Syracuse University

Department of Biology

107 College Pl., Rm. 114

Syracuse, NY 13244

**Email** agarner@syr.edu

**Phone** 315.443.5816

**Website** agarner.expressions.syr.edu

**Twitter** @sticky\_morph

**Education**

**2016 – 2021 Ph.D. in Integrated Bioscience**

The University of Akron, Akron, Ohio

Dissertation title: *Examining the relationships between form, function, environment, and behavior in adhesive pad-bearing lizards*

**2012 – 2016 B.Sc. in Biology, *magna cum laude***

The University of Akron, Akron, Ohio

**Professional Appointments**

**2022 – Assistant Professor**

Department of Biology, Syracuse University

**2022 – Member**

BioInspired Institute, Syracuse University

**2021 – 2022 Postdoctoral Teaching Fellow**

Ecological, Evolutionary, & Organismal Biology

Department of Biology, Villanova University

**Peer-Reviewed Publications**

\*Denotes undergraduate co-author †Denotes invited manuscript ‡Denotes equal contribution of authors

*15 published articles | 1 book chapter in press | 2 manuscripts in review* | *1 manuscript in preparation*

**2022 Garner, A.M.**, M.C. Wilson, C. Wright\*, A.P. Russell, P.H. Niewiarowski, and A. Dhinojwala. Parameters of the adhesive setae and setal fields of the Jamaican radiation of anoles (Dactyloidae: *Anolis*): potential for ecomorphology at the microscopic scale. Biological Journal of the Linnean Society 137(1):85-99.

**2022** Palecek, A.M., **A.M. Garner**, M.R. Klittich, A.Y. Stark, J.D. Scherger, C. Bernard, P.H. Niewiarowski, and A. Dhinojwala. An investigation of gecko attachment on wet and rough substrates leads to application of surface roughness power spectral density analysis. Scientific Reports 12:11556.

**2021 Garner, A.M.**‡, M.C. Wilson‡, C. Wright\*, A.P. Russell, P.H. Niewiarowski, and A. Dhinojwala. The same but different: setal arrays of anoles and geckos indicate alternative approaches to achieving similar adhesive effectiveness. Journal of Anatomy 238(5):1143- 1155. **Cover**.

**2021 Garner, A.M.**, A.M. Pamfilie\*, A. Dhinojwala, and P.H. Niewiarowski. Tokay geckos (Gekkonidae: *Gekko gecko*) preferentially use substrates that elicit maximal adhesive performance. Journal of Experimental Biology 224(4):jeb241240. **Cover**.

**2021 Garner, A.M.** and A.P. Russell. Revisiting the classification of squamate adhesive setae: historical, morphological, and functional perspectives. Royal Society Open Science 8: 202039.

**2021** Russell, A.P. and **A.M. Garner**. Setal field transects, evolutionary transitions and gecko- anole convergence provide insights into the fundamentals of form and function of the digital adhesive system of lizards. Frontiers in Mechanical Engineering 6:1-17.

**2020 Garner, A.M.**‡,A.M. Pamfilie‡\*, E.J. Hamad\*, R. Kindig\*, J.T. Taylor\*, C.K. Unsworth, and P.H. Niewiarowski. Home-field advantage: Native gecko exhibits improved exertion capacity and locomotor ability in structurally complex environments relative to its invasive counterpart. Frontiers in Zoology 17(23): 1-11.

**2019 Garner, A.M.**, C. Buo, J.M. Piechowski, A.M. Pamfilie\*, S.R. Stefanovic, A. Dhinojwala, and P.H. Niewiarowski. Digital hyperextension has no influence on the active self-drying of gecko adhesive subdigital pads. Journal of Experimental Zoology – Part A 333(2):118-125.

**2019** Cohn, E.\*‡, P. Cole\*‡, A. Haymaker\*‡, **A.M. Garner**, and R.L. Londraville. Response to Underwater Laser Pointer in the Orange-Finned Anemonefish *Amphiprion chrysopterus* and Three-spot Damselfish *Dascyllus trimaculatus*. Journal of Fish Biology 96:274-277.

