

ALYSSA Y. STARK

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PROFESSIONAL POSITIONS

- 2017-pres. **Assistant Professor**, Department of Biology, Villanova University, PA
- 2014-2017 **Postdoctoral Associate**, Department of Biology, University of Louisville, KY
Advisor:
- Dr. Stephen P. Yanoviak, Department of Biology
- 2013-14 **Project Manager**, Biomimicry Research and Innovation Center, University of Akron, OH
Advisors:
- Thomas N. Tyrrell, CEO & Funder, Great Lakes Biomimicry
 - Don Knechtges, VP & Director of Economic Development, Great Lakes Biomimicry
- 2008-13 **Teaching Assistant**, Department of Biology, University of Akron, OH

EDUCATION

- 2014 **Ph. D. Integrated Bioscience**, University of Akron, OH
Dissertation: *The effect of water on the gecko adhesive system*
Advisors:
- Dr. Peter H. Niewiarowski, Department of Biology
 - Dr. Ali Dhinojwala, Department of Polymer Science
- 2006 **B. S. Animal Biology (specialization: Animal Behavior)**, University of California, Davis, CA
Senior Thesis: *Behavioral study of California sea lions (*Zalophus californianus*) suffering from the effects of domoic acid toxicity*
Advisor:
- Dr. Brenda McCowan, School of Veterinary Medicine & California National Primate Research Center
- Collaboration: The Marine Mammal Center, Sausalito, CA
- 2005 **ARAD. Associate of the Royal Academy of Dance**, The Royal Academy of Dance, UK
Advanced II Professional Examination in Ballet
- 2004 **A. A. Associates Degree**, Santa Rosa Junior College, Santa Rosa, CA

CONSULTING

- 2017-pres. **Biomimicry Subject Matter Expert**, ORC International Inc.
- 2015 **Biologist**, Biomimicry Global Design Challenge, The Biomimicry Institute

AFFILIATIONS

The Adhesion Society; Society for Integrative and Comparative Biology; Sigma Xi; The Biomimicry Network; The Royal Academy of Dance

AWARDS

- 2020 **Carl Gans Award**, The Society for Integrative and Comparative Biology and the Division of Comparative Biomechanics. *In recognition of an outstanding young investigator for distinguished contributions to the field of comparative biomechanics.* \$1,000
- 2018 **Early Career Scientist Award**, The Adhesion Society, sponsored by the Adhesive and Sealant Council, Inc. *For fundamental contributions and groundbreaking research on biological adhesion.* \$1,000
- 2014 **Peebles Award for Research in Adhesion Science**, The Adhesion Society. \$750
- 2014 **Alan Gent Distinguished Student Paper Award**, The Adhesion Society. \$500

FUNDING

Pending

External

- 2020 **NSF Discovery Research K-12, Division Of Research On Learning #2101566.** *Making inspired by nature²: a platform for teaching engineering design through maker-centered learning and biomimicry.* With D. Williams (University of Louisiana, Lafayette, LA), A. Barber, (University of Louisiana, Lafayette, LA), P. Sheppard (University of Louisiana, Lafayette, LA). \$90,559 to Stark; \$1,510,727 to University of Louisiana, Lafayette, LA
- 2020 **Beckman Scholars Program.** Selected as a representative mentor for Villanova University, PA.

Internal

- 2020 **V² Program**, Villanova University, PA. *Stronger and stickier: an experimental and computational approach to design bio-inspired metamaterials with advanced mechanical properties.* With G. Feng (Villanova University, PA), D. Cereceda (Villanova University, PA), G. Gu (University of California, Berkeley, CA). \$47,765

Received

External

- 2020 **NSF Division Of Integrative Organismal Systems (IOS) #2015817.** *Collaborative research: RUI: Functional morphology and ecological implications of ant adhesion in the tropical forest canopy.* With S. P. Yanoviak (University of Louisville, KY). \$480,927 to Stark; \$299,607 to Yanoviak
- 2018 **Scientific Meeting Grant**, The Company of Biologists. *The path less traveled: Reciprocal illumination of gecko adhesion by unifying material science, biomechanics, ecology, and evolution.* With Tim Higham (University of California, Riverside, CA), Tony Russell (University of Calgary, Canada). \$5,216
- 2018 **NSF Scientific Meeting Grant, Division Of Integrative Organismal Systems (IOS) #1832815.** *The path less traveled: Reciprocal illumination of gecko adhesion by unifying material science, biomechanics, ecology, and evolution.* With Tim Higham (University of California, Riverside, CA), Tony Russell (University of Calgary, Canada). \$15,000

