

AMANDA K. POWERS*, Ph.D.

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*née Krutzler

EDUCATION & TRAINING

- 2025-present *Xavier University*, Cincinnati, OH, Assistant Professor (Biology)
- 2023-2024 *Harvard Medical School / University of Cincinnati*, Postdoctoral Fellow
- 2018-2023 *Harvard Medical School Blavatnik Institute*, Boston, MA, Postdoctoral Fellow in Genetics
- 2013-2018 *University of Cincinnati*, Cincinnati, OH, Ph.D. Biological Sciences
- 2011-2013 *University of Cincinnati*, Cincinnati, OH, Research Technician
- 2011 *Xavier University*, Cincinnati, OH, B.S. Biology

RESEARCH INTERESTS

Quantitative and Molecular Genetics; Evolution and Development; Functional Morphology

PEER-REVIEWED PUBLICATIONS

- 2025 **Powers AK**, A Amaismeier, K Thiel, W Anyonge, S McGaugh, T Boggs, CJ Tabin, and JB Gross "Genetic mapping of orofacial traits reveals a single genomic region associated with differences in multiple parameters of jaw size between *Astyanax mexicanus* surface and cavefish." *Evolution & Development in press*
- 2024 Beck A, H Grunwald, R Moran, R Rodriguez-Morales, **AK Powers**, S McGaugh, and JE Kowalko "Defining the unseen: Population-specific markers for *A. mexicanus* blind cavefish" *Zebrafish* <https://doi.org/10.1089/zeb.2023.0105>
- 2023 **Powers AK**, C Hyacinthe, M Riddle, YK Kim, A Amaismeier, K Theil, B Martineau, E Ferrante, R Moran, S McGaugh, T Boggs, JB Gross, and CJ Tabin "Genetic mapping of craniofacial traits in the Mexican tetra reveals loci associated with bite differences between cave and surface fish." *BMC Ecology and Evolution*. 23:41. <https://doi.org/10.1186/s12862-023-02149-3>
- 2022 Gross JB and **AK Powers** "Reinterpreting the work of Charles Breder: Sensory neuromasts and orbital skeleton variation in *Astyanax* cavefish." *Developmental Biology* doi.org/10.1016/j.ydbio.2022.11.004
- 2020 **Powers AK**, DJ Berning, and JB Gross "Parallel evolution of constructive craniofacial traits across distinct populations of *Astyanax mexicanus* cavefish" *Journal of Experimental Zoology: Part B Molecular and Developmental Evolution*. 334:450-462. doi.org/10.1002/jez.b.22932
- 2019 **Powers AK**, CA Garita-Alvarado, R Rodiles-Hernández, DJ Berning, JB Gross and CP Ornelas-García "A geographical cline in craniofacial morphology across populations of Mesoamerican lake-dwelling fishes." *Journal of Experimental Zoology: Part A Ecological and Integrative Physiology*. 333:171-180. doi.org/10.1002/jez.2339
- 2018 Gross JB and **AK Powers** "A natural animal model system of craniofacial anomalies: the blind Mexican cavefish." *The Anatomical Record* 303:24-29. doi.org/10.1002/ar.23998

Powers AK, SA Kaplan, TE Boggs and JB Gross “Facial bone fragmentation in blind cavefish arises through two unusual ossification processes.” *Scientific Reports* 8:7015.
<https://www.nature.com/articles/s41598-018-25107-2>

Powers AK, TE Boggs, and JB Gross “Canal neuromast position prefigures developmental patterning of the suborbital bone series in *Astyanax* cave- and surface-dwelling fish.” *Developmental Biology* 441:252-261.
doi.org/10.1016/j.ydbio.2018.04.001

2017 **Powers AK**, EM Davis, SA Kaplan* and JB Gross “Cranial asymmetry arises later in the life history of the blind Mexican cavefish, *Astyanax mexicanus*.” *PLoS ONE* 12(5): e0177419.
doi.org/10.1371/journal.pone.0177419

