

Joseph C. Spagna

Assistant Professor of Biology

William Paterson University
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APPOINTMENTS

Assistant Professor, Department of Biology
William Paterson University of New Jersey 2008

RESEARCH FOCUS

Evolution and comparative physiology of locomotor systems.

Study taxa: primarily arthropods, with projects and taxonomic expertise with spiders and ants.
Additional areas of study: Systematics, phylogenetic methods, and bioinformatics.

EDUCATION

University of California at Berkeley

Ph.D., Department of Environmental Science, Policy
and Management, Division of Insect Biology 2006

Research advisor: Rosemary G. Gillespie

Dissertation: "Molecular Systematics and Running Ability in
Grass-spiders (Araneae: Agelenidae) and Their Kin"

Claremont McKenna College

Bachelor of Arts in Biology and Philosophy (dual major) 1995

POSTDOCTORAL RESEARCH

University of Illinois, Urbana-Champaign

Biomechanical characterization and modeling of jaw-strikes and jaw-jumps
in trap-jaw ants (*Odontomachus spp.*) 2006 - 2008

PUBLICATIONS

Spagna, J.C., Patek, S.N., and Suarez, A.V. Worker polymorphism provides an alternate axis for strike-force variation in a power-amplified jaw system. For submission to *Journal of Comparative Physiology A*, *in prep.*

Spagna, J.C., S.C. Crews, and R.G. Gillespie. (2009) Conservative evolution of disparate aquatic lifestyles in spiders. *Invertebrate Systematics* (in review).

Miller, J.A., Carmichael, A., Ramírez, M., **Spagna, J.C.**, Haddad, C.R., Řezáč, M., Johannesen, J., Král, J., Wang, X., Griswold, C.E. Phylogeny of Entelegyne Spiders: Affinities of the Family Penestomidae (NEW RANK), Generic Phylogeny of Eresidae, and Asymmetric Rates of Change in Spinning Organ Evolution (Araneae, Araneoidea, Entelegynae) *Molecular Phylogenetics and Evolution*. (in press).

Gillespie, R.G. & **Spagna, J.C.** (2009). "Spiders" in Encyclopedia of Insects (2nd ed.), V. Resh and R. Carde, eds. San Diego: Elsevier Press. Pp. 941-951.

Suarez, A.V. and **J. C. Spagna**. (2009). 'Trap-jaw ants.' Pp 216-217 in Ant Ecology, L. Lach, C. Parr, and K. Abbott editors. Oxford University Press.

Spagna, J.C., A. Schelkopf, T. Carrillo, and A.V. Suarez. (2008) Evidence of behavioral co-option from context-dependent variation in mandible use in trap-jaw ants (*Odontomachus* spp.). *Naturwissenschaften* 96:243-350.

Spagna, J.C., A.I. Vakis, C. Schmidt, S.N. Patek, N. Tsutsui, X. Zhang, and A.V. Suarez. (2008) Phylogeny, scaling, and the generation of extreme forces in trap-jaw ants. *Journal of Experimental Biology* 211:2358-2368.

Spagna, J.C. and F. Alvarez-Padilla. (2008) Finding an upper limit for gap costs in direct-optimization parsimony. *Cladistics* 24: 787-801.

Tsutsui, N. D., A.V. Suarez, **J.C. Spagna** & J. S. Johnston. 2008. The evolution of genome size in ants. *BMC Evolutionary Biology* 8: 64.†

Spagna, J.C. and R.G. Gillespie. (2008) More data, fewer shifts: Molecular insights into evolution of the spinning apparatus in non-orb-weaving spiders. *Molecular Phylogenetics and Evolution*, 46:347-368. doi:10.1016/j.ympev.2007.08.008

Spagna, J.C., D.I. Goldman, P. Lin, D. E. Koditschek, & R.J. Full. (2007) Distributed mechanical feedback in arthropods and robots simplifies control of rapid running on challenging terrain. *Bioinspiration and Biomimetics* 2, 9-18. *Includes issue cover art.*†

Spagna, J.C. and R.G. Gillespie. (2006) Unusually long *Hyptiotes* (Araneae: Uloboridae) sequence for small subunit (18S) ribosomal RNA supports secondary structure model utility in spiders. *Journal of Arachnology* 34, 557-565.

Gould, S. A. C., Tran, K. T., **Spagna, J. C.**, Moore, A. M. F. & Shulman, J. B. (1999). Short and long range order of the morphology of silk from *Latrodectus hesperus* as characterized by atomic force microscopy. *International Journal of Biological Macromolecules* 24, 151-157.

Spagna, J. C. & Moore, A. M. F. (1999). Safe Immobilization by CO₂ of *Latrodectus hesperus* (Arachnida: Theridiidae). *Pan-Pacific Entomologist* 74(4), 210-213.

† indicates papers that have been recognized as among the "most downloaded" by their respective publishers.