Internal

- 2020 **Biology Graduate Student Research Assistant Award (to K. Voegtlin, advisee)**, Villanova University, PA. \$8,180
- 2020 **University Faculty Summer Research Grant**, Villanova University, PA. *A leap of faith: the role of adhesion on tropical ant running and jumping*. \$11,608.06
- 2019 **University Graduate Student Summer Fellowship (to C. Mitchell, advisee)**, Villanova University, PA. \$5,000
- 2019 **Biology Undergraduate Research Fellowship (to K. Naughton, advisee)**, Villanova University, PA. \$4,000
- 2018-20 **Villanova Undergraduate Research Fellowship (to M. Dineen-Carey, A. Conte (twice), S. Dolloff, advisees)**, Villanova University, PA. \$16,000
- 2018 **College of Liberal Arts and Sciences Faculty Research and Development Grant**, Villanova University, PA. *Functional morphology of tropical ant adhesion*. \$850
- 2018 **Villanova Match Research Program for First Year Students**, Villanova University, PA. \$1,000
- 2011-13 **Graduate Student Professional Enrichment Grant**, University of Akron, OH. \$900
- 2012 **Biomimicry Workshop Scholarship**, Talan Products, Inc., OH. \$750
- 2009-11 **Choose Ohio First Tiered Mentoring Program**, University of Akron, OH. \$9,000
- 2010 **Choose Ohio First Bioinformatics Scholarship**, University of Akron, OH. \$3,200
- 2009 **Graduate Student Government Research Grant**, University of Akron, OH. \$1,300
- 2009 **Integrative Research in Bioscience Assistantship**, University of Akron, OH. \$16,550
- 2005 **Lewis Clark Starr Scholarship**, University of California, Davis, CA. \$2,500
- 2001-04 **Doyle Foundation Scholarship**, Santa Rosa Junior College, CA. \$6,850

Not Received

External

- 2020 **Research Grant in Science and Engineering**, Keck Foundation. *Stronger and stickier: an experimental and computational approach to design ant adhesive pad-inspired metamaterials with advanced adhesion functionality*. With G. Feng (Villanova University, PA), D. Cereceda (Villanova University, PA), G. Gu (University of California, Berkeley, CA).

- 2019 **Franklin Research Grant**, American Philosophical Society. *To jump or not to jump: adhesive and locomotor performance and kinematics of tropical ants.*
- 2019 **Carl Gans Award**, Society for Integrative and Comparative Biology. *Nominated.*
- 2018 **NSF Major Research Instrumentation Program (MRI), Track 1, Directorate for Engineering #1828558.** *Acquisition of a confocal raman microscope for nano-bio-chemical-thermal research.* With G. Feng (Villanova University, PA), B. Li, (Villanova University, PA), X. Cheng (Bryn Mawr College, PA), A. Blice-Baum (Cabrini University, PA).
- 2018 **New Investigator Research Grant**, Charles E. Kaufman Foundation. *Stick or slip: rate-dependence in biological adhesive systems.*
- 2017 **NSF Division Of Integrative Organismal Systems (IOS) #1730829.** *A sticky situation: mechanisms and functional ecology of ant adhesion in a tropical forest.* With S. P. Yanoviak (University of Louisville, KY).
- 2016 **Women in Science Fellowship**, L'Oréal USA. *Functional and ecological components of canopy ant adhesion to plant surfaces.*
- 2016 **NSF Division Of Integrative Organismal Systems (IOS) #1625746.** *Getting a grip: functional roles of ant adhesion in a tropical forest.* With S. P. Yanoviak (University of Louisville, KY), D. Schulz (University of Louisville, KY), R. Cohn (University of Louisville, KY).
- 2015 **NSF Division Of Integrative Organismal Systems (IOS) #1525572.** *Footprints in the forest: functional and ecological components of tropical rainforest ant adhesion to plant surfaces.* With S. P. Yanoviak (University of Louisville, KY), D. Schulz (University of Louisville, KY), R. Cohn (University of Louisville, KY).
- 2015 **Program Grant**, Human Frontier Science Program. *Adhesion in tropical rainforest canopy ants.* With S. P. Yanoviak (University of Louisville, KY), D. Schulz (University of Louisville, KY), R. Cohn (University of Louisville, KY), D. Sameoto (University of Alberta, Canada).

Internal

- 2019 **Outstanding Faculty Mentor Teaching Award**, Villanova University, PA. *Nominated*
- 2019 **Junior Faculty Award for Excellence in Teaching**, Villanova University, PA. *Nominated*
- 2018 **University Faculty Summer Research Grant**, Villanova University. *Some like it hot: adhesive performance and behavior of ants in variable temperature.*
- 2016 **Academic and Research Excellence for the 21st Century**, Internal RFP from the Graduate School and the Office of Research and Innovation, University of Louisville, KY. *Soft Matter: an emergent area of interdisciplinary research at University of Louisville.* With R. Cohn (University of Louisville, KY).

**Planned
External**

- 2021 **NSF Major Research Instrumentation Program (MRI), Track 1, Directorate for Biological Sciences.** *Acquisition of an environmental scanning electron microscope for visualization and characterization of biological and bio-inspired materials.* With G. Feng (Villanova University, PA) and B. Li (Villanova University, PA). Submit January 2021
- 2021 **NSF Faculty Early Career Development Program (CAREER), Division Of Integrative Organismal Systems (IOS).** *Running with sticky feet: functional morphology of wet and dry temporary adhesive systems.* Submit Summer 2021

REFEREED PUBLICATIONS

(denotes undergraduate student author; † denotes graduate student author)

