



# **Faculty Research Interests**

**Department of Biology  
Villanova University**

**Revised: August, 2019**

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**Education**

B.Sc.	Jammu University, India	1979
M.Sc.	Jammu University, India	1982
Ph.D.	All India Institute of Medical Sciences, New Delhi, India	1987
Post-Doctoral Experience	Harvard University	1987-1990
	Dana-Farber Cancer Institute, Harvard University	1990-1995

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**Research**

One research project in my laboratory focuses on the role of lipid rafts in spatiotemporal regulation of cell signaling in CD4<sup>+</sup> T lymphocytes. Signaling cascades initiated by a number of cell surface proteins after binding their ligand are well characterized but a cohesive model that integrates signaling in space and time on the plasma membrane remains poorly understood. We are investigating the role of compositionally heterogeneous, nano-meter size, cholesterol-, saturated lipid-rich domains play an important role in determining the outcome of responses and cell fate in CD4<sup>+</sup> T lymphocytes. Lipid rafts are heterogeneous in composition (George et.al., 2006; Bamezai & Kennedy, 2008) and coalesce during cellular interactions in the absence of a specific antigen (Kennedy et.al., 2011). This later observation goes against the current paradigm which suggests that antigen alone plays a central role in the organization (of signaling proteins) on the plasma membrane. We are currently examining the role antigen-independent raft coalescence on the plasma membrane of CD4<sup>+</sup> T cell in the responses they generate after encountering a specific antigen.

Second project in my laboratory concerns Immunobiology of Ly-6 proteins. While studies with transgenic mice have allowed us to gain insights into the signaling role of Ly-6 proteins expressed on CD4<sup>+</sup> T cells, the mechanism of such regulation remains unclear. How does this GPI-anchored protein lacking transmembrane and cytoplasmic domains communicate and signal to the cell interior during development of lymphocytes and while mounting a fitting response to an infection? Engaging a tail-less Ly-6 proteins on CD4<sup>+</sup> T cell lines initiate signaling with wide array of functional consequences that range from the production of cytokines (IL-2), to growth inhibition and apoptosis. How does Ly-6A protein co-opts this membrane nano-structure and its contents (receptors, other signaling molecules) to communicate to the cell interior is not known. Membrane localization of Ly-6A protein to lipid rafts and its regulation of membrane proximal signaling event (Ca<sup>2+</sup> flux experiments, Henderson et.al., 2002) provide a strong rationale for the focus on early membrane proximal events that involve lipid rafts. We are currently examining the lipid raft-dependent and independent signaling that occurs after engaging Ly-6 proteins.

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**Selected Publications**

- \*Jones, M., \*\*DeWolf, S., \*\*Vacharathit, V., \*\*Yim M., \*Spencer, S., and Bamezai, AK. 2016. Investigating B cell development, natural and primary antibody responses in Ly-6A/Sca-1 deficient mice PLOS ONE (In Press)
- Comber, J.D and Bamezai, A. Gold Nanoparticles (AuNPs): A New Frontier in Vaccine Delivery. Journal of Nanomedicine Biotherapeutic Discov 2015, 5:4 (Invited Editorial)
- \*Schieffer D, \*\*Naware S, \*Bakun W and Bamezai, AK. 2014. Lipid raft-based membrane order is important for antigen specific clonal expansion of CD4<sup>+</sup> T lymphocytes. BMC Immunology, 15:58 (December 14, 2014). An "Editor's pick" article.
- Bamezai AK and \*\*Divakar Lal 2014. Self-assembling nanoparticle: A strategy for designing universal flu vaccine. Journal of Nanomedicine and Biotherapeutic Discovery 4 (2): e129 (Invited Editorial)\*\*DeWolf, S, and Bamezai, A. 2013. Sex-specific effects of Stem cell antigen 1 (Sca-1)/Ly-6A in B lymphocyte development. (In Revision)
- \*Comber J.D., and Bamezai A. 2012. In vitro derivation of interferon- $\gamma$  producing, IL-4 and IL-7 responsive memory-like CD4<sup>+</sup> T cells. Vaccine, 30(12):2140-2145
- \*Kennedy C, \*Nelson MD and AK. Bamezai. 2011. Analysis of Detergent-free Lipid Rafts isolated from CD4<sup>+</sup> T cell line: Interaction with antigen presenting cells promotes coalescing of lipid rafts. BMC-Cell Communication and Signaling 9:31
- Bamezai, A. 2008. "Membrane rafts and Signaling". Immunology, Endocrinology and Metabolic Agents in Medicinal Chemistry, (Invited Editorial) 8:325-326
- \*Reed,J.,\*Branigan, P., and Bamezai, A. 2008. Interferon-gamma enhances clonal expansion and survival of CD4<sup>+</sup> T cells. Journal of Interferon and Cytokine Research, 28: 611-618.
- Bamezai, A., \*Kennedy, C. 2008. Cell-free antibody capture method for analysis of detergent-resistant membrane rafts. Methods in Molecular Biology, 477: 137-147.
- \*\*George, S., \*Nelson, M.D., Dollahon, N. and Bamezai, A. 2006. A novel approach to examining compositional heterogeneity of detergent-resistant lipid rafts. Immunology and Cell Biology. 84:192-202.

\* Graduate student \*\* Undergraduate student

## Professor and Gerald M. Lemole Endowed Chair in Integrative Biology DR. AARON M. BAUER

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### Education

B. S.	Michigan State University, East Lansing	1982
Ph.D.	University of California, Berkeley	1986
Post-Doctoral Experience	University of Calgary	1987-88

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### Research

My current research involves the analysis of evolutionary patterns in reptiles and amphibians. In particular I am interested in the phylogenetic systematics, evolutionary and functional morphology, and zoogeography of the geckos and other lizards of the southern hemisphere. Techniques used in this work include phylogenetic and phylogeographic techniques, DNA sequencing, x-ray CT-scanning, light and electron microscopy, whole body staining, radiography, and field research techniques.

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### Selected Publications

- Weinell, J.L.\*, Branch, W.R., Colston, T.J., Jackman, T.R., Kuhn, A., Conradie, W. and A.M. Bauer. 2019. A species-level phylogeny of *Trachylepis* (Scincidae: Mabuyinae) provides insight into their reproductive mode evolution. *Molecular Phylogenetics and Evolution* 136:183–195.
- Marques, M.P., Ceriaco, L.M.P., D.C. Blackburn, A.M. Bauer. 2018. Diversity and distribution of the amphibians and terrestrial reptiles of Angola: Atlas of historical and bibliographic records (1840–2017). *Proceedings of the California Academy of Sciences* 65, Suppl. II:1–501.
- Ceraco, L.M.P. and A.M. Bauer. 2018. Nomenclature and taxonomic status of the genus *Blanus* Wagler, 1830 (Squamata: Blanidae) from the Iberian Peninsula. *Journal of Natural History* 52:849–880.
- Brennan, I.G.\*, Bauer, A.M., Tri, N.V., Wang, Y-Y., Wang, W., Zhang, Y-P. and R.W. Murphy. 2017. Barcoding utility in a mega-diverse, cross-continental genus: keeping pace with *Cyrtodactylus* geckos. *Scientific Reports* 7:5592. DOI: 10.1038/s41598-017-05261-9.
- Bauer, A.M., DeBoer, J.C.\* and D.J. Taylor\*. 2017. Atlas of the reptiles of Libya. *Proceedings of the California Academy of Sciences* 64:155–318.
- Roll, U., Feldman, A., Novosolov, M., Allison, A., Bauer, A.M. .... and S. Meiri. 2017. The global distribution of tetrapods reveals a need for targeted reptile conservation. *Nature Ecology & Evolution* 1:1677–1682.
- Paluh, D.J.\* and A.M. Bauer. 2017. Comparative skull anatomy of terrestrial and crevice-dwelling *Trachylepis* skinks (Squamata: Scincidae) with a survey of resources in scincid cranial osteology. *PLoS ONE* 12(9): e0184414.
- Daza, J.D., Stanley, E.L., Wagner, P., Bauer, A.M. and D.A. Grimaldi. 2016. Mid-Cretaceous amber fossils illuminate the past diversity of tropical lizards. *Science Advances* 2, e1501080.
- Bauer, A.M. 2013. *Geckos: The Animal Answer Guide*. Johns Hopkins University Press, Baltimore. 159 pp., 16 pls.
- Gamble, T., Greenbaum, E., Russell, A.P., Jackman, T.R., and Bauer, A.M. 2012. Repeated origin and loss of toepads in geckos. *PLoS ONE* 7(6): e39429. Doi:10.1371/journal.pone.0039429.
- Gamble, T. Bauer, A.M., Colli, G.R., Greenbaum, E., Jackman, T.R., Vitt, L.J., and Simons, A.M. 2011. Coming to America: multiple origins of New World geckos. *Journal of Evolutionary Biology* 24:231–244.
- Stanley, E.\*, Bauer, A.M., Jackman, T., Branch, W.R. and Mouton, P.leF.N. 2011. Between a rock and a hard polytomy: Rapid radiation in the rupicolous Girdled Lizards (Squamata: Cordylidae). *Molecular Phylogenetics and Evolution* 58:53–70.
- Russell, A.P. and Bauer, A.M. 2008. The appendicular locomotor apparatus of *Sphenodon* and normal-limbed squamates. Pp. 1-466 in Gans, C., Gaunt, A., and Adler, K.K., eds. *Biology of the Reptilia*, vol. 21. Society for the Study of Amphibians and Reptiles, Ithaca, NY.
- Lamb, T. and Bauer, A.M. 2006. Footprints in the sand: independent reduction of subdigital lamellae in the Namib-Kalahari burrowing geckos. *Proc. Royal Society B* 273:855-864.
- Bauer, A. M. and Sadlier, R. A. 2000 *The Herpetofauna of New Caledonia*. Soc. Stud. Amphib. Ithaca. 310 pp.
- Bauer, A. M. 1994. *Das Tierreich. Gekkonidae* (volume 1, Australia and the Pacific). Walter De Gruyter Publishers, Berlin. 306pp.