**2019** Gamel, K.M., **A.M. Garner**, and B.E. Flammang. Bioinspired remora adhesive disc offers insight into evolution. Bioinspiration & Biomimetics 14(5):1-8.

**2019** Niewiarowski, P.H., A. Dhinojwala, and **A.M. Garner**. Adapting a thermal physical model approach to estimate gecko adhesion performance opportunity and constraint: How rough could it be? Integrative and Comparative Biology 59(1):203-213.

**2019† Garner, A.M.**, M.C. Wilson, A.P. Russell, A. Dhinojwala, and P.H. Niewiarowski. Going Out on a Limb: How Parallel Investigation of the Anoline Adhesive System can Enhance our Understanding of Fibrillar Adhesion. Integrative and Comparative Biology 59(1):61- 69.

**2018** McInerney, S.J., B. Khakipoor, **A.M.** **Garner**, T. Houette‡, C.K. Unsworth‡, A. Rupp, N. Weiner, J.F.V. Vincent, J.K.S. Nagel, and P.H. Niewiarowski. E2BMO: Facilitating User Interaction with a BioMimetic Ontology via Semantic Translation and Interface Design. Designs 2(4):53. 

**2017 Garner, A.M.**, S.M. Lopez, and P.H. Niewiarowski. Brown anole (*Anolis sagrei*) adhesive forces remain unaffected by partial claw clipping. Acta Herpetologica 12:133- 137.

**2017** **Garner, A.M.**, A.Y. Stark, S.A. Thomas, and P.H. Niewiarowski. Geckos go the Distance: Water's Effect on the Speed of Adhesive Locomotion in Geckos. Journal of Herpetology 51:240-244.

Book Chapters

**In press** Russell, A.P. and **A.M. Garner**. Solutions to a Sticky Problem: Convergence of the Adhesive Systems of Geckos and Anoles (Reptilia: Squamata). In: Convergent Evolution. V. Bels and A. Russell (Eds).

Manuscripts in Review or In Preparation

**In review** Orndorf, N., **A.M. Garner**, and A. Dhinojwala. Polar bear paw pad surface roughness and its relevance to contact mechanics on snow.

**In review** Pamfilie, A.M.\*, **A.M. Garner**, A.P. Russell, A. Dhinojwala, and P.H. Niewiarowski. Get to the point: Claw morphology impacts frictional interactions on rough substrates.

**In preparation** Moura, A.J.\*, **A.M. Garner**, J.P. Cucchiara\*, J.P. McCormack\*, C.A. Narvaez, A.Y. Stark, and M.P. Russell. Hyposalinity reduces tube foot performance in the green sea urchin, *Strongylocentrotus droebachiensis*.

**Funding**

**2020 Roger Conant Grants in Herpetology**

Society for the Study of Amphibians and Reptiles

Amount: $500

**Honors And Awards**

**2020 D. Dwight Davis Award**

Finalist

Division of Vertebrate Morphology

Society for Integrative and Comparative Biology 2020 Annual Meeting

**2019 American Microscopical Society Travel Award**

American Microscopical Society

Amount: $250

**2017-2019 Company of Biologists’ Travel Grant**

Society of Experimental Biology

Amount: £250 per year, £750 total

**2017-2019 Professional Enrichment Grant**

The University of Akron Graduate Student Government

Amount: $200 per year, $600 total

**2019 Best Poster Award**

The University of Akron Interdisciplinary Symposium

Graduate Student Category

Buchtel College of Arts and Sciences

**2015-2017 Charlotte Mangum Student Support Award**

The Society for Integrative and Comparative Biology Annual Meetings

Amount: $109 per year, $327 total

**Invited Presentations**

**2022 Bronx Zoo, Advanced Inquiry Program**

Convergent evolution of the adhesive toe pads of lizards leads to an enhanced understanding of the fundamentals of fibrillar adhesion

**2021 Villanova University, Department of Biology**

Examining the Relationships between Form, Function, Environment, and Behavior in Adhesive Pad-bearing Lizards