31. Mitchell, C. T.†, C. Balda Dayan†, D-M. Drotlef, M. Sitti & **A. Y. Stark**. 2020. The effect of substrate wettability and modulus on gecko and gecko-inspired synthetic adhesion in variable temperature and humidity. *Scientific Reports*. In press.
30. **Stark, A. Y.**, C. A. Narvaez & M. P. Russell. 2020. Adhesive plasticity among populations of purple sea urchin (*Strongylocentrotus purpuratus*). *Journal of Experimental Biology* 223: jeb228544 (Cover)
doi:10.1242/jeb.228544
29. **Stark, A. Y.** & S. P. Yanoviak. 2020. Adhesion and running speed of a tropical arboreal ant (*Cephalotes atratus*) on rough, narrow, and inclined substrates. *Integrative and Comparative Biology* 60(4): 829-839.
<https://doi.org/10.1093/icb/icaa078>
28. Narvaez, C. A., A. Padovani, **A. Y. Stark** & M. P. Russell. 2020. Plasticity in the purple sea urchin (*Strongylocentrotus purpuratus*): tube feet regeneration and adhesive performance. *Journal of Experimental Marine Biology and Ecology* 528: 151381.
<https://doi.org/10.1016/j.jembe.2020.151381>
27. Fernhaber, S. & **A. Y. Stark**. 2019. Biomimicry: new insights for entrepreneurship scholarship. *Journal of Business Venturing Insights* 12: 12:e00137.
<https://doi.org/10.1016/j.jbvi.2019.e00137>
26. Russell, A., **A. Y. Stark** & T. Higham. 2019. The integrative biology of gecko adhesion: historical review, current understanding and grand challenges. *Integrative and Comparative Biology* 59(1): 101-116
doi:10.1093/icb/icz032
25. **Stark, A. Y.**, H. R. Davis† & W. K. Harrison. 2019. Shear adhesive performance of leaf-cutting ant workers (*Atta cephalotes*). *Biotropica* 51(4): 572-580
doi:10.1111/btp.12664

24. **Stark, A. Y.** & C. T. Mitchell†. 2019. Stick or slip: adhesive performance of geckos and gecko-inspired synthetics in wet environments. *Integrative and Comparative Biology* 59(1): 214-226
doi:10.1093/icb/icz008
23. **Stark, A. Y.** & S. P. Yanoviak. 2018. Adhesion and running speed of a tropical arboreal ant (*Cephalotes atratus*) on wet substrates. *Royal Society Open Science* 5(11): 181540
doi:10.1098/rsos.181540
22. **Stark, A. Y., K. Arstingstall** & S. P. Yanoviak. 2018. Adhesive performance of tropical arboreal ants varies with substrate temperature. *Journal of Experimental Biology* 221(1): jeb171843
doi:10.1242/jeb.171843
21. **Stark, A. Y., B. J. Adams†, J. Fredley** & S. P. Yanoviak. 2017. Out on a limb: the thermal microenvironment of tropical arboreal ants. *Journal of Thermal Biology* 69: 32-38
doi:10.1016/j.jtherbio.2017.06.002
20. Garner, A. M., A. Y. Stark, S. A. Thomas† & P. H. Niewiarowski. 2017. Geckos go the distance: water's effect on gecko locomotor performance. *Journal of Herpetology* 51(2): 240-244
doi:10.1670/16-010
19. Spicer, M. E.†, **A. Y. Stark**, B. J. Adams†, R. Kneale & S. P. Yanoviak. 2017. Thermal constraints on foraging of tropical canopy ants. *Oecologia* 183(4): 1007-1017
doi:10.1007/s00442-017-3825-4
18. **Stark, A. Y.** 2016. Biomimicry: what's in it for us? A biologist's perspective on how biomimicry can inform studies of the natural world. *Zygote Quarterly* 17(3): 80-93 (refereed opinion piece)
17. **Stark, A. Y., M. Klittich†, M. Sitti, P. H. Niewiarowski & A. Dhinojwala.** 2016. The effect of temperature and humidity on adhesion of a gecko-inspired adhesive: implications for the natural system. *Scientific Reports* 6(30936)
doi:10.1038/srep30936
16. Yanoviak, S. P., C. Silveri, **A. Y. Stark**, J. T. Van Stan II & D. F. Levia, Jr. 2016. Surface roughness affects the running speed of tropical canopy ants. *Biotropica* 49(1): 92-100
doi:10.1111/btp.12349
15. Walker, C. S., R. L. Ethington & **A. Y. Stark.** 2016. Who is your champion? A look at the structure and function of animals to help solve a problem. *Science and Children* 53(9): 39-45
14. **Stark, A. Y., S. Subarajan**, D. Jain†, P. H. Niewiarowski & A. Dhinojwala. 2016. Superhydrophobicity of the gecko toe pad: biological optimization verses laboratory maximization. *Philosophical Transactions of the Royal Society A* 374(2073): 20160184
doi:10.1098/rsta.2016.0184