\*Graduate

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**Education**

B.S.	The Pennsylvania State University	1998
M.S.	Northern Arizona University	2002
Ph.D.	Northern Arizona University	2005
Post-Doctoral Experience	The Smithsonian Environmental Research Center	2005-07

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**Research**

My research occurs at the intersection of ecosystem processes and the biotic factors which influence them. In a broad sense, I investigate how insect, plant and microbial communities interact and regulate carbon and nutrient cycling. My research is not ecosystem or organism dependent, but rather, I pursue mechanistic questions and examine the most useful ecosystems to answer them. I am convinced that mechanistic explanations for ecological patterns lead to more appropriate generalizations and consequently, strides towards cross-ecosystem theory. Therefore, my research and the resultant publications provide synergistic multi-ecosystem explanations linking communities and ecosystem function. In an applied sense, I am interested in how anthropogenic alterations of biodiversity can impact ecosystems and the functions they provide. Some major questions I am experimentally investigating in multiple ecosystems (tropical mangroves, deciduous forests, coniferous forests)

- How do dominant plant range shifts impact wetland carbon storage?
  - How do mangrove invasions into salt marshes impact microbial communities and function?
  - How does warming impact wetland ecosystem processes?
  - How does nutrient eutrophication impact warming-altered phenology and native-invasive plant dynamics?
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**Selected Publications**

- Chapman, S.K.**, M.A. Hayes, B. Kelly\*, J.A. Langley. 2019. What is the oxygen sensitivity of coastal wetland carbon mineralization? *Biology Letters* 15: 20180407. <http://dx.doi.org/10.1098/rsbl.2018.0407>
- Coldren, G.A. Langley, J.A. Feller, I.C. and **S.K. Chapman**. 2019. Warming accelerates mangrove expansion and surface elevation gain in a subtropical wetland. *Journal of Ecology*. <https://doi.org/10.1111/1365-2745.13049>
- Kittredge, H.A.\*\*, T. Cannone\*\*, J. Funk\*, **S.K. Chapman**. 2018. Soil respiration and extracellular enzyme production respond differently across seasons to elevated temperatures. *Plant and Soil*. <https://doi.org/10.1007/s11104-018-3591-z>
- Langley, J.A. **S.K. Chapman** and 17 other authors. 2018. Ambient changes exceed treatment effects on plant species abundance in global change experiments. *Global Change Biology*. <https://doi.org/10.1111/gcb.14442>
- Barreto, C.R.\*, E. M. Morrissey, D.D. Wykoff, and **S.K. Chapman**. 2018. Co-occurring mangroves and salt marshes differ in microbial community composition. *Wetlands*. <https://doi.org/10.1007/s13157-018-0994-9>
- Megonigal, P.A., **S.K. Chapman**, M. Kirwan, J.A. Langley, P. Dijkstra, S. Crooks. 2018. Coastal Wetland Responses to Warming in *A Blue Carbon Primer: The State of Coastalland Carbon Science, Practice and Policy*. by L. Windham-Myers, S. Crooks and T.G. Troxler. CRC Press
- Doughty C.D.\* K. C. Cavanaugh, C.R. Hall, I.C. Feller, **S.K. Chapman**, 2017. Impacts of mangrove encroachment and mosquito impoundment management on coastal protection services. *Hydrobiologia* DOI 10.1007/s10750-017-3225-0
- Chapman, S.K. K.A. Devine, C. Curran, R.O. Jones, and F.S. Gilliam. 2016. Impacts of soil nitrogen and carbon additions on forest understory communities with a nitrogen long-deposition history. *Ecosystems* 19: 142-154 DOI 10.1007/s10021-015-9922-5
- Doughty, C.L. \* J. A. Langley, W.S. Walker, I.C. Feller, R. Schaub, and S. K. Chapman. 2015. Mangrove range expansion rapidly increases coastal wetland carbon storage. *Estuaries and Coasts*. DOI10.1007/s12237-015-9993-8
- Langley, J.A. H.K. White, R.U. Palanivel\*\*, T. Shannon, and S.K. Chapman. 2015. Marsh plants mediate the influence of nitrogen fertilization on the degradation of oil from the Deepwater Horizon oil spill. *Ecosphere*.
- Fischer, D.G., S.K. Chapman, A.T. Classen, J.A. Schweitzer, K.C. Grady, C.A. Gehring, T.G. Whitham. 2014. Plant genetic effects on soils under climatic change. *Plant and Soil* 379: 1-19.
- Wooliver R. J.K. Senior, J.A. Schweitzer, J. O'Reilly-Wapstra, S.K. Chapman, J.A. Langley, J.K. Bailey. 2014. Evolutionary History and Novel Biotic Interactions Determine Plant Responses to Elevated CO<sub>2</sub> and Nitrogen Fertilization. *PlosOne* DOI: 10.1371/journal.pone.0114596

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**Education**

A.B.	Dartmouth College, Hanover, NH	1979
M.S.	University of Michigan, Ann Arbor	1981
Ph.D.	University of Michigan, Ann Arbor	1987
Post-Doctoral Experience	Archbold Biological Station, Lake Placid, FL	1987-90

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**Research**

My research interests include behavior, ecology, and conservation, with an emphasis on field studies of marked birds to address questions concerning ecological influences on social organization and mating systems. We also work on the ecology of the uniquely herbivorous ant-acacia jumping spider, *Bagheera kiplingi*.

The largest component of my current research program focuses on the northward-moving hybrid zone between Black-capped and Carolina Chickadees in southeastern Pennsylvania, and related studies of other chickadees (e.g., Boreal Chickadees in Nova Scotia). This work involves comparative of Carolina Chickadee populations in Chester and Berks Cos. and a Black-capped population in Schuylkill Co., as well as field study at Hawk Mountain Sanctuary, where a population that formerly comprised all Black-capped Chickadees is being invaded by Carolinas and hybrids. Recently, we also began examine the ways in which animal **personality** (consistent behavioral differences among individuals) might influence—and be affected by—the hybridization process.

Research on *Bagheera kiplingi* has so far been involved periods of field research in the Yucatan region of Mexico. This study links up with our biennial Field Ecology & Evolution class, which involves 2 weeks of field study in the same area; most students who have studied *Bagheera kiplingi* have first completed the “FEE” course.

A third area of research focuses on social ecology and conservation of island mockingbirds and allies (Galápagos, Socorro, St. Lucia, Cozumel). Students have completed, and may continue to undertake, thesis projects under my direction in all three of these areas.

Methods common to all three areas of study include direct behavioral observation, color-banding, monitoring of demographic parameters such as survival and nest success, sampling of food resources and vegetation, and laboratory-based genetic analyses. We analyze spatial patterns using a Geographic Information System (GIS) and we use selected molecular markers (mtDNA, microsatellites and single nucleotide polymorphisms (SNPs)) to investigate species identity, parentage, and population structure. Most student projects have involved a combination of laboratory and field approaches; opportunities exist for projects involving periods of field study in Pennsylvania, Mexico, Nova Scotia.