**2021 Syracuse University, Department of Biology**

Form-Function-Environment Relationships in Adhesive Pad-bearing Lizards

**2020 Denver Zoo, Advanced Inquiry Program**

Convergent evolution of the adhesive toe pads of lizards leads to an enhanced understanding of the fundamentals of fibrillar adhesion

**Conference Presentations**

†Denotes presenting author ‡Denotes equal contribution of authors \*Denotes undergraduate co-author

*11 oral presentations | 8 poster presentations | 19 total presentations*

Oral Presentations

**2021 Garner, A.M.**†, M.C. Wilson, C. Wright\*, A.P. Russell, P.H. Niewiarowski, and A. Dhinojwala. Ecomorphological correlates of the adhesive setae and setal fields of Jamaican anoles. SICB 2021 Annual Meeting (Virtual).

**2021** Pamfilie, A.M.\*†, **A.M. Garner**, A.P. Russell, A. Dhinojwala, and P.H. Niewiarowski. Claw morphology influences frictional interactions on rough substrates. SICB 2021 Annual Meeting (Virtual).

**2020 Garner, A.M.**†, M.C. Wilson, C. Wright\*, A.P. Russell, P.H. Niewiarowski, and A. Dhinojwala. Adhesive setal morphology and setal field configuration in *Anolis equestris*. SICB 2020 Annual Meeting, Austin, Texas.

**2019** Niewiarowski, P.H.†, A. Dhinojwala†, and **A.M. Garner**. Developing prototypes for testing gecko adhesion on rough surfaces. From symposium titled, “The Path Less Traveled: Reciprocal Illumination of Gecko Adhesion by Unifying Material Science, Biomechanics, Ecology, and Evolution”. SICB 2019 Annual Meeting, Tampa Bay, Florida.

**2019 Garner, A.M.**†, M.R. Klittich, D. Maksuta, P.H. Niewiarowski, and A. Dhinojwala. The Role of Surface Lipids on the Self-Cleaning Ability of Gecko Subdigital Adhesive Pads. SICB 2019 Annual Meeting, Tampa Bay, Florida.

**2019** Gamel, K.M.†, **A.M. Garner**, and B.E. Flammang. Modeling evolutionary selection for performance, in the case of the remora adhesive disc. SICB 2019 Annual Meeting, Tampa Bay, Florida.

**2018** Unsworth, C.K.†, **A.M. Garner**, S.J. McInerney, B. Khakipoor, T. Houette, A. Rupp, and N. Weiner. E2BMO: Facilitating User Interaction with a BioMimetic Ontology through Semantic Translation and Interface Design. AAAI, Arlington, Virginia.

**2018 Garner, A.M.**†, M.R. Klittich, J.M. Piechowski, D. Maksuta, C. Buo, S.R. Stefanovic, P.H. Niewiarowski, and A. Dhinojwala. Recovery Ability of Gecko Adhesive Toe Pads After Fouling with Water or Dirt. SICB 2018 Annual Meeting, San Francisco, California.

**2018** M.R. Klittich†, **A.M. Garner**‡, D. Maksuta‡, P.H. Niewiarowski, and A. Dhinojwala. Impact of Surface Chemistry on Gecko Self-Cleaning. SICB 2018 Annual Meeting, San Francisco, California.

**2017** **Garner, A.M.**†, J.M. Piechowski, C. Buo, S.R. Stefanovic, P.H. Niewiarowski, and A. Dhinojwala. The Role of Digital Hyperextension in the Self-drying Mechanism of Gecko Adhesive Toe Pads. SICB 2017 Midwest Regional Meeting, The University of Akron, Akron, Ohio.

**2017 Garner, A.M.**†, K.E. Siman, A. Wright, T. Davis, and P.H. Niewiarowski. What Goes Up, Must Come Down: The Effect of Running Orientation on the Speed of Adhesive Locomotion in Geckos. SICB 2017 Annual Meeting, New Orleans, Louisiana.