Powers AK “Digest: Old World lizards give rise to ‘young’ lizard skulls.” *Evolution* 71(4):1116-1117.
doi.org/10.1111/evo.13224

Lyon A, **AK Powers**, JB Gross, and KE O’Quin “Three loci control scleral ossification in blind *Astyanax mexicanus* cavefish.” *PLoS ONE* 12(3): e0171061.
doi.org/10.1371/journal.pone.0171061

2016 Gross, JB, A Gangidine and **AK Powers** “Asymmetric facial bone fragmentation mirrors asymmetric distribution of cranial neuromasts in blind Mexican cavefish.” *Symmetry* 8:118.
doi.org/10.3390/sym8110118

Gross JB, **AK Powers**, EM Davis and SA Kaplan “A pleiotropic interaction links vision loss to hypermelanism in *Astyanax mexicanus* cave x surface hybrids.” *BMC Evolutionary Biology* 16:145.
doi.org/10.1186/s12862-016-0716-y

2015 Gross JB, BA Stahl, **AK Powers**, and BM Carlson “Natural bone fragmentation in the blind cave-dwelling fish: Candidate gene identification through integrative comparative genomics.” *Evolution & Development* 18:7-18.
doi.org/10.1111/ede.12131

Gross JB and **AK Powers** “The evolution of the cavefish craniofacial complex.” *Biology and Evolution of the Mexican Cavefish*. In: Keene A, Yoshizawa M, and McGaugh S, editors. San Diego, Elsevier. 193-207.

2014 Gross JB, **AJ Krutzler (now AK Powers)**, and BM Carlson “Complex craniofacial changes in blind cave-dwelling fish are mediated by genetically symmetric and asymmetric loci.” *Genetics* 196:1303-1319.
doi.org/10.1534/genetics.114.161661

MANUSCRIPTS IN PREPARATION

2025 Noga A, W Anyonge, and **AK Powers*** “Geometric morphometric analysis reveals cranial shape divergence and asymmetry in extinct and extant species of big cats (Carnivora: Felidae).” *Author for correspondence
<https://www.biorxiv.org/content/10.1101/2022.05.20.492788v1>

Lee CH, Oh S, Serowoky M, Camacho J, **Powers AK**, Tomizawa R, Mariani F, Kirschner MW, and Tabin CJ “Dissecting the steps of chondrocyte hypertrophy through Raman microscopy and scRNA-seq.” *in preparation for submission*

RESEARCH FUNDING

2019 *Ruth L. Kirschstein National Research Service Award (NRSA) Individual Fellowship*, NIH (NIAMS); Department of Genetics, Blavatnik Institute at Harvard Medical School. Award Number 1F32AR076187-01. July 2019-2021. Project title: Investigating modes of cartilage cell size regulation and fate during endochondral ossification.

- 2017 *GSGA Group Grant* (with Ben Merritt), University of Cincinnati, Graduate Student Government Association. "Traditional and Alternative Careers in Biology" professional development series.
- University Research Council (URC) Fellowship*, University of Cincinnati, Cincinnati, OH.
- Student Research Grant-In-Aid (GIAR)*, UC Chapter of Sigma Xi.
- GSGA Research Fellowship*, University of Cincinnati, Cincinnati, OH.
- 2016 *Fellowship for Doctoral Students Aspiring to Academic Careers*, University of Cincinnati Graduate School Fellows, Cincinnati, OH.
- 2014 *Wieman-Benedict Research Award*. University of Cincinnati, Department of Biological Sciences 2014-2017.
- 2010 *Summer Undergraduate Research Fellowship*, Xavier University, Cincinnati, OH.