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**Selected Publications** (for access to PDF versions, visit <http://www98.homepage.villanova.edu/robert.curry/RLC/publications.htm> )

- Kelemen, E. P.\*, K. E. Zusi#, and R. L. Curry. 2015. Song repertoire of the Carolina Chickadee in southeastern Pennsylvania. *Wilson Journal of Ornithology*, in press
- Taylor, S. A., R. L. Curry, T. A. White, V. Ferretti, and I. J. Lovette. 2014. Spatiotemporally consistent genomic signatures of reproductive isolation in a moving hybrid zone. *Evolution* 68:3066-3081
- Taylor, S. A., W. Hochachka, T. A. White, V. Ferretti, R. L. Curry, and I. J. Lovette. 2014. Climate-mediated movement of an avian hybrid zone. *Current Biology* 24:671-676
- Lovette, I. J., B. S. Arbogast, R. L. Curry, R. M. Zink, C. A. Botero, J. P. Sullivan, A. L. Talaba, R. B. Harris, D. R. Rubenstein, R. E. Ricklefs, and E. Bermingham. 2012. Phylogenetic relationships of the mockingbirds and thrashers (Aves: Mimidae). *Molecular Phylogenetics and Evolution* 63:219-229
- LaPergola, J. B.\*, J. G. Marina Hipolito, J. E. Martínez-Gómez, and R. L. Curry. 2012. First description of the nest and eggs of the island-endemic Cozumel Vireo (*Vireo bairdi*). *Wilson Journal of Ornithology* 124:743-749
- Meehan, C. J.\*, E. J. Olson, M. W. Reudink, T. K. Kyser, and R. L. Curry. 2009. Herbivory in a spider through exploitation of an ant-plant mutualism. *Current Biology*, 19:R982-R893
- \*Reudink, M. W., S. G. Mech, S. P. Mullen, and R. L. Curry. 2007. Structure and dynamics of the hybrid zone between Black-capped Chickadees (*Poecile atricapillus*) and Carolina Chickadees (*Poecile carolinensis*) in southeastern Pennsylvania. *Auk* 124:463-478
- Curry, R. L., L. M. Rossano\*, and M. W. Reudink\*. 2007. Behavioral aspects of chickadee hybridization. Pages 95-110 in *Ecology and behavior of chickadees and titmice: an integrated approach* (K. Otter, Ed.). Oxford University Press, Oxford, England.
- \*Reudink, M. W., S. G. Mech, and R. L. Curry. 2006. Extrapair paternity and mate choice in a chickadee hybrid zone. *Behavioral Ecology* 17:56-62 \*Graduate Student

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**Education**

B.S.	SUNY at Binghamton, Binghamton, NY	1982
Ph.D.	Cornell University, Ithaca, NY	1989
Postdoctoral experience	University of Pennsylvania, Philadelphia PA	1990-1995

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**Research**

My overall research interest is to understand how the fundamental processes of cell death, differentiation, and division are integrated and cross-regulated, so that normal development of the vertebrate embryo is achieved. I use the freshwater tropical zebrafish as a model system, and our lab centers around the investigation of the critical epigenetic transcriptional co-regulator Brd2 (bromodomain-containing 2), which is implicated in the control of all three processes, and is both a maternal and zygotic factor during development. We ask questions such as: 1) What is the expression pattern of Brd2 throughout development and in different tissues, and what clues to function do these patterns provide? 2) What are the upstream regulators and downstream transcriptional targets of Brd2, what cellular function do these targets accomplish, and how do targets change through developmental time? 3) What molecules interact with the Brd2 protein and under what conditions, and how do these interactions elucidate regulatory connections between cell death, differentiation and division? 4) What are the effects of overexpressing or knocking down expression of Brd2 on germline and embryonic development, and what does this imply about its epigenetic role in the context of the whole organism? Since Brd2 has a closely related paralog (Brd2b) in zebrafish, we also conduct comparative evolutionary studies to assess the level of functional divergence that has occurred after gene duplication. Experimental approaches entail molecular, cellular and genetic techniques including: Northern and Western blot analysis, in situ hybridization to RNA in tissues and zebrafish embryos, immunohistochemistry, confocal microscopy, chromatin-immunoprecipitation (ChIP), DNA sequencing and analysis, bioinformatics and data-mining, cloning and polymerase chain reaction (PCR), microinjection of zebrafish embryos, transgenic line construction, and phenotypic and behavioral analyses.

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**Selected Publications**

- Jalali, F., DiBenedetto, A.J., and Karlsson, J.O.M. 2018. Chilling causes perivitelline granule formation in activated zebrafish oocytes. **Cryobiology** **81**: 210-213.
- Murphy\*, T., Melville\*, H., Fradkin\*\*, E., Bistany\*, G., Branigan\*\*, G, Olson\*, K., Comstock\*\*, C., Hanby\*\*, H., Garbade\*\*, E., and DiBenedetto A.J. 2017. Knock-down of epigenetic transcriptional co-regulator Brd2a disrupts apoptosis and proper formation of the hindbrain and midbrain-hindbrain boundary (MHB) region in zebrafish embryos in zebrafish. **Mechanisms of Development** **146**: 10-30.
- Desmond, M.E., J. E. Knepper, A. J. DiBenedetto, E. Malaugh\*, S.Callejo, R. Carretero, M.-I. Alonso and A.Gato 2014. "Focal Adhesion Kinase as a Mechano-transducer during Rapid Brain Growth of the Chick Embryo" *Intl. J. Dev. Biol.* **58**:35-43.doi: 10.1387/ijdb.130305md
- DiBenedetto, AJ, Guinto\*, JB, Ebert\* TD, Bee\*\* KJ, Schmidt\*\* MM, and Jackman TR. 2008. Zebrafish *brd2a* and *brd2b* are paralogous members of the bromodomain-ET (BET) family of transcriptional coregulators that show structural and expression divergence. **BMC Developmental Biology** **8**: 39-58.
- DiBenedetto, A. J., J. Klick Stoddard\*\*, and B. J. Glavan\*\*, 2001. Cloning and molecular characterization of a novel gene encoding a WD-repeat protein expressed in restricted areas of adult rat brain. **Gene** **271**: 21-31.
- Wang, S., A. J. DiBenedetto, and R. N. Pittman. 1997. Genes induced in programmed cell death of neuronal PC12 cells and developing sympathetic neurons *in vivo*. **Developmental Biology** **188**: 322-336.
- DiBenedetto, A. J., and R. N. Pittman. 1995. Death in the balance. **Perspectives on Developmental Neurobiology**. **3**: 109-117.
- Pittman, R. N., and A. J. DiBenedetto. 1995. Apoptosis of undifferentiated and terminally differentiated PC12 cells. @ In: *Cellular Aging and Cell Death*. (Holbrook, J. J., G. R. Martin, and R. A. Lockshin, eds.). John Wiley and Sons, Inc., New York, pp. 255-265.
- Pittman, R. N., and A. J. DiBenedetto. 1995. PC12 cells overexpressing tissue plasminogen activator regenerate neurons to a greater extent and migrate faster than control cells in complex extracellular matrix. **Journal of Neurochemistry** **64**: 566-575.
- Pittman, R. N., S. Wang, A. J. DiBenedetto, and J. C. Mills. 1993. A system for characterizing cellular and molecular events in programmed neuronal cell death. **Journal of Neuroscience** **13**: 3669-3680.

\*\*Undergraduate student      \*Graduate student

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**Education**

B.A.	Stanford University	1993	
Ph.D.	Cornell University		2001
Post-Doctoral Experience	Cornell University		2001-2002

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**Research**

My research involves studying the behavioral ecology of arthropods, with an emphasis on sexual selection in insects. Arthropods are the most abundant and diverse group in the animal kingdom, and they occupy nearly every ecological niche in marine, freshwater and terrestrial habitats. The extraordinary evolutionary success of arthropods can be partly attributed to the remarkable diversity of mating systems, and these fascinating creatures provide many wonderful opportunities to do both field and laboratory studies. Sexual selection is an important area of behavioral ecology that explains phenomena including exaggerated male traits, female mating preferences, precopulatory courtship signals, and postcopulatory sperm selection. I am primarily interested in the reproductive behavior of arthropods, particularly species that are sexually dimorphic – that is, where strong competition for mates has ultimately lead to divergence in the appearance of males and females. The main goal of my research program is to examine how the costs and benefits of precopulatory choice and postcopulatory selection shape the evolution of mating systems, and we study a variety of insects including moths, damselflies and earwigs.

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**Selected Publications** (for access to PDF versions, visit my website: <http://viyengar.clasit.org/>)

