Faculty Research Interests

Department of Biology
Villanova University

Revised: September, 2017

Professor **DR. ANIL BAMEZAI**

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

Research

One research project in my laboratory focuses on the role of lipid rafts in spatiotemporal regulation of cell signaling in $CD4^+$ 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 $CD4^+$ 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 $CD4^+$ 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 $CD4^+$ 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 $CD4^+$ 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^{2+} 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.

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+ 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-¿ producing, IL-4 and IL-7 responsive memory-like CD4+ T cells. Vaccine, 30(12):2140-2145

*Kennedy C, *Nelson MD and AK. Bamezai. 2011. Analysis of Detergent-free Lipid Rafts isolated from CD4+ 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+ 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

Education

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

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.

Selected Publications

B.R.Karin, M. Metallinou, JL Weinell, TR Jackman, AM 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.

Scharf, I., Feldman, A., Novosolov, M., Pincheira-Donoso, D., Das, I., Bohm, M., Uetz, P., Torres-Carvajal, O., Bauer, A.M., Roll, U., and S. Meiri. 2015. Late bloomers and baby boomers: an analysis of ecological drivers of squamate longevity. Global Ecology and Biogeography 24: 396–405.

Grismer, J.L.*, Bauer, A.M., Jackman, T.R., and L.L. Grismer. 2014. Multiple origins of parthenogenesis, and a revised species phylogeny for the Southeast Asian butterfly lizards, *Leiolepis*. Biological Journal of the Linnean Society 113:1080–1093.

Bauer, A.M. 2013. Geckos: The Animal Answer Guide. Johns Hopkins University Press, Baltimore. 159 pp., 16 pp. 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.

Wood, P.L., Jr.*, Heinicke, M.P., Jackman, T.R., and Bauer, A.M. 2012. Phylogeny of bent-toed geckos (*Cyrtodactylus*) reveals a west to east pattern of diversification. Molecular Phylogenetics and Evolution 65:992–1003.

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.

Portik, D.*, Bauer, A.M., and Jackman, T.R. 2011. Bridging the gap: Western Rock Skinks (*Trachylepis sulcata*) have a short history in South Africa. Molecular Ecology 20:1744–1758.

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.

Bauer, A.M., Jackman, T.R., Greenbaum, E., Giri, V., and De Silva, A. 2010. South Asia supports a major endemic radiation of *Hemidactylus* geckos. Molecular Phylogenetics and Evolution 57:343-352.

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.

Bauer, A.M. , Lamb, T., and Branch, W.R. 2006. A revision of the *Pachydactylus serval* and *P. weberi* groups (Reptilia: Squamata: Gekkonidae) of Southern Africa, with the description of eight new species. Proceedings of the California Academy of Sciences 57:595-709.

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 **Undergraduate Student

Associate Professor **DR. SAMANTHA CHAPMAN**

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

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?

Selected Publications

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/x12237-015-9993-8

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_2 and Nitrogen Fertilization. PlosOne DOI: 10.1371/journal.pone.0114596

Feller, I.C., A.H Chamberlain, C. Piou, S. K. Chapman, and C.E. Lovelock. 2013 Latitudinal patterns of herbivory in mangrove forests: consequences of nutrient over-enrichment. Ecosystems 16: 1203-1215.

Classen, A.T., S.K. Chapman, T.G. Whitham, S.C. Hart, and G.W. Koch. 2013. Long-term insect herbivory slows tree growth and soil development in an arid ecosystem. Ecosphere 4(5), article 52.

Chapman, S.K. G.S. Newman, S.C. Hart, J.A. Schweitzer, and G.W. Koch. 2013. Leaf litter mixtures alter microbial community development: mechanisms for non-additive effects in litter decomposition. PLOS One 8(4): e62671.

Chapman, S.K. R.U. Palanivel** and J. Adam Langley. 2012. Soil carbon stability responds to land-use and groundcover management in Southern Appalachian agro-ecosystems. Soil Science Society of American Journal 76:2221–2229.