13. Niewiarowski, P. H., **A. Y. Stark** & A. Dhinojwala. 2016. Sticking to the story: outstanding challenges in gecko-inspired adhesives. *Journal of Experimental Biology* 219(7): 912-919
doi:10.1242/jeb.080085
12. **Stark, A. Y.**, A. M. Palecek, C. Argenbright†, C. Bernard, A. Brennan, P. H. Niewiarowski & A. Dhinojwala. 2015. Gecko adhesion on wet and dry patterned substrates. *PLoS ONE* 10(12)
doi:10.1371/journal.pone.0145756
11. **Stark, A. Y.**, D. M. Dryden†, J. Olderman, K. A. Peterson, P. H. Niewiarowski, R. H. French & A. Dhinojwala. 2015. Adhesive interactions of geckos with wet and dry fluoropolymer substrates. *Journal of the Royal Society Interface* 12(108): 20150464 (Cover)
doi:10.1098/rsif.2015.0464
10. **Stark, A. Y.**, J. Ohlemacher, A. Knight & P. H. Niewiarowski. 2015. Run don't walk: locomotor performance of geckos on wet surfaces. *Journal of Experimental Biology* 218(15): 2435-2441(Cover)
doi:10.1242/jeb.120683
9. Jain, D.†, **A. Y. Stark**, P. H. Niewiarowski, T. Miyoshi & A. Dhinojwala. 2015. NMR spectroscopy reveals the presence and association of lipids and keratin in adhesive gecko setae. *Scientific Reports* 3(9594)
doi:10.1038/srep09594
8. Astrop, T. I.†, V. Sahni†, T. A. Blackledge & **A. Y. Stark**. 2015. Mechanical properties of the chitin-calcium-phosphate clam shrimp carapace (Order Spinicaudata): implications for taphonomy and fossilization. *Journal of Crustacean Biology* 35(2): 123-131
doi:10.1163/1937240X-00002332
7. Badge, I.†, **A. Y. Stark**, E. L. Paoloni, P. H. Niewiarowski & A. Dhinojwala. 2014. The role of surface chemistry on adhesion and wetting of gecko toe pads. *Scientific Reports* 4(6643)
doi:10.1038/srep06643
6. **Stark, A. Y.**, N. A. Wucinich, E. L. Paoloni, P. H. Niewiarowski & A. Dhinojwala. 2014. Self-drying: A gecko's innate ability to remove water from wet toe pads. *PLoS ONE* 9(7)
doi:10.1371/journal.pone.0101885
5. **Stark, A. Y.**, B. McClung, P. H. Niewiarowski & A. Dhinojwala. 2014. Reduction of water surface tension significantly impacts gecko adhesion underwater. *Integrative and Comparative Biology* 54(6): 1026-1033 (Cover)
doi:10.1093/icb/ucu066
4. **Stark, A. Y.**, I. Badge†, N. A. Wucinich, T. W. Sullivan, P. H. Niewiarowski & A. Dhinojwala. 2013. Surface wettability plays a significant role in gecko adhesion underwater. *Proceedings of the National Academy of Sciences USA* 110(16): 6340-6345 (Cover)
doi:10.1073/pnas.1219317110

3. **Stark, A. Y., T. Sullivan** & P. H. Niewiarowski. 2012. The effect of surface water and wetting on gecko adhesion. *Journal of Experimental Biology* 215(17): 3080-3086 (Cover)
doi:10.1242/jeb.070912
2. Niewiarowski, P. H., **A. Stark**, B. McClung, B. Chambers & T. Sullivan. 2012. Faster but not stickier: invasive house geckos can out-sprint resident mournful geckos in Moorea, French Polynesia. *Journal of Herpetology* 46(2): 194-197
doi:10.1670/11-148
1. Hsu, P. Y. †, L. Ge †, X. Li, **A. Y. Stark**, C. Wesdemiotis, P. H. Niewiarowski & A. Dhinojwala. 2011. Direct evidence of phospholipids in gecko footprints and spatula-substrate contact interface detected using surface-sensitive spectroscopy. *Journal of the Royal Society Interface* 9(69): 657-664 (Cover)
doi:10.1098/rsif.2011.0370

BOOK CHAPTERS

1. Niewiarowski, P. H., **A. Y. Stark** & A. Dhinojwala. 2017. A bibliometric analysis of gecko adhesion: a view of its origins and current directions. Pages 1-19 in: L. Xue, L. Heepe, and S. Gorb (eds.). *Bio-inspired Structured Adhesives* (vol. 9). Springer, New York.

POPULAR MEDIA

1. Fernhaber, S. A. & **A. Y. Stark**. To survive a pandemic, entrepreneurs might try learning from nature. *The Wall Street Journal*. Published online and in print May 11, 2020.
<https://www.wsj.com/articles/to-survive-the-pandemic-entrepreneurs-might-try-learning-from-nature-11588986419>

MANUSCRIPTS SUBMITTED

(denotes undergraduate student author; † denotes graduate student author)

4. Ringenwald, B. E., E. C. Bogacki, C. A. Narvaez & **A. Y. Stark**. The effect of variable temperature, humidity, and substrate wettability on gecko (*Gekko gekko*) locomotor performance and behavior. In review.
3. Palecek, A. M., A. M. Garner, M. R. Klittich †, **A. Y. Stark**, J. D. Scherger †, C. Bernard, P. H. Niewiarowski & A. Dhinojwala. Surface roughness characterization at multiple length scales reveals the complexity of gecko adhesion on wet and rough substrates. In review.
2. Singla, S., D. Jain, C. M. Zoltowski, S. Voleti, **A. Y. Stark**, P. H. Niewiarowski & A. Dhinojwala. Direct evidence of acid-base interactions in gecko adhesion. In review.
1. **Stark, A. Y.**, K. J. Voegtlin †, E. C. Bogacki, S. L. Dolloff, B. E. Ringenwald & A. S. Rive. Running with sticky feet: locomotor performance of adhesive cursorial animals. In review.