- Egan, A.L., Hook, K.A., Reeve, H.K. & Iyengar, V.K. (2016) Polyandrous females provide sons with more competitive sperm: support for the sexy-sperm hypothesis in the rattlebox moth (*Utetheisa ornatrix*). *Evolution* 70(1): 72-81.
- Conner, W.E. & Iyengar, V.K. (2016) Male Pheromones in Moths: Reproductive Isolation, Sexy Sons, and Good Genes. In Allison, J.D. and Cardé, R.T. (eds.), *Pheromone Communication in Moths: Evolution, Behavior and Application*, University of California Press, Berkeley, CA.
- Walsh, J.T. & Iyengar, V.K. (2015) Win, lose, or draw: effects of residency, size, sex, and kinship on high-stakes larval contests in a moth. *Ethology* 121(8): 733-739.
- Iyengar, V.K., Castle, T. & Mullen, S.P. (2014) Sympatric sexual signal divergence among *Calopteryx* damselflies is correlated with increased intra- and interspecific male-male aggression. *Behavioral Ecology and Sociobiology* 68(2): 275-282.
- Kelly, C.A., Norbutus, A., Lagalante, A.F. & Iyengar, V.K. (2012) Male courtship pheromones indicate genetic quality in an arctiid moth (*Utetheisa ornatrix*). *Behavioral Ecology* 23(5): 1009-1014.
- Iyengar, V.K. & Reeve, H.K. (2010) Z-linkage of female promiscuity genes in the moth *Utetheisa ornatrix*: support for the sexy sperm hypothesis? *Evolution* 64(5): 1267-1272.
- Iyengar, V.K. (2009) Experience counts: females favor multiply-mated males over chemically-endowed virgins in a moth (*Utetheisa ornatrix*). *Behavioral Ecology and Sociobiology* 63(6): 847-855.
- Iyengar, V.K. & Starks, B.D. (2008) Sexual selection in harems: male competition plays a larger role than female choice in an amphipod. *Behavioral Ecology* 19(3), 642-649.
- Bezzerides, A.L., Iyengar, V.K. & Eisner, T. (2008) Female promiscuity does not lead to increased fertility or fecundity in an arctiid moth (*Utetheisa ornatrix*). *Journal of Insect Behavior* 21(4): 213-221.
- Bezzerides, A.L., Iyengar, V.K. & Eisner, T. (2005) Corematernal function in *Utetheisa ornatrix*: interpretation in light of data from field-collected males. *Chemoecology* 15(3), 187-192.
- Iyengar, V.K. & Eisner, T. (2004) Male indifference to female traits in an arctiid moth (*Utetheisa ornatrix*). *Ecological Entomology* 29(3), 281-284.
- Iyengar, V.K., Reeve, H. K. & Eisner, T. (2002) Paternal inheritance of a female moth's mating preference. *Nature* 419(6909), 830-832.

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**Education**

B.S.	University of California, Davis	1987
Ph.D.	University of California, Berkeley	1993
Postdoctoral	Washington University, St. Louis	1994-99

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**Research**

My research has focused on two areas in evolutionary genetics: 1. Reconstructing the history of populations representing different stages of speciation and 2. Using DNA sequence data in combination with other data to provide a robust historical framework for examining evolutionary processes. In my research, I have tried to apply innovative tests of phylogenetic patterns to molecular data in order to make reliable inferences of history. I have studied the evolutionary histories of both salamanders and lizards. My studies of western species of Plethodontid salamanders includes recent introductions of species, measures of gene flow between populations and the effects of combining morphological and molecular data for systematic studies. My postdoctoral research involved documenting and reconstructing parallel adaptive radiations in Caribbean anoline lizards using DNA sequences as well as morphological and ecological measures of habitat use.

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**Selected Publications**

- Agarwal I, Biswas S, Bauer A, Jackman T, et.al. (2017) Cryptic species, taxonomic inflation, or a bit of both? New species phenomenon in Sri Lanka as suggested by a phylogeny of dwarf geckos (Reptilia, Squamata, Gekkonidae, Cnemaspis). *Systematics and Biodiversity*.
- Gamble T, Greenbaum E, Jackman T, et.al. (2017) Repeated evolution of digital adhesion in geckos: a reply to Harrington and Reeder. *Journal of Evolutionary Biology*.
- Heinicke M, Jackman T, Bauer A. (2017) The measure of success: geographic isolation promotes diversification in *Pachydactylus* geckos. *BMC Evolutionary Biology*.
- B R Karin, M Metallinou, J L Weinell, T R Jackman, A M Bauer (2016) Resolving the higher-order phylogenetic relationships of the circumtropical Mabuya group (Squamata: Scincidae): An out-of-Asia diversification. *Molecular phylogenetics and Evolution*. Elsevier.
- Brennan I, Bauer A, Jackman T (2016) Mitochondrial introgression via ancient hybridization, and systematics of the Australian endemic pygopodid gecko genus *Delma*. *Molecular Phylogenetics and Evolution*.
- Gamble T, Greenbaum E, Jackman T, Bauer A. (2015) Into the light : diurnality has evolved multiple times in geckos. *Biological Journal of the Linnean Society*.
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- Bauer A, Masroor R, Titus-Mcquillan J, Heinicke M, Daza J, Jackman T. (2013). A preliminary phylogeny of the Palearctic naked-toed geckos (Reptilia: Squamata: Gekkonidae) with taxonomic implications. *Zootaxa*.
- Wood P, Heinicke M, Jackman T, Bauer A. (2012). Phylogeny of Bent-toed Geckos (*Cyrtodactylus*) Reveals a West to East Pattern of Diversification. *Molecular Phylogenetics and Evolution*
- W R Branch, A M Bauer, T R Jackman et al. (2011) A new species of the *Pachydactylus weberi* complex (Reptilia: Squamata: Gekkonidae) from the Namib-Rand Reserve, southern Namibia., 1-15. In *Breviora*.
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- D M Portik, A M Bauer, T R Jackman (2011) Bridging the gap: western rock skinks (*Trachylepis sulcata*) have a short history in South Africa., 1744-1758. In *Molecular ecology* 20 (8).
- S V Nielsen, A M Bauer, T R Jackman et al. (2011) New Zealand geckos (Diplodactylidae): Cryptic diversity in a post-Gondwanan lineage with trans-Tasman affinities., 1-22. In *Molecular Phylogenetics and Evolution* 59 (1).
- Dibenedetto AJ, Guinto JB, Ebert TD, Bee KJ, Schmidt MM, Jackman T.R. 2008. Zebrafish *brd2a* and *brd2b* are paralogous members of the bromodomain-ET (BET) family of transcriptional coregulators that show structural and expression divergence. *BMC Developmental Biology* 10:8-39 PDF.
- Smith, S.A., Sadlier, R.A., Bauer, A.M., Austin, C.C., and Jackman, T.R. 2007. Molecular phylogeny of the scincid lizards of New Caledonia and adjacent areas: Evidence for a single origin of the endemic skinks of Tasmantis. *Molecular Phylogenetics and Evolution* 43: 1151 -1166.



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**Education**

B.S.	North Carolina State University	1998
M.S.	Northern Arizona University	2000
Ph.D.	Northern Arizona University	2005
Post-Doc Experience	The Smithsonian Environmental Research Center	2005-07

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**Research**

I am interested in how ecosystems respond to, and may feedback to, global change. The most complex and uncertain questions regarding future ecosystems occur in the rhizosphere where plant roots interact intimately with the soil microbes to carry out the majority of terrestrial carbon and nutrient cycling. I use novel isotopic and gas exchange techniques to address these questions. I'm also working on a global change experiment in a brackish marsh on the Chesapeake Bay examining plant and microbial response to elevated CO<sub>2</sub> and nitrogen pollution and sea level rise.

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**Selected Publications**

- \*\*Charbonneau B, Wootton L, Wnek J, Langley JA, Posner, M. 2017. Invasive sedge stabilized dunes more than native grass during Superstorm Sandy. *Journal of Applied Ecology*
- \*\*Pastore MA, Megonigal JP, Langley JA. 2017 Greenhouse gas footprint of a brackish marsh in response to elevated CO<sub>2</sub> and nitrogen. *Biogeochemistry* 133:73-87.
- Faticchi, S, Leuzinger S, Paschalis A, Langley JA, Barraclough AD, Hovenden M. 2016. Partitioning direct and indirect effects discloses the response of water-limited ecosystems to elevated CO<sub>2</sub>. *PNAS* 113: 12757-12762.
- \*\* Pastore MA, Megonigal JP, Langley JA. 2016. Elevated CO<sub>2</sub> promotes long-term nitrogen accumulation only in combination with nitrogen addition. *Global Change Biology* 22: 391-403.
- \*\* Doughty CL, Langley JA, Walker WS, Shaub R, Feller IC, Chapman SK. 2015. Mangrove range expansion rapidly increases coastal wetland carbon storage. *Estuaries & Coasts* 1-12.
- Langley JA, White HK, \*Palanivel RA, Shannon T, Chapman SK. 2015. Marsh plants mediate the influence of nitrogen fertilization on degradation of oil from the Deepwater Horizon spill. *Ecosphere* 6:art126.
- Kirwan ML, Guntenspergen GR, Langley JA. 2014. The temperature sensitivity of organic matter decay in tidal marshes. *Biogeosciences* 11 (17), 4801-4808.
- Langley JA, Hungate BA, 2014. Plant community feedbacks and long-term ecosystem responses to multi-factored global change. *AoB Plants* 6: plu035. doi: 10.1093/aobpla/plu035
- Langley JA, Mozdzer TJ, \*Shepard KA, \*Hagerty SB, Megonigal JP. 2013. Elevated CO<sub>2</sub>, nitrogen pollution and tidal marsh plant response to sea level rise. *Global Change Biology* 19: 1495-1503.
- Chapman SK, \*Palanivel RU, Langley JA. 2012. Soil carbon stability responds to land-use and groundcover management in southern Appalachian agroecosystems. *Soil Science Society of America Journal* 76: 2221-2229.
- Kirwan ML, Langley JA, Guntenspergen GR, Megonigal JP. 2012. The impact of sea-level rise on organic matter decay rates in Chesapeake Bay brackish tidal marshes. *Biogeosciences* 10: 1869-1876.
- Langley JA, Megonigal JP. 2012. Field-based radiometry to estimate tidal marsh plant growth in response to elevated CO<sub>2</sub> and nitrogen addition. *Wetlands* 32: 571-578.
- \*White KA, Langley JA, Cahoon DR, Megonigal JP. 2012. C<sub>3</sub> and C<sub>4</sub> root-shoot biomass allocation responses to elevated CO<sub>2</sub> and nitrogen: contrasting resource capture strategies. *Estuaries & Coasts* 35: 028-1035.
- Langley JA, Megonigal JP. 2010. Ecosystem response to elevated CO<sub>2</sub> levels limited by nitrogen-fuelled species shift. *Nature* 466: 96-99.
- Langley JA, McKee KL, Cahoon DR, Cherry JA, Megonigal JP. 2009. Elevated CO<sub>2</sub> stimulates marsh elevation gain, counterbalancing sea-level rise. *Proceedings of the National Academy of Sciences* 106: 6182-6186.
- Langley JA, McKinley D, Wolf AA, Hungate BA, Drake BG, Megonigal JP. 2009. Priming depletes soil carbon and releases nitrogen in a scrub-oak ecosystem exposed to elevated CO<sub>2</sub>. *Soil Biology & Biochemistry* 41: 54-60.