PRESENTATIONS AND PUBLISHED ABSTRACTS

Spagna, J.C. "Intracolony variation in jaw characteristics of trap-jaw ants." Northeast Regional Meeting, Division of Vertebrate Morphology/Division of Comparative Biomechanics of the Society for Integrative and Comparative Biology, Brown University, Oct. 2009.

Spagna, J.C., Patek, S.N. and Suarez, A.V. Polymorphic trap-jaws: intra- and interspecific scaling of jaw forces in trap-jaw ants. Presented to the Society for Integrative and Comparative Biology, Boston, MA January 2009.

Miller, J.A., A. Carmichael, C.E. Griswold, J. Johannesen, J. Kral, **J. Spagna** & C. Haddad. 'Phylogenetic affinities of the enigmatic spider subfamily Penestominae' presented to the 24th European Congress of Arachnology, Bern, Switzerland, August 2008.

Spagna, J.C., Patek, S.N., Vakis, A.I., and Suarez, A.V. 'Contribution of jaw size to generation of extreme forces in trap-jaw ants' Presented to the Society for Integrative and Comparative Biology, Phoenix, AZ January 2007.

Spagna, J.C. and A.V. Suarez. 'Interspecific variation in jaw usage and associated behaviors in the trap-jaw ant genus *Odontomachus* (Formicidae: Ponerinae)' presented to the Entomology Society of America, Indianapolis, Indiana, December 2006.

Spagna, J.C. and R.G. Gillespie. 'Unusually long small subunit (18S) ribosomal RNA sequence from *Hyptiotes* (Araneae: Uloboridae) supports secondary structure model utility in spiders.' Presented to Annual Meeting of the American Arachnological Society, Baltimore, MD, June 2006.

D.I. Goldman, **J.C. Spagna**, R.J. Full, P.C. Lin, and D.E. Koditschek (University of California, Berkeley and University of Pennsylvania). 'Arthropod locomotion on a challenging substrate using a distributed foot.' Presented to IUPS Biophysical and Biomechanical Adaptation and Bioinspired Engineering symposium, California Institute of Technology, March 2005.

Spagna, J.C., D.I. Goldman, & R.J. Full, 'Contribution of a distributed foot to running performance in terrestrial arthropods.' Presented to the Society of Integrated and Comparative Biology. San Diego, CA, January 2005.

Spagna, J.C., & R.G. Gillespie. 'Molecular phylogenetics and cribellum evolution in RTA-clade spiders.' Presented to at the 16th International Congress of Arachnology, Ghent, Belgium, August 2004.

Goldman, D.I., **J.C. Spagna**, S. Basho, and R.J. Full. 'Arthropod locomotion on challenging surfaces.' Presented at Dynamics Days 2004, 23rd Annual International Meeting on Nonlinear Dynamics and Complex Systems, Chapel Hill, N.C., January 2004.

Spagna, J.C. and R.G. Gillespie. 'Molecular Phylogenetics and Spinneret Evolution of RTA-clade Spiders.' Presented to Annual Meeting of the American Arachnological Society, Denver, CO, July 2003.

Spagna, J.C. and R.G. Gillespie. 'Running Performance of the Grass-Spider *Hololena adnexa* on Intermittent Surfaces.' Presented to Annual Meeting of the American Arachnological Society, Denver, CO, July 2003.

Spagna, J.C. and R.G. Gillespie. 'Molecular Phylogenetic Analysis of North American Grass-spiders (Araneae: Agelenidae).' Annual meeting of American Arachnological Society, June 2002.

Spagna, J.C., and R.G. Gillespie. 'Cladistics and Biogeography of North American Grass-spiders (Araneae: Agelenidae).' presented to the Society for Integrative and Comparative Biology, January 2002.

Moore, A.M.F., **Spagna, J.C.**, Thor, D., and Lawrence, B.A. 2001. Molecular structure and material properties in tarantula silk.' *American Zoologist* 41 (6): 1530.

Spagna, J.C., J.B. Shulman, A.M.F. Moore and S.A.C. Gould. 'Analysis and comparison of surface structures of various silks of the funnel-web weaving spider, *Hololena curta*.' presented to the Society for Integrative and Comparative Biology, January 1999.

Moore, A.M.F., **J.C. Spagna** and B.A. Lawrence. 'Enhanced Inquiry-Based Learning through Interdisciplinary Research.' presented to the Sigma Xi Forum, November 1999.

POPULAR PRESS COVERAGE OF RESEARCH AND TEACHING

Discover magazine, "Deus ex machina," June 2008.

New Scientist magazine, "Leg spines make robots better scramblers," February 2007.

Bioscience magazine, "Teach for America, hope for the future." October 2007.

INVITED PRESENTATIONS AND SEMINARS

Panel Discussion, Darwin's Birthday Celebration, William Paterson University, February 2009

"American Controversial" television program, evolution panel discussion, William Paterson University production, November 2008.

"Bioinspiration from Trap-jaw Ants," with Andrew Suarez, Beckman Institute Imaging Technology Group Seminar, February 27, 2007.