ACADEMIC AWARDS & HONORS

- 2019 *Karel F. Liem Award for Outstanding Poster Presentation*, Division of Vertebrate Morphology, Society for Integrative and Comparative Biology, Tampa, FL.
- 2018 *Presidential Medal of Graduate Student Excellence*, Finalist, University of Cincinnati. Cincinnati, OH.
- 2017 *J. Robie Vestal Award for Outstanding Doctoral Student*, Department of Biological Sciences, University of Cincinnati. Cincinnati, OH.
- Best Student Talk Award*, *Astyanax* International Meeting (AIM), Querétaro, Mexico.
- Student Travel Award*, *Astyanax* International Meeting (AIM), Querétaro, Mexico.
- D. Dwight Davis Award for Best Oral Presentation*, Division of Vertebrate Morphology, Society for Integrative and Comparative Biology (SICB), New Orleans, LA.
- 2016 *GSGA Travel Award*, Graduate Student Government Association, University of Cincinnati, Cincinnati, OH.
- Den & Sheilah Roenfeldt Travel Fellowship*, International Conference on Subterranean Biology, Fayetteville, AK.
- 2015 *1st Place Poster Award*, Fourth Annual Craniofacial Research Symposium, Cincinnati Children's Hospital Medical Center, Cincinnati, OH.
- 2012 *Sigma Xi (UC Chapter) award for outstanding research poster*, University of Cincinnati, Cincinnati, OH.

MEDIA AND POPULAR PRESS

- 2020 **Powers, AK** and JB Gross. Selected Cover Image: Cavefish Special Issue. *JEZ-B: Molecular and Developmental Evolution* 334 (12/11/2020).
- 2019 Pennisi, E "A lopsided face helps this eyeless cave fish navigate" *Science* doi:[10.1126/science.aaw5465](https://doi.org/10.1126/science.aaw5465). Photo credit: **Amanda Powers**/Joshua Gross
- 2018 **Powers, AK** and JB Gross. Selected Cover Image: Special Issue on Cavefish Development. *Developmental Biology* 441 (2018).
- 2017 **Powers, AK** "How do blind cavefish find their way?" *Science* 360 Picture of the day (5/30/2017). Featured Research and Images by Michael Miller "How do blind cavefish find their way? A UC study suggests it's all in their bones" *UC Magazine* (also featured in *Science Daily*, *New Atlas*, and *Science Times*).

<https://www.sciencedaily.com/releases/2017/05/170524191558.htm>

- 2016 Pennisi, E “Antisocial cave fish may hold clues to schizophrenia, autism” *Science* Doi:10.1126. Photo credit: **Amanda Powers**/Joshua Gross
<https://www.science.org/content/article/antisocial-cave-fish-may-hold-clues-schizophrenia-autism>

Pennisi, E “Blind cave fish may provide insights into human health” *Science* 352(6293):1502-1503.
Photo credit: **Amanda Powers**/Joshua Gross
<https://www.science.org/doi/10.1126/science.352.6293.1502>

AK Powers and JB Gross “Blind cavefish neuromasts” *NIH Funded Research Winning Image* (National Institute of Dental and Craniofacial Research)

Featured Research and Images by Elissa Yancey “Extra sensory perceptions: UC researchers study small systems to make big advances” *UC Magazine*.
https://magazine.uc.edu/editors_picks/recent_features/sensory.html

- 2014 Fuller, D “High-tech examination of a cave-dwelling fish finds possible genetic link to human Disorders” *Phys.org, Science Daily, Science CODEX, and UC.edu*. Video and photo credit: **Amanda Krutzler (Powers)**

TEACHING EXPERIENCE

- 2021 *Developmental Biology (Lecture: Neural Crest)* University of Massachusetts – Boston, Boston, MA
- 2019-2023 *Craniofacial Development and Genetics (Lecture: Tooth Development)* Harvard School of Dental Medicine, Boston, MA
- 2014-2015 *Genetics /Cell Structure and Function Laboratory Instructor* University of Cincinnati, Cincinnati, OH (BIOL2081C)
- 2014 *General Biology I Laboratory Instructor* University of Cincinnati, Cincinnati, OH (BIOL1081)