\*Undergraduate author, \*\*Graduate author

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**Education**

A.B.	Stanford University, Stanford, CA	1977
M.S.	University of Michigan, Ann Arbor, MI	1983
Ph.D.	University of Michigan, Ann Arbor, MI	1990
Post-Doctoral Experience	Northeastern University, Boston, MA	1990-92

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**Research**

Metabolic/muscle physiology and environmental physiology. Ongoing research includes investigation of oxidative stress and the functional and morphological maturation of effector tissues for thermogenesis and locomotion in birds and mammals, muscle function in vertebrates and invertebrates, and ecotoxicology. I use a variety of techniques in my research, and integrate research at the ecological, organismal and suborganismal levels of organization.

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**Selected Publications**

- Olson, J.M., C. Kearney\*, G. Rivera\*\*. 2013. Antioxidant enzymes: Acute and chronic responses to exercise-induced oxidative stress in gastrocnemius muscle of mice. *Integr. Comp. Biol.* (2013) 53 (suppl 1): e346.
- Olson, J.M., K. Allport\*\*, P. Kealey\*\*, S McWilliams, and U. Bauschinger. 2011. Effect of Diet and Training on Ketone Body Metabolism in Starlings. *Integr. Comp. Biol.* (2011) 51 (suppl 1): e103.
- Olson, J.M., A. Caragiulo\*, B. Czerwinski-Shields\*, and D. Soucier\*\*. 2010. Prolonged Cold Exposure in Young Quail: avUCP, Ultrastructure and Catabolic Capacities in Skeletal Muscle. *Integr. Comp. Biol.* (2010) 50 (suppl 1): e128.
- Shea, R. E., J. M. Olson, and R. E. Ricklefs. 2007. Growth rate, protein accumulation, and catabolic enzyme activity of skeletal muscles of Galliform birds. *Physiol. Biochem. Zoology* 80(3):306–316. 2007.
- Dawson, W. R. and J. M. Olson. 2003. Thermogenic capacity and enzymatic activities in the winter-acclimatized dark-eyed junco (*Junco hyemalis*). *J. Thermal Biol.* 28:497-508.
- Olson, J. M. 2001. Ontogeny of catabolic and morphological properties of skeletal muscle of the red-winged blackbird (*Agelaius phoeniceus*). *J. Comp. Physiol.* 171(7):527-542.
- Krijgsveld, K. L., J. M. Olson, and R. E. Ricklefs. 2001. Catabolic capacity of the muscles of shorebird chicks: maturation of function in relation to body size. *Physiol. Biochem. Zool.* 74:250-260.
- Olson, J. M., F. M. A. McNabb, M. S. Jablonski\*\*, and D. V. Ferris\*\*. 1999. Thyroid development in relation to the development of endothermy in the red-winged blackbird (*Agelaius phoeniceus*). *Gen Comp. Endocrinol.* 1999. 116:204-212.
- Olson, J. M. and R. L. Marsh. 1998. Activation patterns and length changes in hindlimb muscles of the bullfrog (*Rana catesbeiana*) during jumping. *J. Exp. Biol.* 201:2763-2777.
- McNabb, F. M. A., and J. M. Olson. 1996. Development of thermoregulation and its hormonal control in precocial and altricial birds. *Poultry and Avian Biology Reviews* 7:111-125.
- Marsh, R. L. and J. M. Olson. 1994. Power output of scallop adductor muscle during contractions replicating the in vivo mechanical cycle. *J. Exp. Biol.* 193:139-156.
- Olson, J. M. 1994. The ontogeny of shivering thermogenesis in the red-winged blackbird (*Agelaius phoeniceus*). *J. Exp. Biol.* 191:59-88.
- Olson, J. M., and R. L. Marsh. 1993. Contractile properties of the striated adductor muscle in the bay scallop, *Argopecten irradians* at several temperatures. *J. Exp. Biol.* 176:175-193.
- Marsh, R. L., J. M. Olson, and S. K. Guzik. 1992. Mechanical performance of scallop adductor muscle during swimming. *Nature* 357:411-413.
- Olson, J. M. 1992. Growth, the development of endothermy, and the allocation of energy in red-winged blackbirds (*Agelaius phoeniceus*) during the nestling period. *Physiol. Zool.* 65:124-152.
- Olson, J. M. 1991. Thermal relations of nestling red-winged blackbirds in southeastern Michigan. *Auk* 108:711-716.
- Marsh, R. L., W. R. Dawson, J. J. Camilliere, and J. M. Olson. 1990. Regulation of glycolysis in the pectoralis muscles of seasonally acclimatized American goldfinches exposed to cold. *Am. J. Physiol.* 258 (Regulatory Integrative Comp. Physiol. 27):R711-R717.
- Olson, J. M., and K. M. Crawford. 1989. Seasonal changes in buffering capacities and the activity of LDH in the heart and skeletal muscle of a vertebrate facultative anaerobe. *J. Exp. Biol.* 145:471-476.

\* Graduate student \*\* Undergraduate student

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**Education**

B.S.	San Diego State University, San Diego, CA	1980
M.S.	San Diego State University, San Diego, CA	1984
Ph.D.	University of California, Berkeley	1990
Post-Doctoral Experience	California Academy of Sciences, San Francisco, CA	1990-92

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**Research**

My research lies at the intersection of marine invertebrate ecology, and fisheries and population biology. Currently I have an active program focusing on the population and larval ecology of commercially important estuarine and marine invertebrates. My work has both basic and applied significance. The kinds of questions I ask shed light on the ecology, life history, and population biology of the organisms I study. At the same time the data I gather are fundamental to the sustainable and intelligent management of these valuable natural resources. Focusing on applied problems often leads to an increase in the basic understanding of nature.

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**Selected Publications**

- Russell, M. P. and C. A. Narváez. 2016. Skeletal ossicles in echinoids are unreliable chronometers. *Marine Biology*. 163: 156-164
- Haag, N.\*, M. P. Russell, and C. Hernández. 2016. Effects of spine damage and microhabitat on resource allocation of the purple sea urchin *Strongylocentrotus purpuratus* (Stimpson 1857). *Journal of experimental marine biology and ecology*. 482: 106-117
- Lützen, J., Å. Jespersen, and M. P. Russell. 2015. The Pacific clam *Nutricola tantilla* (Bivalvia: Veneridae) has separate sexes and makes use of brood protection and sperm storage. *Journal of Molluscan Studies*. 1–10. doi:10.1093/mollus/eyv015
- Russell, M. P. 2013. Echinoderm responses to variation in salinity. *Advances in Marine Biology*. 66: 171 – 213.
- Haag, N\*\*, M. P. Russell, C. Hernández, and N. R. Dollahon. 2013. Assessing fluorochrome-staining efficacy in the green sea urchin, *Strongylocentrotus droebachiensis* (Müller). *Cahiers de Biologie Marine*. 54: 625 – 631.
- Clemente, S., J. C. Hernández, G. Montaña-Moctezuma, M. P. Russell, and T. A. Ebert. 2013. Predators of the sea urchin *Strongylocentrotus purpuratus* and the effects of spatial refuge on juvenile survival. *Journal of Experimental Marine Biology and Ecology*. 160: 579-590
- Elliot, L. F.\*\*, M. P. Russell & J.C. Hernández. 2013. Estimating Echinoid test volume from height and diameter measurements. Pp. 105-112, In: *Echinoderms in a Changing World: Proceedings of 13th International Echinoderm Conference*. C. Johnson editor.
- Russell, M. P., T. A., Ebert, V. Garcia\*\*, and A. Bodnar. 2013. Field and laboratory growth estimates of the sea urchin *Lytechinus variegatus* in Bermuda. Pp. 133-140, In: *Echinoderms in a Changing World: Proceedings of 13th International Echinoderm Conference*. C. Johnson editor.
- Ebert, T. A., J. C. Hernández, and M. P. Russell. 2012. Ocean conditions and bottom-up modifications of gonad development in the sea urchin *Strongylocentrotus purpuratus* over space and time. *Marine Ecology Progress Series*. 467: 147-166.
- Falase, L. E.\*, M. P. Russell, and N. R. Dollahon. 2011. Spermcasting of spermatozeugmata by the bivalves *Nutricola confusa* and *N. tantilla*. *Invertebrate Biology*. 130:334-343.
- Ebert, T. A., J. C. Hernández, and M. P. Russell. 2010. Problems of the gonad index and what can be done: analysis of the purple sea urchin *Strongylocentrotus purpuratus*. *Marine Biology*. 158: 47-58
- Hernández, J. C. and M. P. Russell. 2010. Does presence of substratum cavities affect allometric growth in the sea urchin *Strongylocentrotus purpuratus*? *Journal of experimental biology*. 213: 520-525
- Geraghty, J. \*\*, M. P. Russell and N. Dollahon. 2009. A quantitative assessment of spermatozoa morphology in *Nutricola confusa* and *Nutricola tantilla* (Bivalvia: Veneridae). *Veliger*. 50:263-268
- Ebert, T. A., M. P. Russell, G. Gamba and A. Bodnar. 2008. Growth, survival, and longevity estimates for the rock-boring sea urchin *Echinometra lucunter lucunter* (Echinodermata, Echinoidea) in Bermuda. *Bulletin of Marine Science*. 82: 381–403.
- Barker, M. F. and M. P. Russell. 2008. The distribution and behaviour of *Patiriella mortenseni* and *P. regularis* in the extreme hyposaline conditions of the Southern New Zealand Fiords. *Journal of experimental marine biology and ecology*. 355: 76-84
- Dumont, C. P.\*, J. H. Himmelman and M. P. Russell. 2006. Daily movement of the sea urchin *Strongylocentrotus droebachiensis* in different subtidal habitats in eastern Canada. *Marine Ecology Progress Series*. 317: 87-99