PROFESSIONAL PRESENTATIONS

Invited Academic Presentations

- 2020 **Stark, A. Y.** *Tenacious toes and fastening feet: biological adhesive systems in complex environments.* Carl Gans Award speaker, Society for Integrative and Comparative Biology, Austin, TX
- 2020 **Stark, A. Y.** and S. P. Yanoviak. *Adhesive performance of tropical arboreal ants on canopy substrates.* Symposium speaker, Society for Integrative and Comparative Biology, Austin, TX
- 2019 **Stark, A. Y.** *Investigating biological adhesive systems and their potential for bio-inspired design.* Plenary speaker, Bioinspired Materials: From understanding, through processing, to replication, Monte Verita, Switzerland
- 2019 **Stark, A. Y.** *Stick to the plan! Adhesive performance of geckos, ants, and sea urchins in challenging conditions.* Seminar speaker, Department of Biology, West Chester University, West Chester PA
- 2019 **Stark, A. Y.** *Sea Urchin tube feet don't suck – they stick! And lithology matters.* Seminar speaker, Department of Biology, Villanova University, Villanova PA
- 2019 **Stark, A. Y.** *The AdHERE and NOW: functional morphology of three biological adhesive systems.* Special seminar speaker, Department of Biology, University of California, Berkeley, Berkeley CA
- 2019 **Stark, A. Y.** *Get a grip: functional morphology of biological adhesive systems in challenging environments.* Seminar speaker, Department of Biology, Franklin & Marshall College, Lancaster PA
- 2019 **Stark, A. Y.** *Stick or slip: adhesive performance of geckos and gecko-inspired synthetics in wet environments.* Symposium speaker, Society for Integrative and Comparative Biology, Tampa, FL
- 2018 **Stark, A. Y.** *Adhesive performance of tropical arboreal ants.* BAMBI seminar speaker, Smithsonian Tropical Research Institute, Barro Colorado Island, Panama
- 2018 **Stark, A. Y.** *Sticky situations: the functional morphology of biological adhesive systems.* Seminar speaker, Department of Mechanical Engineering, Villanova University, Villanova PA
- 2018 **Stark, A. Y.** *Using biomimicry to solve a sticky situation.* Seminar speaker, Department of Geography and the Environment, Villanova University, Villanova PA
- 2017 **Stark, A. Y.** *Wet and dry biological adhesives in complex environments: learning from ants and geckos.* Session speaker, Gordon Research Conference on Science of Adhesion, Mount Holyoke, MA
- 2016 Ditsche, P., **A. Y. Stark** & D. J. Irschick. *Biological attachment mechanisms; from dry to wet: examples and applications.* Tandem oral presentation, International Congress of Vertebrate

Morphology, symposium on interdisciplinary and evolutionary approach to vertebrate biological materials, Washington DC

- 2016 **Stark, A. Y.** *Animal tracks: do living organisms leave behind chemical clues to adhesive success?* Keynote speaker and panel member, Central Regional Meeting of the American Chemical Society, session on bio-inspired chemistry: inspiring solutions, sponsored by Procter & Gamble Co., Covington, KY
- 2015 **Stark, A. Y.** *The effect of water on the gecko adhesive system: behavioral implications.* Seminar speaker for behavior discussion group, Smithsonian Tropical Research Institute, Panama City, Panama
- 2014 **Stark, A. Y.** *The effect of water on the gecko adhesive system.* Seminar speaker, Department of Biology, University of Louisville, Louisville, KY

Invited Industry Presentations

- 2016 **Stark, A. Y.** *Wet and dry biological adhesives in complex environments: learning from ants and geckos.* Session speaker, 1st Annual National Biomimicry Summit and Education Forum for Aerospace, in collaboration with NASA, Cleveland, OH
- 2015 **Stark, A. Y.,** P. H. Niewiarowski, A. Dhinojwala & M. Sitti. *The effect of temperature and humidity on gecko-inspired synthetic adhesives.* Session speaker, Adhesive and Sealant Convention Spring Conference and Expo., Nashville, TN
- 2013 **Stark, A. Y.** *Nanomechanical study of gecko setae and clam shrimp shells.* Oral presentation, Agilent Technologies Nanomechanical Properties Workshop, University of Akron, OH
- 2012 **Stark, A. Y.** & D. Keeble. *Biomimicry and attachment.* Oral Presentation and discussion, Talan Products, Inc., Cleveland, OH
- 2011 **Stark, A. Y.,** P. Hsu, P. H. Niewiarowski & A. Dhinojwala. *The gecko adhesive system: analysis of lipid footprints.* Session speaker, Biannual Meeting of the Akron Functional Materials Center, University of Akron and the Austen Bioinnovation Institute, Akron, OH
- 2009 Sethi, S., I. Badge & **A. Y. Stark.** *Gecko adhesion and application.* Demonstration, World President's Organization, Akron, OH

Conference Presentations

I attend at least two professional meetings per year, typically the Society for Integrative and Comparative Biology and the Adhesion Society annual meetings. Below is a list of talks and posters presented by my students, colleagues and I in the last 5 years. A complete list of presentations is available upon request.

