedings of the Royal Society of London B., Journal of Experimental Biology, Behavioral Processes, Molecular Genetics & Genomics, Journal of the Royal Society Interface</i>	2019
<i>Biochemical Genetics</i>	2018
<i>Behavioral Ecology and Sociobiology</i>	2017
<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

Grant Peer Review

Austrian Science Fund (FWF), External reviewer	2022
National Science Foundation, Division of Environmental Biology, <i>Ad hoc</i> reviewer	2022
National Science Foundation, Integrative Research in Biology (IntBIO) Program, <i>Ad hoc</i> reviewer	2022
National Science Foundation, Integrative Ecological Physiology (IEP), Panelist	2022
Graduate Women In Science (GWIS), National Fellowship Competition, External reviewer	2020
Animal Behavior Society, Student Grant Program, External reviewer	2017