\*Graduate student

\*\*Undergraduate student

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**Education**

B.S.	Villanova University, Villanova, PA	1983
Ph.D.	Pennsylvania State University, Hershey	1987

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**Research**

Cell biology and physiology. My research interests are primarily focused on regulatory mechanisms of signals that modulate uterine tissue growth and remodeling. We use an *in vivo* model system in the rodent to more specifically define patterns of regulation induced by hormones and other bioactive chemicals. Laboratory projects center on two main areas:

1) Estrogen induced uterine tissue inflammation activated via rapid receptor signaling pathways. The current focus is on G-protein coupled estrogen receptor (GPER) which is a ubiquitous membrane associated receptor that activates a variety of rapid signaling pathways including those involved in cell proliferation and survival. Utilizing *vivo* morpholino knockdown techniques in an immature rat ovariectomized rat model, we are currently working to assess how estrogen-induced inflammatory response is altered in the absence of GPER expression and to further characterize roles of this signaling protein in rapid uterine tissue response to estrogen.

2) Effects of xenoestrogenic environmental contaminants such as bisphenol A or DEHP or natural plant based estrogenic agents such as genistein found in soybeans on mammalian tissue biology and metabolic response. These bioactive compounds are implicated as causative agents in breast and prostate cancer, human infertility, and metabolic imbalance/obesity. Humans are exposed to these agents primarily through food and water sources such as with bisphenol A and genistein. In our current studies, we utilize either immature ovariectomized rat or adult ovariectomized mouse model organisms with chronic chemical treatments in the presence or absence of estrogen to assess complex biological effects and chemical response interactions on multiple morphological and biochemical endpoints in hormone responsive tissues including uterus, mammary gland, and liver.

With either project area experimental techniques include protein expression analysis via Western blot or ELISA, visualization of protein expression via immunohistochemistry with confocal microscopy, transmission electron microscopy to visualize ultrastructure changes in tissue morphology, and mRNA expression profiling via qPCR.

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**Selected Publications**

- Yudt, M. R., Russo, L.A., Berrodin, T. J. , Ellis, D. , Jelinsky, S.A. , Cohen, J. C. , Cooch, N., Unwalla, R. J., Fensome, A., Wrobel, J., Zhang, Z., Nagpal, S. and Winneker, R. C. Discovery of a Novel Mechanism of Steroid Receptor Antagonism: WAY-255348 Modulates Progesterone Receptor Cellular Localization, Phosphorylation and Promoter Interactions. *Biochemical Pharmacology*, 82: 1709-1719, 2011.
- Russo, L. A., B. J. Peano, S. P. Trivedi, T. D. Cavalcanto, B. A. Olenchock, J. A. Caruso, A. R. Smolock, O. Vishnevsky, and R. M. Gardner. 2009. Regulated expression of matrix metalloproteinases, inflammatory mediators, and endometrial matrix remodeling by 17 $\beta$ -estradiol in the immature rat uterus. *Reproductive Biology and Endocrinology* 7:124. (Open Access article)
- Russo, L., Vishnevsky, O.\*\*, Caruso, J.\*\*, and Gardner, R. 2006. The role of inflammation in estrogen-induced extracellular matrix turnover and MMP regulation in the immature rat uterus. *FASEB Journal*, Vol. 20, No. 5 Part II.
- Hafey, M\*, Russo, L.A., and Dollahon, N. Selective estrogen receptor modulators, tamoxifen and the raloxifene analogue LY117018, induce changes in uterine collagen matrix organization. *FASEB Journal*, 2003.
- Peano, B.J.\* and Russo, L.A. 17 $\beta$ -estradiol differentially regulates MMP-3, 7, and 9 in the immature rat uterus. *FASEB Journal*, 2003.
- Russo, L.A. and Olenchock, B.A.\*\* 2000. *In Vivo* regulation of matrix metalloproteinase mRNA expression by 17 $\beta$ -estradiol in the immature rat uterus. *Molecular Biology of the Cell*, Vol. 11 Suppl.: 259a.
- Russo, L. A., Calabro, S. P., Filler\*, T. A., Carey, D. J. and Gardner, R. M. 2001. *In Vivo* regulation of Syndecan-3 Expression in the Rat Uterus by 17 $\beta$ -Estradiol. *Journal of Biological Chemistry*, Vol. 276, pp. 686-692.
- Morgan, H. E., B. H. L. Chua, and L. A. Russo. 1992. Protein synthesis and degradation. In: *The Heart and Cardiovascular System*, Second edition. H. A. Fozzard et al., eds. Raven Press Ltd., New York, pp. 1505-1524.
- Russo, L. A., and H. E. Morgan. 1991. Effects of diabetes on cardiac protein metabolism. In: *Diabetic Heart*. N. Nagano and N. S. Dhalla, eds. Raven Press, New York, pp. 249-262.

\*Graduate student \*\* Undergraduate student

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**Education**

B.Sc.	State University of New York at Stonybrook	2000
M.Ed.	George Mason University, Fairfax, VA	2016
Ph.D.	Brown University, Providence, RI	2007
Post-Doctoral Experience	University of WI, Madison; Janelia Research Campus/HHMI	2007-16

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**Research**

Males and females of all kinds of animals can differ greatly in behavior, especially during social interactions. These differences are often not learned, but innate—meaning they are ‘hardwired’ in the brain by actions of genes. How do genes build the potential for an individual to behave with respect to one sex but not the other? And how do sex-specific behaviors evolve in the first place?

Our laboratory attempts to answer these questions using the innate sexual behaviors of the fruit fly, *Drosophila*. During courtship, a *Drosophila* male will vibrate a wing to produce a “song” for the female, whereas a female does not sing, but decides whether or not to mate. Several genes have been discovered that build the potential for male or female behavior in flies. How these genes shape the neural circuits that guide sex-specific behaviors is unclear. And next to nothing is known about how those neural circuits emerged during evolution. We study these problems using a variety of genetic, anatomical and behavioral experiments on a variety of *Drosophila* species. We are hopeful that our findings will offer general insights into the genetics, neurobiology and evolution of innate behaviors and sexual differences.

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**Selected Publications**

Shirangi TR. Motor Control: Winging It with a Few Good Muscles. *Curr Biol*. 2017 Feb 6;27(3):R115-R116.

Shirangi TR, Wong AM, Truman JW, Stern DL. *Doublesex* Regulates the Connectivity of a Neural Circuit Controlling *Drosophila* Male Courtship Song. *Dev Cell*. 2016 Jun 20;37(6):533-44.

Shirangi TR, Stern DL, Truman JW. Motor control of *Drosophila* courtship song., *Cell Rep*. 2013 5(3):678-86.

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**Education**

B.S.	University of California, Davis	2006
Ph.D.	University of Akron	2014
Post-Doctoral Experience	University of Louisville	2014-17

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**Research**

My research program uses an integrative approach to explore how environmental factors affect the morphology, performance, and behavior of biological organisms. I integrate laboratory and field-based methods rooted in biology, with analytical and theoretical methods from physics, chemistry, and material science. Currently I use ants, geckos, and sea urchins (with Dr. Michael Russell) to explore questions about the **functional morphology of adhesion**.