Poster Presentations

**2021 Garner, A.M.**†, A.M. Pamfilie\*, A. Dhinojwala, and P.H. Niewiarowski. Tokay geckos (Gekkonidae: *Gekko gecko*) preferentially use substrates that elicit maximal adhesive performance. SICB 2021 Annual Meeting (Virtual).

**2020 Garner, A.M.**†, A.L. Ramer, and P.H. Niewiarowski. A sticky situation: anole adhesive performance as an inquiry-based learning exercise in an introductory biology course. SICB 2020 Annual Meeting, Austin, Texas.

**2020** Pamfilie, A.M.†\*, **A.M. Garner**, and P.H. Niewiarowski. Watch your step: a comparison of digital morphology across ecomorphs in *Anolis* lizards. SICB 2020 Annual Meeting, Austin, Texas.

**2019 Garner, A.M.**†, A. Dhinojwala, and P.H. Niewiarowski. Design and Calibration of a Prototype Physical Model to Estimate Gecko Adhesion on Rough Surfaces. Gordon Research Conference, Science of Adhesion. Mt. Holyoke College, South Hadley, MA.

**2019 Garner, A.M.**†, M.C. Wilson, A.P. Russell, P.H. Niewiarowski, and A. Dhinojwala. Morphometrics and Patterning of the Adhesive Setal Fields of an Anolis Lizard in Comparison to those of its Gekkotan Counterparts. SICB 2019 Annual Meeting, Tampa Bay, Florida.

**2019 Garner, A.M.**, A.M. Pamfilie†\*, A. Dhinojwala, and P.H. Niewiarowski. Relationships between Adhesive Performance and Substrate Preference Behavior in Tokay Geckos (*Gekko gecko*). SICB 2019 Annual Meeting, Tampa Bay, Florida.

**2018 Garner, A.M.**, A.J. Keith†\*, A. Schnarrenberger\*, H.C. Astley, and P.H. Niewiarowski. The Effect of Running Orientation on Gecko Locomotor Performance. SICB 2018 Annual Meeting, San Francisco, California.

**2016 Garner, A.M.**†, A.Y. Stark, S.A. Thomas, and P.H. Niewiarowski. Geckos Go the Distance: Water’s Effect on Gecko Locomotor Performance. SICB 2016 Annual Meeting, Portland, Oregon.

**Teaching and Mentoring Experience**

Courses Taught

U = undergraduate course U/G = combined undergraduate and graduate course

*Postdoctoral Teaching Fellow, Department of Biology, Villanova University*

**2022 Digital Skills for Biologists (U/G)**

Fundamentals of programming, electronics, 3D printing, actuation and robotics for application to biological experiments.

**2021 Behavioral Biology of Animals (U)**

A course in animal behavior for a non-majors audience. Lecture and laboratory focus on the evolution, mechanisms, and consequences of animal behavior. Laboratory includes inquiry-based learning exercises.

*Teaching Assistant, Department of Biology, The University of Akron*

**2018-2021 Herpetology (U)**

Survey of the diversity, ecology and evolution of amphibians and reptiles. Special emphasis is given to Ohio species.

**2019-2020 Vertebrate Zoology Laboratory (U/G)**

Evolution, ecology, behavior, systematics and anatomy of vertebrates. Laboratory with field trips.

**2017-2020 Principles of Biology Laboratory II (U)**

Animal diversity, nutrients, gas exchange, transport, homeostasis, control in plants and animals, behavior, and ecology.

**2018-2019 Digital Skills for Biologists (U/G)**

Fundamentals of programming, electronics, 3D printing, actuation and robotics for application to biological experiments.

**2017-2018 Foundations of Physiology Laboratory I (U)**

Laboratory experiments in animal physiology. Transport processes, neurophysiology, endocrinology, and muscle physiology. Presentation of results in written scientific format.

**2017 Human Anatomy and Physiology Laboratory I (U)**

Laboratory devised to allow hands on experience using models, dissections of various animals, virtual dissection, and physiological exercises.

**2016 General Ecology (U)**

Study of interrelationships between organisms and environment.