ORAL PRESENTATIONS

- 2022 **Powers AK**, A Amaismeier, W Anyonge, and CJ Tabin “The evolution of jaw size differences in cavefish” *Northeastern Society for Developmental Biology regional meeting*, Woods Hole, MA.
- Powers AK**, A Amaismeier, W Anyonge, and CJ Tabin “The genetic basis underlying jaw size differences in cavefish” *Astyanax International Meeting*, San Antonio, TX.
- Powers AK**, A Amaismeier, W Anyonge, and CJ Tabin “Candidate genes for evolved changes in tooth and jaw traits co-localize on the cavefish genome” *Society for Integrative and Comparative Biology (SICB)*, Phoenix, AZ.
- 2021 **Powers AK** and CJ Tabin “The genetic basis of orofacial features in cavefish” *Society for Integrative and Comparative Biology (SICB)*, Virtual Meeting.
- 2019 **Powers AK** and CJ Tabin “The evolution of orofacial features in blind cavefish” NE Regional Meeting of the *Society for Integrative and Comparative Biology (SICB)*, Boston College, Boston, MA.
- Powers AK**, C Garita-Alvarado, R Rodiles, DJ Berning, JB Gross and CP Ornelas-García “Cranial plasticity in lake-dwelling *Astyanax* morphotypes corresponds to feeding preference” *Astyanax International Meeting* Queretaro, Mexico.
- Powers AK**, TE Boggs, SA Kaplan, EM Davis and JB Gross “Sensory-skeletal integration and cranial asymmetry in cavefish” *Astyanax International Meeting* Queretaro, Mexico.

Powers AK, DJ Berning, A Manning, N Nzobigeza and JB Gross “Sensing in the dark: asymmetrical skulls may help blind cavefish find their way” *Society for Integrative and Comparative Biology (SICB)*, Tampa, FL. *Session Chair

2018 **Powers AK**, SA Kaplan, TE Boggs and JB Gross “Two unusual mechanisms explain cranial bone fragmentation in cavefish” *Society for Integrative and Comparative Biology (SICB)*, San Francisco, CA. *Selected abstract for Best Student Oral Presentation Symposium (DEB Division)

2017 **Powers, AK**, SA Kaplan, TE Boggs, and JB Gross “Unusual ossification processes mediate the development of the cavefish skull” *Society for Craniofacial Genetics and Developmental Biology (SCGDB)*, Minneapolis, Minnesota. *Selected abstract invited for oral presentation.

Powers, AK, EM Davis, SA, Kaplan, TE Boggs and JB Gross “The evolution of craniofacial changes in the blind Mexican cavefish” *Evolution*, Portland, OR.

Powers, AK, EM Davis, SA Kaplan, and JB Gross “Cranial asymmetry manifests later in the life history of the blind Mexican cavefish, *Astyanax mexicanus*” *Midwest Ecology and Evolution Conference (MEEC)*, University of Illinois, Champaign, IL.

Powers, AK, EM Davis, SA Kaplan, and JB Gross “The evolution of cranial asymmetry across the life history of the blind Mexican cavefish” *Astyanax International Meeting*, Querétaro, Mexico.

Powers, AK, SA Kaplan, and JB Gross “The developmental basis of cranial bone fragmentation in the blind Mexican cavefish” *Society for Integrative and Comparative Biology (SICB)*, New Orleans, LA. *Selected abstract for Best Student Oral Presentation Symposium (DVM Division)

2016 **Powers, AK**, EM Davis, SA Kaplan, and JB Gross “The evolution of craniofacial shape change in the blind Mexican cavefish” *International Conference on Subterranean Biology (ICSB)*, Fayetteville, AK. June 2016.

Powers, AK “The evolution of craniofacial changes in the blind Mexican cavefish” *Invited Lecture*, The College of Wooster, Wooster, OH. November 2015-2017

2015 **Powers, AK** “Connecting sensory neuromast expansion and suborbital bone fragmentation” *Astyanax International Meeting*, Querétaro, Mexico. October 2015.