I have three major areas of interest:

1. Research on the adhesive systems of ants and geckos has principally focused the physical **mechanism** of adhesion. However, this has left gaps in our understanding of the chemical, material, and morphological characteristics of these systems. My collaborators and I fill these gaps using techniques such as mass spectrometry, NMR, and SEM.
2. Most biological adhesive systems are tested in controlled laboratory conditions. However, this approach often neglects whole organism **performance, behavior**, and relevant abiotic and biotic environmental factors. To address these complex interactions, I test static and dynamic adhesion of live ants and geckos in a variety of ecologically relevant conditions in the laboratory and in the field. I use these results to make predictions and test questions about the behavior, ecology, and evolution of these systems.
3. I am interested in the **application** of bio-inspired design and biomimicry to real-world problems. I apply the insights I glean from the mechanistic, performance, and behavioral attributes of natural adhesive systems to synthetic adhesive systems. I also find that focus on application provides important opportunities for collaboration within and outside of academia, interdisciplinary education, and service.

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**Selected Publications** (for a complete list of publications, visit [www.alyssaystark.com](http://www.alyssaystark.com))

- 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*. In press.
- Stark, A. Y.**, H. R. Davis\* & W. K. Harrison\*\*. 2019. Shear adhesive performance of leaf-cutting ant workers (*Atta cephalotes*). *Biotropica*. In press.
- 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*.
- 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*.
- Stark, A. Y.**, K. Arstingstall\*\* & S. P. Yanoviak. 2018. Adhesive performance of tropical arboreal ants varies with substrate temperature. *Journal of Experimental Biology* doi:10.1242/jeb.171843
- 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
- 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
- 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)
- 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
- 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)
- 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)
- 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

\*\*Undergraduate student, \*Graduate student

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**Education**

B.A.	Amherst College, Amherst, MA	1974
M.A.	University of Missouri, Columbia	1978
Ph.D.	West Virginia University, Morgantown	1982
Post-Doctoral Experience	West Virginia University, Morgantown	1982-84

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**Research**

Ongoing research activities focus on the biogeochemistry and ecosystem ecology of boreal peatland ecosystems. These ecosystems collectively contain 1/3 of the world's soil carbon, and have accumulated this carbon as peat over the past several thousand years. Our research strives to understand past, present, and future carbon cycling in these systems, especially in the face of natural and anthropogenic disturbances. Current research focuses on the impacts of enhanced nitrogen and sulfur acid deposition on peatlands resulting from ongoing oil sands development in the Fort McMurray area of Alberta and on nitrogen cycling after fire in Alberta peatlands.

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**Selected Publications**

- Wieder, R.K., D.H. Vitt, M.A. Vile, J.A. Graham\*, J.A. Hartsock\*, H. Fillingim, M. House, J.C. Quinn, K.D. Scott, M. Petix\*, K.J. McMillen. 2019. Experimental nitrogen addition alters structure and function of a boreal bog: Critical load and thresholds revealed. *Ecological Monographs*, DOI 10.1002/ecm.1371.
- Hartsock\*, J.A., R.K. Wieder, M.A. Vile. 2019. Nitrogen retention by *Sphagnum fuscum* in laboratory mesocosms: Responses to experimentally added NH<sub>4</sub><sup>+</sup>-N and NO<sub>3</sub><sup>-</sup>-N. *Wetlands* 39: 79-85.
- Stuart\*, J.E.M., R.K. Wieder, M.A. Vile. 2018. Net nitrogen mineralization in Alberta Bog peat is insensitive to experimentally increased nitrogen deposition and time since wildfire. *Biogeochemistry* 138: 155-170.
- Wieder, R.K., M.A. Vile, K.D. Scott, C.M. Albright, K. McMillen, D.H. Vitt, M. Fenn. 2016. Differential effects of high atmospheric N and S deposition on bog plant/lichen tissue and porewater chemistry across the Athabasca Oil Sands Region. *Environmental Science and Technology* 50: 12630-12640.
- Wieder, R.K., M.A. Vile, C.M. Albright, K.D. Scott, D.H. Vitt, J.C. Quinn, M. Burke-Scoll\*. 2016. Effects of altered atmospheric nutrient deposition from Alberta oil sands development on *Sphagnum fuscum* growth and C, N, and S accumulation in peat. *Biogeochemistry* 129: 1-19.
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- Vile, M.A., R.K. Wieder, T. Živković\*, K.D. Scott, D.H. Vitt, J.A. Hartsock\*, C.L. Iosue, J.C. Quinn, M. Petix\*, H. Fillingim\*, J.M.A. Popma\*, K.A. Dynarski\*\*, T.R. Jackman, C.M. Albright and D.D. Wykoff. 2014. N<sub>2</sub>-fixation by methanotrophs sustains carbon and nitrogen accumulation in peatlands. *Biogeochemistry* 121: 317-328.
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- Benavides, J.C., D.H. Vitt and R.K. Wieder. 2013. The influence of climate change on recent peat accumulation patterns of *Distichia muscoides* cushion bogs in the high elevation tropical Andes of Colombia. *Journal of Geophysical Research-Biogeosciences* 118: 1627-1635.
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\*Graduate student

\*\*Undergraduate student

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**Education**

B.S.	Bates College	1992
Ph. D.	Columbia University	1998
Postdoctoral	Yale University	1998-2000
	Tulane University	2000-2005
	Arizona State University Biodesign Institute	2006-2008

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**Research**

Our lab works on two main areas:

1. Highly-conserved yet unexplored genes in bacteria (as a resource for improving bacterial engineering and vaccine design)
2. Cloning and transfer of large gene systems in bacteria (to study their evolution and application in synthetic biology and cellular engineering across species)

Unexplored genes: The genomics revolution has allowed us to sequence and decode virtually all known bacterial genomes. This has allowed us to identify a certain category of genes that are highly-conserved across bacterial species yet are unexplored and remain totally unstudied. Nothing is known about the role of these genes in bacterial biology. We believe these genes represent an untapped resource of gene function that would be beneficial to bacterial engineering and help us learn about conserved gene mechanisms in different bacteria. We target these unexplored regions of the bacterial genome for study. We have found a variety of conserved phenotypes associated with these genes in Gram negative bacteria (mostly starting off in *Salmonella* but branching out to other species as well). These discoveries establish new tools for bacterial engineering, synthetic biology, and vaccine design.

Cloning and transfer of large gene systems: Using techniques termed VEX-Capture and FRT-Capture, we are able to conveniently clone large genomic segments in bacteria (40-100+ Kb) and easily transfer these segments to new bacterial recipients. We have targeted large contiguous gene systems for analysis using this approach. We cloned the entire SPI-1 and SPI-2 type three secretion systems from *Salmonella enterica* and have studied their expression and function in other Gram negative recipients. We have also cloned the entire *pdu/cob/cbi* gene system from *Salmonella enterica* (which functions to form a protein-based organelle called a microcompartment or MCP), and we have shown that this system is functional across different bacteria. These studies open new doors to functional applications in bacteria and to new avenues of synthetic biology.

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**Selected Publications**

- Graf, L, Wu K, and **Wilson JW**. 2018. Transfer and analysis of *Salmonella pdu* genes in a range of Gram negative bacteria demonstrates exogenous microcompartment expression across a variety of species. *Microbial Biotechnology*. 2018 Jan;11(1):199-210.
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- Santiago, C. P., L. N. Quick, and **J. W. Wilson**. 2011. Self-transmissible IncP R995 plasmids with alternative markers and utility for Flp/FRT cloning strategies. *J. Microbiol. Biotechnol*. 21(11):1123-1126.
- Jennings M.E., Quick L.N., Soni A., Davis R.R., Crosby K., Ott C.M., Nickerson C.A., and **J.W. Wilson**. 2011. Characterization of the *Salmonella enterica* Serovar Typhimurium *ycdI* Gene, Which Encodes a Conserved DNA Binding Protein Required for Full Acid Stress Resistance. *J. Bacteriol*. 193(9):2208-17.



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**Education**

B.S.	University of California, Davis	1993
Ph. D.	Stanford University	1999
Postdoctoral	University of California, San Francisco	1999-2005
	Harvard University	2005-2006

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**Research**

Our work studies how thiamine metabolism is regulated in *C. glabrata* at the level of thiamine biosynthetic promoters and transcriptional activators. By understanding how these promoters are regulated, rational strategies to alter the expression of thiamine starvation genes can be explored. Our work also examines whether thiamine nutrient status and the presence of CgPmu3 (and other thiamine regulated genes) influences the ability of *C. glabrata* to persist and multiply in phagocytic, macrophage-like cells. As clearance of *C. glabrata* is mediated by phagocytic cells. If the ability to acquire thiamine is defective in *C. glabrata*, then this fungal pathogen should be more easily cleared from the bloodstream by phagocytic cells. Long-term our work will provide a better understanding of the thiamine biosynthetic and acquisition pathway and determine if this pathway is a suitable target for the development of anti-fungal compounds.