**2016 Biomimetic Design (U/G)**

A studio design course using nature as a model for creating innovative solutions targeting a specific design problem. It combines a brief introduction into biomimetics and is open to students from different disciplines in the arts, sciences, and engineering.

Guest Lectures

**2022 Examining the Relationships between Form, Function, Environment, and Behavior in Adhesive Pad-bearing Lizards**

Functional Morphology, Villanova University

**2021 Body Support, Locomotion, and Feeding of Reptiles and Amphibians**

Herpetology, The University of Akron

**2017**  **Gecko Biology and Adhesion: Beyond Saving You Money on Car Insurance**

Herpetology, The University of Akron

**2017**  **Gecko Biology and Adhesion: Beyond Saving You Money on Car Insurance**

Biomimetic Design, The University of Akron

**2016 The Gecko Adhesive System: An Adaptation for an Arboreal Lifestyle**

General Ecology, The University of Akron

**2016 The Gecko Adhesive System: A Sticky Solution for All Sorts of Problems**

Biomimetic Design, The University of Akron

Curriculum Development

**2019-2020 Vertebrate Zoology Laboratory**

Developed a biomimicry lecture and assignment, a “press release” science communication assignment, a final presentation which required students to talk about the biology of five vertebrate species in five slides, and virtual dissection presentations

**2019-2020 Principles of Biology Laboratory II**

Co-developed two laboratory exercises on the topic of biomimicry aimed at increasing student understanding of, and connections between, the broader impacts of basic and applied scientific research

Mentoring

**\*** indicates co-author on peer-reviewed articles, manuscripts in preparation, and/or conference presentations

† indicates undergraduate thesis advisee

**Doctoral Student Advisees**

|  |  |  |
| --- | --- | --- |
| Name | Year(s) | Institution |
| Andrew Moura | 2022 - | Syracuse University |

**Doctoral Student Committee Membership**

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Advisor | Year(s) | Institution |
| Valeria Perez | Dr. Susan Parks | 2022 - | Syracuse University |

**Undergraduate Student Mentees**

|  |  |  |
| --- | --- | --- |
| Name | Year(s) | Institution |
| Caroline Kane† | 2022 | Villanova University |
| Andrew Moura\*† | 2021-2022 | Villanova University |
| John McCormack† | 2021-2022 | Villanova University |
| Hana Arabi | 2021-2022 | The University of Akron |
| Timothy Zatkos† | 2020 | The University of Akron |
| Caitlin Wright\*† | 2019-2020 | The University of Akron |
| Amanda Haymaker\* | 2019 | The University of Akron |
| Patrick Cole\* | 2019 | The University of Akron |
| Emilie Cohn\* | 2019 | The University of Akron |
| Joshua Taylor\* | 2019 | The University of Akron |
| EJ Hamad\* | 2019 | The University of Akron |
| Rachael Kindig\* | 2019 | The University of Akron |
| Alexandra Pamfilie\*† | 2018-2021 | The University of Akron |
| Alexandra Tomasko† | 2017-2018 | The University of Akron |
| Alexis Schnarrenberger\*† | 2016-2018 | The University of Akron |
| Austin Keith\*† | 2016-2018 | The University of Akron |

**High School Student Mentees**

|  |  |  |
| --- | --- | --- |
| Name | Year(s) | Institution |
| Laney King | 2019 | The University of Akron |
| Benjamin Sprenger | 2018 | The University of Akron |
| Nyle Garg | 2018 | The University of Akron |

**Professional Service**

Reviewer

Journal of Experimental Biology, Zoology, Bioinspiration & Biomimetics, Biology Open, Biomimetics, Biological Journal of the Linnean Society

Other Service

**2022 – The Society for Integrative and Comparative Biology**

Public Affairs Committee

Member

**2022 Collaboration for Unprecedented Success and Excellence (CUSE) Grant Program**

Office of Research, Syracuse University

Reviewer

**2021 The Society for Integrative and Comparative Biology**

2021 Annual Meeting (Virtual)

Assistant session chair, Complementary to S8: The Biology of Sticky: Adhesive Silk, Fiber, and Glue Biomaterials Across Eukaryota