"Phylogenetics as inspiration for biomechanical and physical models", Entomology Seminar, University of Illinois, August 28, 2006.

"Fast, Spiny, and Out of Control: Arthropod, Robot and Monster Locomotion on Challenging Surfaces" presented to Biology Department, Lewis and Clark College, April 12, 2005. *Additional presentations:* Portland State University, April, 2005, and University of the Pacific, July 2005.

"How do you get a robot out of a tree? Evolution as inspiration for mechanical models." Presented to the Joint Science Department of The Claremont Colleges, February 23, 2005.

TEACHING EXPERIENCE

William Paterson University

2008-2009

Evolution†

Field Entomology†

Bioinformatics‡

Field Biology, Lecture and Laboratory

General Biology II (Organismal systems), Lecture and Laboratory

Ecology, Evolution, and Behavior, Lecture and Laboratory

Field Entomology, Lecture, Field and Laboratory Course

† courses developed by instructor

‡ course currently in development

UC Berkeley, Department of Integrative Biology

2005

Introductory Biology 1B (Evolution, Plant biology, Ecology)

UC Berkeley Natural History Museums

2003 - 2005

Outreach Teacher, GK-12 Program, 10th-12th grade Biology and Environmental Science

U.C. Berkeley, Department of Environmental Science, Policy and Management (ESPM)

Arachnology Seminar, ESPM 198 UC Berkeley

2004 - 2005

ESPM 201B-Case Studies in Environmental Science

2003

ESPM 44 - Biological Control	2002
ESPM 140- General Entomology w/Laboratory	2001
Scripps College	1997 - 1999
Teaching Assistant, Biology/Physics 148 "Seminar in Silk" (4 semesters)	
Teach For America Summer Institute	1996
Corps Member Advisor	
Baltimore City Public Schools	1995 - 1997
Biology Teacher, 9 th -12 th grades	

RESEARCH STUDENTS MENTORED

Student Name (Academic Status, Region of Origin)

Edgar Valdivia (Undergraduate, NJ)
 Vivin Mohan (Undergraduate, NJ)
 Kameron Fazelpoor (Undergraduate, NJ)
 Tara Graham (Undergraduate, NJ)
 Antonis Vakis (Masters Student, Cyprus)
 Maryan Mongkeya (Undergraduate, Micronesia)
 Laurie Reuney (Undergraduate, Micronesia)
 Courtney Cech (Undergraduate, IL)
 Kevan Citta (Undergraduate, IL)
 Adam Schelkopf (Undergraduate, IL)
 Rebecca Schield (Undergraduate, IL)
 Carrillo, Tiana (Undergraduate, Puerto Rico)

GRANTS AND FELLOWSHIPS

Amount

Center for Research Fellowship, William Paterson University	\$5,920
NSF GK-12 Teaching/Outreach Fellowship	\$57,500
University Fellowship, University of California	\$15,000
Herbert Magy Scholarship, U.C. Berkeley	\$ 1,000
Walker Fund Systematics Grants, Division of Insect Biology	\$ 4,000
Julius Freitag Memorial Award, UC Berkeley	\$ 1,000
Gump Research Station Fellowship, French Polynesia	\$ 1,500
Vincent Roth Memorial Grant for Spider Systematics	\$ 500

GRANT PROPOSALS

Collaborative and RUI: Adaptation, Physics, and the Raw Materials of Evolution NSF-Integrative Organismal Systems (pending)	\$445,410
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HONORS AND AWARDS**Year**

Best student oral presentation runner-up, SICB meeting (Division of Invertebrate Zoology)	2005
Best Poster, Dynamics Days (2 nd author)	2004
Best Student Poster, American Arachnological Society Meeting	2003
Honorable Mention, NSF Graduate Fellowships Program	1995, 1999
National Merit Scholar	1991-1995

SERVICE AND COMMITTEE WORK

Independent Study Committee, Wm. Paterson University Biology Dept.	2009-2010
Coordinator, Departmental Seminar, Biology Dept., WPU	2009-2010
Curator, William Paterson University Entomology Teaching Collection	2009-
Peer Reviewer: <i>Pan-Pacific Entomologist</i> , <i>Journal of Arachnology</i> , <i>Zootaxa</i> , <i>Entomologia Acta et Applicata</i> , <i>Molecular Phylogenetics and</i> <i>Evolution</i> , <i>In Silico Biology</i> , <i>Journal of Insect Conservation</i>	2005-2009
Graduate Admission Committee, UCB	2003
Faculty Meeting Student Representative, UCB	2003-2004
President, Entomology Students Organization, UCB	2001-2002
Treasurer, Entomology Students Organization, UCB	2000-2001

PROFESSIONAL AFFILIATIONS AND CERTIFICATIONS

Council for Undergraduate Research
Entomological Society of America
Pacific Coast Entomological Society
American Arachnological Society
Society for Systematic Biology
Society for Integrative and Comparative Biology
Sigma Xi
Alumnus, Teach For America