Simpson, L.T.* I.C. Feller and **S.K. Chapman.** 2012**.** Effects of competition and nutrient enrichment on *Avicennia germinans* in the salt marsh-mangrove ecotone. Aquatic Botany 104: 55-59

R.O. and S.K. Chapman. 2011. "The roles of biotic resistance and nitrogen deposition in regulating non-native understory diversity". Plant and Soil 345: 2257-269.

S.K. and I.C. Feller. 2011. Away-field advantage: mangrove seedlings grow best in litter from other mangrove species. Oikos 120: 1880-1888.

Chapman, S.K. and G.S. Newman. 2010. Biodiversity at the plant-soil interface: Microbial abundance and community structure drive synergisms during mixed litter decomposition. Oecologia 162: 771-780.

Chapman, S.K., J.A. Schweitzer, and T.G. Whitham. 2006. Herbivory differentially alters plant litter dynamics of evergreen and deciduous trees. Oikos 114: 566-574. *the first two authors contributed equally to this paper

Chapman, S.K., J.A. Langley, S.C. Hart, and G.W. Koch. 2006. Plants actively control nitrogen cycling: uncorking the microbial bottleneck. New Phytologist 169: 27-34.

Professor **DR. ROBERT L. CURRY**

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

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.

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

Associate Professor **DR. ANGELA J. DI BENEDETTO**

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

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, ChIP, RIP, 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.

Selected Publications

Murphy*, T., Melville*, H., Fradkin**, E., Bistany*, G., Comstock**, C., Hanby**, H., Garbade**, E., and DiBenedetto A.J. Phenotypic characterization of brd2 knock-down embryos in zebrafish reveals central nervous system defects and misregulation of Hox gene expression. Under review at BMC Developmental Biology

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 Develepmental Biology 8:** 39-58.

Rodriguez**, J. and DiBenedetto, A.J., 2008. Expression of *brd2a* and *brd2b* in zebrafish spermatogenesis. D**evelopmental Biology 319:** S18

Francis*, L. and DiBenedetto, A.J., 2008. Expression and mechanism of localization of *brd2b* in zebrafish oogenesis. **Developmental Biology 319:** S19

DiBenedetto, A.J. and Murphy*, T. 2007. Phenotypic analysis of transcriptional coactivator *brd2* knockdowns in zebrafish. **Developmental Biology 306:** S68.

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 extend 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

Associate Professor **DR. VIKRAM IYENGAR**

Education

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

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.

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) Corematal 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.

Professor **DR. TODD R. JACKMAN**

Education

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

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.

Selected Publications

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.

Vile M, Kelman Wieder R, Živković T, Scott K, Vitt D, Hartsock J, Iosue C, Quinn J, Petix M, Fillingim H, Popma J, Dynarski K, Jackman T, Albright C, Wykoff D (2014). N2-fixation by methanotrophs sustains carbon and nitrogen accumulation in pristine peatlands. Biogeochemistry.

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.

E L Stanley, A M Bauer, T R Jackman et al. (2011) Between a rock and a hard polytomy: rapid radiation in the rupicolous girdled lizards (Squamata: Cordylidae)., 53-70. In Molecular Phylogenetics and Evolution 58 (1).

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.

Bauer, A.M., Jackman, T.R., Sadlier, R. A., and Whitaker, A. H. 2006. A New Genus and Species of Diplodactylid Gecko (Reptilia: Squamata: Diplodactylidae) from Northwestern New Caledonia. Pacific Science 60:125 - 135.

Bauer, A.M., Jackman, T.R., 2006. Phylogeny and microendemism of the New Caledonian lizard fauna. Herpetologia Bonnensis II. Proceedings of the 13th Congress of the Societas Europaea Herpetologica pp 9-13.