2014 **Krutzler, AJ** and JB Gross “Comparative genomic analyses reveal candidate craniofacial loci in a cavefish model system” *KOI Zebrafish Meeting*, Cincinnati Children’s Hospital, Cincinnati, OH. March 2014.

POSTER PRESENTATIONS

2017 **Powers, AK**, SA Kaplan, T Boggs, and JB Gross “Unusual ossification processes mediate the development of the cavefish skull” *Society for Developmental Biology (SDB)*, Minneapolis, MN.

Powers, AK, EM Davis, SA Kaplan, and JB Gross “Cranial asymmetry manifests later in the life history of the blind Mexican cavefish, *Astyanax mexicanus*” *UC Graduate Poster Expo*, Cincinnati, OH.

2016 **Powers, AK**, SA Kaplan, EM Davis and JB Gross “Cranial asymmetry manifests later in the life history of the blind Mexican cavefish, *Astyanax mexicanus*.” *Society for Craniofacial Genetics and Developmental Biology (SCGDB)*, Boston Children’s Hospital, Boston, MA.

2015 **Powers AK**, SA Kaplan, EM Davis and JB Gross “An analysis of craniofacial symmetry across development and adulthood in blind cavefish” *Craniofacial Research Symposium*, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH.

Krutzler AJ, SA Kaplan, and JB Gross “The evolution of cranial asymmetry and shape variation in the blind Mexican cavefish” *Graduate Student Research Symposium*, University of Cincinnati, Cincinnati, OH.

2014 **Krutzler AJ**, BM Carlson, BA Stahl, TS Slater and JB Gross “Genome-level analyses suggest putative roles for *tgfb3* and *bmp4* in the evolution of craniofacial abnormalities in blind, cave-dwelling fish” *Midwest*

Ecology and Evolution Conference (MEEC), University of Dayton, Dayton, OH.

Krutzler AJ, BM Carlson, BA Stahl, TS Slater and JB Gross “Genetic and transcriptomic analyses reveal two candidate genes associated with dermal bone fragmentation in a natural model system” *Graduate Student Research Symposium*, University of Cincinnati, Cincinnati, OH.

Krutzler AJ, BM Carlson, BA Stahl, TS Slater and JB Gross “Genetic and transcriptomic analyses reveal two candidate genes associated with dermal bone fragmentation in a natural model system” *Cincinnati Children’s Hospital Craniofacial Symposium*, Cincinnati, OH.

2013 **Krutzler AJ**, BM Carlson, JB Gross, “Complex craniofacial changes in blind cave-dwelling fish are mediated by genetically symmetric and asymmetric loci.” *Society for Craniofacial Genetics and Developmental Biology*, Harvard Medical School, Boston, MA.

Krutzler AJ, LE Bruns, JB Gross. “Fragmentation, fusion and asymmetry in the craniofacial skeleton of *Astyanax mexicanus*.” *Astyanax International Meeting*, Ciudad Valles, Mexico.

INVITED SEMINARS

2020 Department of Biology Undergraduate Seminar Series, The College of Wooster, Wooster, OH.

STUDENT MENTORSHIP

Brooke Blackburn, Undergraduate researcher, University of Cincinnati, 2024.

Kathryn Thiel, Undergraduate researcher, Xavier University, 2022-2023.

Nicole, Zhang, Undergraduate student, Harvard University, 2022.

Young Kwang Kim, Dental Student researcher, Harvard School of Dental Medicine, 2021-2023.

Alleigh Amaismeier, Undergraduate researcher, Xavier University (virtual), 2021-2022.

Aidan Noga, Undergraduate researcher, Xavier University (virtual), 2021-2022.

Amy Manning, Undergraduate researcher, University of Cincinnati, 2017-2018.

Heidi Luc, Undergraduate STEM fellow, University of Cincinnati, 2017-2018.