(denotes undergraduate student author; † denotes graduate student author)

- 2020 **Stark, A. Y.**, C. A. Narvaez & M. Russell. *Attachment mechanism varies among three populations of sea urchins (*Strongylocentrotus purpuratus*)*. Oral presentation, Adhesion Society Annual Meeting, Charleston, SC
- 2020 Mitchell, C. T.†, D-M. Drotlef, C. Balda Dayan†, M. Sitti & **A. Y. Stark**. *Peeling the layers back: examining the roles of capillary adhesion and material softening on gecko and gecko-inspired synthetic adhesive performance in variable temperature and humidity*. Oral presentation, Society for Integrative and Comparative Biology, Austin, TX
- 2020 Ringenwald, B. E., E. C. Bogacki & **A. Y. Stark**. *Crawl or fall: the effect of variable temperature and humidity on gecko locomotion*. Poster presentation, Society for Integrative and Comparative Biology, Austin, TX
- 2020 Bogacki, E. C., B. E., Ringenwald & **A. Y. Stark**. *Stick and run: locomotor behavior of Tokay geckos (*Gekko gecko*) on wet and dry substrates*. Poster presentation, Society for Integrative and Comparative Biology, Austin, TX
- 2020 O'Leary, N. E. & **A. Y. Stark**. *Adhesive performance of Tokay geckos (*Gekko gecko*) as a function of variable surface temperature*. Poster presentation, Society for Integrative and Comparative Biology, Austin, TX
- 2020 Implicito, C. J. & **A. Y. Stark**. *The effect of surface temperature on adhesion of a temperate ant (*Camponotus Pennsylvanicus*)*. Poster presentation, Society for Integrative and Comparative Biology, Austin, TX
- 2019 **Stark, A. Y.**, C. A. Narvaez & M. Russell. *Adhesive performance of sea urchins (*Strongylocentrotus purpuratus*) on rock substrates*. Oral presentation, Adhesion Society Annual Meeting, Hilton Head, SC
- 2019 Mitchell, C. T.†, D-M. Drotlef, C. Balda Dayan†, M. Sitti & **A. Y. Stark**. *Elastic modulus affects adhesive strength of gecko-inspired synthetics in variable temperature and humidity*. Poster presentation, Society for Integrative and Comparative Biology, Tampa, FL
- 2018 **Stark, A. Y.** *Stick to it: performance variation in biological adhesive systems*. Poster presentation, Adhesion Society Annual Meeting & World Conference on Adhesion and Related Phenomena (WCARP), San Diego, CA
- 2017 **Stark, A. Y.** *Variation in static and dynamic adhesive performance of ants and geckos in challenging environmental conditions*. Oral presentation, Adhesion Society Annual Meeting, St. Petersburg, FL
- 2017 **Stark, A. Y.** & S. P. Yanoviak. *Slippery when wet: adhesion and running velocity of a tropical canopy ant on wet substrates*. Oral presentation, Society for Integrative and Comparative Biology Annual Meeting, New Orleans, LA

- 2017 Walker, C., R., Ethington & **A. Y. Stark**. *Who is your champion? A close look at how plant and animal structures can function to help solve a problem*. Hands-on workshop & demonstration, National Conference for the National Science Teachers Association, Los Angeles, CA
- 2016 **Stark, A. Y.** & S. P. Yanoviak. *Normal and shear adhesion of ants on hot, wet, and rough substrates*. Oral presentation, Adhesion Society Annual Meeting, San Antonio, TX
- 2016 **Stark, A. Y.** & S. P. Yanoviak. *Move it or lose it: adhesion and running speed on rough substrates in a tropical canopy any*. Oral presentation, Society for Integrative and Comparative Biology Annual Meeting, Portland, OR

TEACHING EXPERIENCE

Courses Taught

- 2020 Summer **Independent Study**, Instructor, Villanova University, PA
- 2020 Spring **Independent Study**, Instructor, Villanova University, PA
- 2020-21 Spring **Research Methods in Form and Function (Discussion)**, Instructor & Course Developer, Villanova University, PA
- 2019 Fall **Functional Morphology (Lecture/Lab)**, Instructor & Course Developer, Villanova University, PA
- 2019 Fall **Research Methods in Form and Function (Discussion)**, Instructor & Course Developer, Villanova University, PA
- 2018-21 Spring **General Biology (Lecture/Lab)**, Co-Instructor, Villanova University, PA
- 2018 Spring **Field Ecology in Costa Rica (Lecture/Lab)**, Co-Instructor, Villanova University, PA
- 2018-20 Spring **Research Methods in Marine Ecology (Discussion)**, Assistant Instructor, Villanova University, PA
- 2017-19 Fall **Research Methods in Marine Ecology (Discussion)**, Assistant Instructor, Villanova University, PA
- 2017-18 Fall **Biomechanics (Lecture/Lab)**, Instructor & Course Developer, Villanova University, PA
- 2015 Fall **Conservation Biology (Lecture)**, Co-Instructor, University of Louisville, KY
- 2013 Spring **Animal Behavior (Lab)**, Teaching Assistant, University of Akron, OH
- 2010-12 Spring **Principles of Biology (Lab)**, Teaching Assistant, University of Akron, OH
- 2008-12 Fall **Principles of Biology (Lab)**, Teaching Assistant, University of Akron, OH
- 2005 Fall **Domestic Animal Behavior (Lecture)**, Undergraduate Teaching Assistant, University of California, Davis, CA