Professor **DR. JANICE E. KNEPPER**

Education

A.B.	Mount Holyoke College, South Hadley, MA	1973
Ph.D.	Brown University, Providence, RI	1979
Post-Doctoral Experience	Johns Hopkins University, MD	1978-81
	New Jersey Medical School	1981-1982
	Baylor College of Medicine	1983-87

Research

The focus of research in my laboratory is the molecular biology of mouse mammary gland development and tumorigenesis. We have identified a gene, zc3h8, which contributes to breast tumor cell proliferation and invasiveness. The gene encodes a protein with predicted RNA binding capacity that is a component of a complex involved in transcription of snRNA genes. The protein localizes to discrete subnuclear bodies. We explore the structural features of the ZC3H8 protein that influence its activity and localization. Strategies employed in our studies include a variety of molecular techniques, including gene cloning, mapping, and sequencing, hybridization and polymerase chain reaction (PCR) analysis, *in vitro* mutagenesis, and transcription analysis. We assess cellular localization using the Department's new confocal microscope. Cell culture systems are important tools for these studies.

Selected Publications

Schmidt, JA, Duffner**, E, Walker, G**, Danielson, KG, and Knepper, JE. 2017. "Zc3h8 associates with PML bodies and influences aggressive tumor cell behavior" *Proc Amer Assoc Cancer Res* **58**:2555.

Schmidt JA, K.G. Danielson, J.L. Swiatek**, E.R. Duffner**, J.E. Knepper. 2016. "Association of ZC3H8 with nuclear bodies and its role in promoting tumor cell behavior in vitro and in vivo." *Mol. Biol. Cell.* **27**: P1229.

E. K. Johnston*, M. K. Francis, and J. E. Knepper. 2015. "Recombinant pigment epithelium derived factor binds vascular endothelial growth factor receptors 1 and 2. *In Vitro Cellular and Developmental Biology, Animal* **51**:730-738. (DOI) 10.1007/s11626-015-9884-0

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

Anderson, T.*, Cali, C.**, Bell, K.*, Danielson, K. G., Klein, A.*, Martin, C.**, Radecki, S.**, Santoro, A.**, Schmidt, J. A., and Knepper, J. E. 2014. "Alteration of mammary tumor cell behavior by Fliz1" *Proc Amer Assoc Cancer Res* **55**: 3391.

Shrestha, E.*, Wang, T.**, Saunders, J.**, and Knepper, J.E. 2012. "Fliz-1 regulation of GATA-3 expression in mammary tumor cells" *Proc Amer Assoc Cancer Res* **53**: 2197.

Timakhov,R.A., Tan,Y., Rao,M.*, Liu, Z., Altomare,D.A., Pei,J, Wiest,D.L., Favorova,O.O., Knepper,J.E., and Testa, J.R. 2009. "Recurrent Chromosomal Rearrangements Implicate Oncogenes Contributing to T-Cell Lymphomagenesis in Lck-MyrAkt2 Transgenic Mice." *Genes, Chromosomes,& Cancer* **48**:786-794.

Tan, Y.F., R. A. Timakhov, M. Rao*, D.A. Altomare, J. Xu, Z. Liu, Q. Gao, S. Jhanwar, A. DiCristofano, D. L. Wiest, J. E. Knepper, and J. R. Testa. 2008. "A novel recurrent chromosomal inversion implicates the homeobox gene D1x5 in T-cell lymphomas from Lck-Akt2 transgenic mice". *Cancer Res*: **68**:1296-1302.

Knepper, J. E., S. Niglio**, D. Boland**, and J. P. Gorres**. 2007. A new integration locus for mouse mammary tumor virus features repeated chromosomal translocations and increased expression of a nearby cellular gene. *Proc Amer Assoc Cancer Res* **48**:1734.

Burke, M. A.*, D. Hutter, R. P. Reshamwala*, and J. E. Knepper. 2003. "Cathepsin L plays an active role in involution of the mouse mammary gland". *Developmental Dynamics*: **227**(3):315-22.