**2021 Great Lakes Biomimicry**

Biological Consultant for Industrial Innovation

**2018 The Society for Integrative and Comparative Biology**

2018 Annual Meeting, San Francisco, California

Session co-chair, Adhesion: Sticky When Dry

**Academic Service**

Community Outreach

In addition to the instances listed below, I give regular outreach presentations using live geckos to educate diverse audiences about gecko biology, gecko adhesion, biomimicry, and Gecko Adhesion Research Group research. Audiences include: students (K-12, undergraduate, graduate), business professionals, scientists in various stages of their careers, and the general public.

**2020 Western Reserve District 5 Science Day (virtual)**

Judge, Animal/Plant Sciences

**2018 University of Akron/Goodyear STEM Career Day**

Gecko adhesion research demonstration

**2019 Skype A Scientist**

Four K-12 US Classrooms

**2019 Camp Bioscience**

Guest Speaker

**2019 Norbert Thompson Biology Undergraduate Research Symposium**

Judge

**2019 Western Reserve District 5 Science Day**

Super Judge, Animal/Plant Sciences

**2018 Camp Bioscience**

Guest Speaker

**2018 Norbert Thompson Biology Undergraduate Research Symposium**

Judge

**2018 Western Reserve District 5 Science Day**

Super Judge, Animal/Plant Sciences

**2018 University of Akron/Goodyear STEM Career Day**

Gecko adhesion research demonstration

**2017 Norbert Thompson Biology Undergraduate Research Symposium**

Judge

**2017 University of Akron/Goodyear STEM Career Day**

Gecko adhesion research demonstration

**2017 University of Akron Scholar’s Day**

Gecko adhesion research demonstration, Department of Biology tour, answered questions about undergraduate programs in biology

**Media Attention**

**2020 The University of Akron**

Garner et al. 2020. Frontiers in Zoology.

[Biology research abroad leads to three published papers and one memorable experience](https://uakron.edu/im/news/biology-research-abroad-leads-to-three-published-papers-and-one-memorable-experience/)

**2019 YouTube**

Cohn et al. 2019. Journal of Fish Biology.

[Clownfish and Laser Pointers](https://nam03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DA655SoAJ-_U%26feature%3Dyoutu.be&data=02%7C01%7C%7Cff80286b773042b380bc08d79f837d08%7Ce8575dedd7f94ecea4aa0b32991aeedd%7C0%7C0%7C637153259407010530&sdata=a8TbjBmVtDdFVwBuevDdnNlSDqmuTSKGnmU1zLNLfXM%3D&reserved=0)

**2019 Numerous media outlets**

Gamel, Garner, and Flammang. 2019. Biomimetics & Bioinspiration.

[New Jersey Institute of Technology](https://news.njit.edu/researchers-remora-inspired-disk-mimics-fishs-suction-mechanism-offers-new-evolutionary-insight), [ScienceDaily](https://www.sciencedaily.com/releases/2019/09/190903162537.htm)

**2019 Anole Annals**

[SICB 2019: Anole Setal Morphological Diversity](http://www.anoleannals.org/2019/01/07/sicb-2019-anole-setal-morphological-diversity/)

**2018 Anole Annals**

Garner, Lopez, and Niewiarowski. 2017. Acta Herpetologica.

[Clipped Claws and Consequences for *Anolis* Adhesive Performance](http://www.anoleannals.org/2018/01/13/clipped-claws-and-consequences-for-anolis-adhesive-performance/)

**2016 Anole Annals**

[SICB 2016: Can Geckos Run Fast When It’s Wet Outside?](http://www.anoleannals.org/2016/01/17/sicb-2016-can-geckos-run-fast-when-its-wet-outside/)

**Professional Affiliations**

The Society for Integrative and Comparative Biology, The Adhesion Society, Society of Experimental Biology, The Society for the Study of Amphibians and Reptiles, The Herpetologists’ League