Guest Lectures

- 2018/19 Spring *Comparative biomechanics*, **Biomechanics (in Mechanical Engineering)**, Villanova University, PA
- 2016 Fall *The next steps in ant chemical ecology*, **Chemical Ecology**, University of Louisville, KY
- 2015 Fall *Biomimicry*, **Biology 102 (biology for non-majors)**, University of Louisville, KY
- 2015 July *Functional morphology of geckos and ants*, **Tropical Field Ecology**, Organization for Tropical Studies, Barro Colorado Island, Panama
- 2014 Fall *Biomimicry and conservation biology*, **Conservation Biology**, University of Louisville, KY

Undergraduate Advising

2017-2021 31 assigned undergraduate student advisees (Biology majors)

Undergraduate Mentoring

Over the last twelve years I have mentored 62 undergraduate students in research as part-time assistants, volunteers, and thesis and honors students. Student participation includes animal husbandry, experimental design, data collection and analysis, presentation of results at scientific meetings, and preparation of manuscripts for publication. Names of students and their respective projects are underlined in the refereed publications section above.

Villanova University, PA

2017 - pres. Mentored 19 undergraduate students

- 8 Senior Thesis Research Advisor, Department of Biology
- 2 Honors Thesis Research Advisor
- 1 Senior Thesis Research Advisor, Department of Psychological and Brain Sciences
- 1 Senior Thesis Research Committee Member, Department of Biology
- 12 co-authored or will co-author at least one refereed publication with me within the next year
- 6 graduated, all are enrolled in a graduate program

University of Louisville, KY

2014-17 Mentored 6 undergraduate students

- 4 co-authored or will co-author at least one refereed publication with me
- 6 graduated, 4 are enrolled in a graduate program

University of Akron, OH

2008-14 Mentored 37 undergraduate students

- 15 co-authored or will co-author at least one refereed publication with me
- ≥ 16 enrolled in graduate programs or employed in relevant industry careers

Graduate Mentoring

2017 - pres. Mentored 9 graduate students

- 2 Masters Thesis Major Advisor, Department of Biology, Villanova University, PA
- 5 Masters Thesis Committee Member, Department of Biology, Villanova University, PA
- 1 Masters Thesis Committee Member, Department of Chemistry, Villanova University, PA

SERVICE

Institutional Service

2020 - pres. **Committee Member**, Department of Biology Diversity, Equity, Inclusion (DEI) Committee, Villanova University, PA

2019 - pres. **Faculty Advisor**, Tri-Beta Villanova Chapter, Villanova University, PA

- 2019 - pres. **Committee Member**, Department of Biology Graduate Committee, Villanova University, PA
- 2018 - pres. **Alternate Committee Member**, Institutional Animal Care and Use Committee (IACUC), Villanova University, PA
- 2018 - pres. **Grant Proposal Reviewer**, Villanova Undergraduate Research Fellowship (VURF) Program, Villanova, PA (annually in Spring)
- 2018 - 2020 **Committee Member**, College of Liberal Arts and Sciences Faculty Research and Development Grant Program, Villanova University, PA
- 2017 - pres. **Committee Member**, Department of Biology Organismal Biology Task Force, Villanova University, PA

Professional Service

Manuscript Reviews

Tissue and Cell; Sensors & Actuators: B. Chemical; Proceedings of the Royal Society B; Journal of Experimental Biology; Bioinspiration & Biomimetics; Proceedings of the National Academy of Sciences; Journal of Morphology; Functional Ecology; ACS Nano; ACS Applied Materials & Interfaces; "Contamination Mitigation Polymeric Coatings for Extreme Environments" (book); eLife; Journal of Insect Science; Friction; Royal Society Open Science; Scientific Reports; Protoplasm; Smart Materials & Structures; Ecology & Evolution; Insect Physiology; Zoology; ACS Applied NanoMaterials; Journal of Insect Physiology; Integrative and Comparative Biology

Grant Reviews

- Ad-hoc Reviewer** National Science Foundation (NSF)
- Panel Member** National Science Foundation (NSF)
- Ad-hoc Reviewer** European Science Foundation (ESF)