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**Selected Publications**

- Nahas JV<sup>@</sup>, Iosue CL, Shaik NF<sup>@</sup>, Selhorst K<sup>@</sup>, He BZ & Wykoff DD. 2018. Dynamic Changes in Yeast Phosphatase Families Allow for Specialization in Phosphate and Thiamine Starvation. *G3* pii: g3.200303.2018. doi: 10.1534/g3.118.200303.
- Barreto CR, Morrissey EM, Wykoff DD & Chapman SK. 2018. Co-occurring mangroves and salt marshes differ in microbial community composition. *Wetlands* doi.org/10.1007/s13157-018-0994-9.
- Burch J, Mashayekh S, Wykoff DD, & Grimes CL. 2018. Bacterial derived carbohydrates bind Cyr1 and trigger hyphal growth in *Candida albicans*. *ACS Infectious Diseases* 4(1):53-58. doi: 10.1021/acsinfecdis.7b00154.
- Coldren GA, Barreto C#, Wykoff DD, Morrissey EM, Langley JA, Feller IC, & Chapman SK. 2016. Chronic warming stimulates growth of marsh grasses more than mangroves in a coastal wetland ecotone. *Ecology* 97(11):3167-3175. doi: 10.1002/ecy.1539.
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- Iosue CL#, Attanasio N\*#, Shaik N@, Neal EM#, Peel M@, Leone SG#, Cali B@, Grannas AM, & Wykoff DD. 2016. Partial decay of thiamine (THI) signal transduction pathway alters growth properties of *Candida glabrata*. *PLoS ONE* 11(3):e0152042 (# authors contributed equally to work).
- Orlando KA, Iosue CL, Leone SG@, Davies DL@, & Wykoff DD. 2015. A Paralog of the Phosphomutase-Like Gene Family in *Candida glabrata*, CgPmu2, Gained Broad-Range Phosphatase Activity Due to a Small Number of Sequence Substitutions. *Biochemical Journal* 471(2): 187-198.
- Estill M\*, Kerwin-Iosue CL, & Wykoff DD. 2015. Dissection of the PHO pathway in *Schizosaccharomyces pombe* using epistasis and the alternate repressor adenine. *Current Genetics* 61(2): 175-183.
- Vile MA, Wieder RK, Scott KD, Vitt DH, Hartsock JA, Iosue CL, Quinn JC, Petix M, Fillingim H, Popma JMA, Dynarski KA, Jackman TR, Albright CM, & Wykoff DD. 2014. N<sub>2</sub>-fixation by methanotrophs sustains carbon and nitrogen accumulation in pristine peatlands. *Biogeochemistry* 121: 317-328.
- Corrigan MW@, Kerwin-Iosue CL, Kuczmariski AS@, Amin KB@, & Wykoff DD. 2013. The Fate of Linear DNA in *Saccharomyces cerevisiae* and *Candida glabrata*: the Role of Homologous and Non-Homologous End Joining. *PLoS ONE* 8(7):e69628
- Carter-O'Connell I, Peel M.@, Wykoff DD\*, & O'Shea EK\*. 2012. Genome-Wide Characterization of the Phosphate Starvation Response in *Schizosaccharomyces pombe*. *BMC Genomics* 13:697-712 (\* = co-corresponding authors)
- Kerwin C.L. & Wykoff D. D. 2012. De novo generation of a phosphate regulated promoter in *Candida glabrata*. *FEMS Yeast Research* 12:980-989.

\* Graduate Student @=Undergraduate student

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**Education**

B.S.	Pepperdine University, Malibu, CA	1999
Ph.D.	Johns Hopkins University School of Medicine, Baltimore, MD	2007
Postdoctoral Research	University of Massachusetts Medical School, Worcester, MA	2007-2012

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**Research**

Like a photocopy of architectural blueprints sent by FedEx to the builder, RNA molecules are classically thought of as the “messengers” of genetic information: carrying recipes for the manufacture of critical proteins to defined locations in the cell. In addition to this role as messenger, however, an ever-increasing catalog of noncoding RNAs – those which do not encode a protein but have inherent function as RNA molecules – play essential roles in all kingdoms of life, and their dysfunction has been linked to cancer, neurodegenerative disease, and a host of other biological processes. My research is focused on understanding the synthesis, regulation and function of a class of small noncoding RNAs known as endogenous small interfering RNAs (endo siRNAs). Because of the extensive genetic and molecular tools available, and because of its history as an important organism in small RNA research, we use the nematode *Caenorhabditis elegans* as a model for small RNA function. The *C. elegans* genome expresses an extensive collection of endo siRNAs that are required for proper development and function of germ (sperm and egg) cells and for faithful chromosome segregation in germ cells and the early embryo. We are using classical genetics and molecular biology in addition to modern next-generation sequencing and comparative genomics to understand the mechanisms that regulate production of diverse endo siRNAs, and to understand how these endo siRNAs function to maintain fertility and chaperone development of the early embryo. Because endo siRNAs and other classes of small noncoding RNAs are known to play a role in development of germ cells in a wide variety of animals, our results are likely to have implications for broader fertility research.

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**Selected Publications**

- Youngman EM** and Claycomb JC. From early Lessons to new frontiers: The worm as a treasure trove of small RNA biology. *Front Genet.* 2014 Nov 27;5:416.
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- Gu W, Shirayama M, Conte D Jr, Vasale J, Batista PJ, Claycomb JM, Moresco JJ, **Youngman EM**, Keys J, Stoltz MJ, Chen CC, Chaves DA, Duan S, Kasschau KD, Fahlgren N, Yates JR 3rd, Mitani S, Carrington JC, Mello CC. Distinct argonaute-mediated 22G-RNA pathways direct genome surveillance in the *C. elegans* germline. *Mol Cell.* 2009 Oct 23;36(2):231-44.
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- Youngman EM**, He SL, Nikstad LJ, Green R. Stop codon recognition by release factors induces structural rearrangement of the ribosomal decoding center that is productive for peptide release. *Mol Cell.* 2007 Nov 30;28(4):533-43. [Commentary, *Mol Cell.* 2007 Nov;28(4):517-9]
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- Brunelle JL, **Youngman EM**, Sharma D, Green R. The interaction between C75 of tRNA and the A loop of the ribosome stimulates peptidyl transferase activity. *RNA.* 2006 Jan;12(1):33-9.
- Youngman EM**, Green R. Affinity purification of in vivo-assembled ribosomes for in vitro biochemical analysis. *Methods.* 2005 Jul;36(3):305-12.
- Youngman EM**, Brunelle JL, Kochaniak AB, Green R. The active site of the ribosome is composed of two layers of conserved nucleotides with distinct roles in peptide bond formation and peptide release. *Cell.* 2004 May 28;117(5):589-99

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**Education**

B.S.	Pepperdine University, Malibu, CA	1998
Ph.D.	Johns Hopkins University School of Medicine, Baltimore, MD	2007
Postdoctoral	Massachusetts Institute of Technology, Cambridge, MA	2007-2012

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**Research**

Work in my lab is focused on understanding the molecular basis of the changes in immunity that accompany aging, including the age-dependent decline in immune function known as “immunosenescence”. We use a primarily genetic approach to study host defense and the physiological response to infection during aging in the roundworm *Caenorhabditis elegans*. Since many of the genetic determinants of lifespan were first discovered in *C. elegans*, worms have become the preeminent model system in which to study the biology of aging. Moreover, worms are protected from microbial infection by an ancient innate immune system consisting of antimicrobial peptides and other immune effector proteins that are regulated by evolutionarily conserved immune signaling pathways. We therefore anticipate that our discoveries will have significant implications for the underlying cause of deficient immune function during aging in diverse species, including older humans. Ongoing work in the lab is directed toward determining how the activity of immune signaling pathways is modulated during aging, identifying genes with important roles in host defense later in life, and defining key age-dependent changes in cellular function that impact resistance to infection.

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**Selected Publications**

- Youngman, M.J., Rogers, Z.N., Kim, D.H. 2011. A decline in p38 MAPK signaling underlies immunosenescence in *Caenorhabditis elegans*. *PLoS Genetics* 7(5):e1002082. doi:10.1371/journal.pgen.1002082.
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- Shivers, R.P., Youngman, M.J., and Kim, D.H. 2008. Transcriptional responses to pathogens in *Caenorhabditis elegans*. *Current Opin. Microbiol.* 11(3):251-6.
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- Youngman, M.J., Aiken Hobbs, A.E., Burgess, S.M., Srinivasan, M., and Jensen, R.E. 2004. Mmm2p, a mitochondrial outer membrane protein required for yeast mitochondrial shape and maintenance of mtDNA nucleoids. *J. Cell Biol.* 164(5):677-88.
- Jensen, R.E., Dunn, C.D., Youngman, M.J., and Sesaki, H. 2004. Mitochondrial building blocks. *Trends Cell Biol.* 14(5):215-8.
- Youngman, M.J. and Green, D.B. 1999. Microwave-assisted extraction of C<sub>60</sub> and C<sub>70</sub> from fullerene soot. *Talanta* 48:1203-1206.

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