Mia Burris, Undergraduate researcher Biology/Engineering, University of Cincinnati, 2017-2018.

Vivian Varghese, Undergraduate researcher, University of Cincinnati, 2016-2017.

Tyler Boggs, Undergraduate researcher, University of Cincinnati. 2016-2017.

Marianne Robison, Undergraduate researcher, University of Cincinnati. 2016-2017.

Stephanie Hacker, REU (NSF) visiting student, University of Kentucky. Summer 2016.

Teresa Rust, Undergraduate WISE researcher, University of Cincinnati. Summer 2016.

Shane Kaplan, Undergraduate STEM fellow, University of Cincinnati. 2015-2018.

Jenny Sung, REU (NSF) visiting student, Berry College. Summer 2015.

Rachel Schafer, Undergraduate summer technician from Kenyon College. Summer 2015.

Jane Rosenthal, Undergraduate volunteer, University of Cincinnati. 2015-2016.

Erin Davis, Undergraduate researcher, University of Cincinnati. 2014-2016.

Tiffany Slater, Undergraduate researcher, University of Cincinnati. 2013-2014.

Lauren Bruns, Undergraduate researcher, University of Cincinnati. 2012-2013.

RELEVANT COURSEWORK

Harvard University

Leaders of Learning (Spring 2020)

Introduction to R (Harvard Chan Bioinformatics Core; Spring 2020)

University of Pennsylvania, School of Dental Medicine

Introduction to Dental Medicine (Spring 2020)

University of Cincinnati

Genetics of Adaptation (Fall 2016)

NCBI Gene Expression Analysis Webinar (Fall 2016)

Contemporary Genomic Analysis (Fall 2014)

Developmental Biology (Fall 2013)

Data Analysis (Spring 2012)

Molecular biology (Fall 2011)

Evolution (Fall 2011)
University of Manchester, Manchester, England
Analysis of Organismal Form (Fall 2014)

PROFESSIONAL ORGANIZATIONS

Harvard Medical Postdoc Association (HMPA)
Outreach committee member 2021-2023
Journal of Experimental Zoology Part A: Ecological and Integrative Physiology
Jr. Editorial Board Member 2018-2024
Biology Graduate Student Association (BGSA)
President 2015-2016
Vice President 2014-2015
Faculty Representative 2016-2017
Greater Cincinnati Chapter of Association for Women in Science (AWIS)
Society for Craniofacial Genetics and Developmental Biology (SCGDB)
Society for Developmental Biology (SDB)
Society for Integrative and Comparative Biology (SICB)
Cincinnati Chapter of Sigma Xi, Associate Member

MANUSCRIPT REVIEWER

Biological Journal of the Linnean Society
Cells & Development
PLoS ONE
Biology Letters
Developmental Biology
Environmental Biology of Fishes
Zoological Research

SERVICE

"Project Success" High school scientific outreach, Harvard Medical School, July 2021.
"Skype-a-scientist" Scientific Outreach, 2020-22.
UC Distinguished Research Professor in STEM Committee Member, December 2017.
Poster Presentation Judge. Division of Vertebrate Morphology, SICB, January 2017.
Biology Alumni Outreach Event. UC Department of Biological Sciences, October 2016.
Faculty Search Committee. UC Department of Biological Sciences, 2016.
Dater Montessori School Scientific Outreach. November 2014.
Women in Science and Engineering (WISE) Graduate Student Panel. 2014-16.
Indian Hill Jr. High School Scientific Outreach. Cincinnati, OH. Spring 2017.
UC/Hughes High School Scientific Outreach. Cincinnati, OH. Spring 2014-24.
Mariemont Elementary and Jr. High Scientific Outreach. Cincinnati, OH. Spring 2014-25.
Boys and Girls Club of Greater Cincinnati Volunteer. 2012-2013.
St. Ursula Villa Preschool Scientific Outreach. Cincinnati, OH. Spring 2025.