Conference Organization

- 2020 **Session Organizer & Chair**, Award for Excellence in Adhesion Science, in honor of award winner Ali Dhinojwala, sponsored by 3M, Adhesion Society Annual Meeting
- 2019 **Symposium Co-organizer**, *The path less traveled: Reciprocal illumination of gecko adhesion by unifying material science, biomechanics, ecology, and evolution*, Society for Integrative and Comparative Biology Annual Meeting (with Tim Higham and Anthony Russell)
- 2015-20 **Co-chair**, *Biological and Bio-inspired adhesives session*, Adhesion Society Annual Meeting
- 2015-17 **Co-chair & Co-founder**, *Women's networking social*, Adhesion Society Annual Meeting
- 2016 **Co-chair**, *Adhesion and robotics session*, Adhesion Society Annual Meeting
- 2015 **Co-organizer**, *Wastestock: converting waste streams into resources*, Louisville, KY
- 2015 **Symposium Organizer**, *Biomimicry: how does nature inspire technology?*, Louisville, KY
- 2015 **Session Moderator**, *Adhesion*, Society for Integrative and Comparative Biology Annual Meeting

Professional Development and Involvement

- 2020 - pres. **Team Member**, *Website Improvement Task Force*, Adhesion Society
- 2020 **Panel Member (invited)**, *Parenting in Academia*, Society for Integrative and Comparative Biology Annual Meeting
- 2019 **Chair (invited)**, *The GRC Power Hour_(TM)*, Gordon Conference on Adhesion Science

- 2019 **Discussion Leader (invited)**, *Biological Adhesives*, Gordon Conference on Adhesion Science
- 2019 **Panel Member (invited)**, *Planning for an Academic Career*, Gordon Research Seminar on Adhesion Science
- 2018-20 **Member-at-Large** (elected), Executive Committee, Adhesion Society
- 2017-18 **Immediate Past Chair**, Bioadhesion Division, Adhesion Society
- 2016-17 **Chair & Co-founder**, Bioadhesion Division, Adhesion Society
- 2015 & 2011 **Participant**, Biomimicry Education Summit, The Biomimicry Institute
- 2012 **Participant**, Backyard Biomimicry Workshop, The Biomimicry Institute

Community Service/Outreach

High School Student Researchers

- 2020 Megan Stratton, Brick Township Memorial High School, Brick, NJ
- 2019 Nicolas Gustafson, home school student, Villanova, PA
- 2018 Grace Field, Phoenixville High School, Phoenixville, PA
- 2014 Misbah Mlokhawala, Laurel School, Shaker Heights, OH
- 2013 Aparna Narendrula, Hathaway Brown, Shaker Heights, OH

K-12 Teachers Involved in Research

- 2015 Caryn Walker, Science Goal Clarity Coach, Jefferson County Public Schools, Louisville, KY
- 2015 Roberta Ethington, 3rd Grade Teacher, St. Matthews Elementary, Louisville, KY
- 2013 Sharon Kaffen, Science Learning Coach, National Inventors Hall of Fame STEM Middle School, Akron, OH

Outreach Presentations

- 2020 **Stark, A. Y.** *Sticky science: research, application, and education*. Center for Innovative Learning and Assessment Technologies, University of Louisiana at Lafayette, Lafayette, LA (ca. 50 K-12 training teachers via Skype)
- 2018 **Stark, A. Y.** *Stuck on you: exploring biological attachment and application*. Center for Innovative Learning and Assessment Technologies, University of Louisiana at Lafayette, Lafayette, LA (to 66 elementary school children via Skype)
- 2018 **Stark, A. Y.** *Adhesion subject matter expert*. Team Phoenix, FIRST LEGO League (FLL) robotics competition team, Lafayette, LA (discussion via Skype)
- 2017 **Stark, A. Y.** *Stuck on you: exploring biological attachment and its applications in the world around us*. Teen Science Day at Louisville Zoo, Louisville, KY
- 2015 Walker, C. S., R. L. Ethington & **A. Y. Stark**. *Ants on the move*. Four day 4th grade science lesson on functional morphology and biomimicry. St. Matthews Elementary, Louisville, KY
- 2014 **Stark, A. Y.** *Geckos and biomimicry: how can geckos help us?* In aid of earning "Animal Helpers Badge", Girl Scouts of NE Ohio Cadette Troop #90115

- 2013 **Stark, A. Y.** *The effect of water on the gecko adhesive system.* Watters Science Seminar Speaker, Lakewood High School, Cleveland, OH
- 2013 & 2012 **Stark, A. Y.** *Geckos and biomimicry.* Honors College Colloquium Speaker, University of Akron, OH
- 2011 **Stark, A. Y.** *The gecko adhesive system: implications and applications.* STEM High School Student Orientation Speaker, University of Akron, OH
- 2009 **Stark, A. Y.** *Geckos, spiders and polymers!* Demonstration, Polymer Family Night (grades 6-8), Our Lady of the Elms Girls School, Akron, OH

SELECTED MEDIA ATTENTION

National Geographic (with video); Discovery Channel Canada (with video); Science Daily and Science NOW; AAAS Science Update; Smithsonian; National Science Foundation; BBC; Huffington Post; Science Illustrated; The Plain Dealer (with video); The University of Akron (with video); "Meet a Biomimic" via Biomimicry 3.8; "Faculty Friday" at Villanova University; "Ants Marching" in Villanova Magazine; "Bright Ideas" in President's Report, Villanova University; HER podcast with Dr. Pamela Peeke - RadioMD

REFERENCES

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