Hutter, D., M. Burke*, R. Reshamwala*, and J. Knepper. 2001. "Cathepsin L involvement in mouse mammary gland involution". *Mol. Biol. Cell* **12**: 2289, Suppl S.

Mehle, A. A., P. J. Wermuth*, and J. E. Knepper. 1998. "Characterization of the long terminal repeat regions of mouse mammary tumor virus isolates from a spontaneous mammary tumor arising in a BALB/c mouse." *Proc Amer Assoc Cancer Res* **39:135.

Chen, Z., J. E. Knepper, and A. A. Gaspari. 1995. Minor histocompatibility antigen dependent rejection of Pam 212 epidermoid carcinoma by DBA/2 mice. Cellular Immunology 164:90-99.

*Graduate student

** Undergraduate student

Associate Professor **DR. ADAM LANGLEY**

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

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_2 and nitrogen pollution and sea level rise.

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_2 and nitrogen. *Biogeochemistry* 133:73-87.

Fatichi, 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_2. *PNAS* 113: 12757-12762.

** Pastore MA, Megonigal JP, Langley JA. 2016. Elevated CO2 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 CO2, 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 is 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_2 and nitrogen addition. Wetlands 32: 571-578.

*White KA, Langley JA, Cahoon DR, Megonigal JP. 2012. C_3 and C_4 root-shoot biomass allocation responses to elevated CO_2 and nitrogen: contrasting resource capture strategies. Estuaries & Coasts 35: 028-1035.

Langley JA, Megonigal JP. 2010. Ecosystem response to elevated CO_2 levels limited by nitrogen-fuelled species shift. Nature 466: 96-99.

Langley JA, McKee KL, Cahoon DR, Cherry JA, Megonigal JP. 2009. Elevated CO_2 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_2. Soil Biology & Biochemistry 41: 54-60.

*Undergraduate author, **Graduate author

Associate Professor **DR. JOHN M. OLSON**

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

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.

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

Professor **DR. MICHAEL P. RUSSELL**

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

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.

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. Hernandéz. 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. Hernandéz, 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. Hernandéz, G. Montaño-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. Hernandéz, 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.

Falese, 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. Hernandéz, 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

Hernandéz, 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

Associate Professor **DR. LOUISE A. RUSSO**

Education

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

Research

Cell biology and physiology. My research interests are primarily focused on regulatory mechanisms of proliferative signals that modulate uterine growth. Although modification of reproductive activity has become a significant focus of human health care, perhaps the least understood element in mammalian fertility is the role of the uterus itself in establishment and maintenance of pregnancy. While the dynamics of uterine tissue growth and remodeling effected by cyclic secretion of ovarian hormones have been well understood for decades, a clear picture of regulated changes at the cell and molecular level has not been established. To gain understanding of hormone control of protein expression and activity, we use an in vivo model system in the rodent to more specifically define patterns of regulation. Laboratory projects currently focus in one of three main areas: 1) estrogen mediated regulation of expression and activation of degradative enzymes that serve critical roles in establishment of the uterine receptive state and therefore fertility, 2) characterization of the mechanism whereby estrogen triggers a potent uterine inflammatory like reaction involving leukocyte infiltration, cytokine secretion, and signaling pathway activation, 3) effects of xenoestrogenic environmental contaminants on mammalian reproductive tissue function via binding interaction with the estrogen receptor which have been implicated as causative agents for breast and prostate cancer development or human infertility. Experimental techniques that are used in these studies include protein analysis via gel electrophoresis and Western blotting, immunohistochemistry, or ELISA, light and electron microscopy and mRNA expression profiling via quantitative rtPCR.

Selected Publications

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 17beta-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. 17β-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 matrilysin mRNA expression by 17β-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 17β-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.

Rannels, D. E., and L. A. Russo. 1991. Compensatory growth of the lung. In: The Lung: Scientific Foundations. R. G. Crystal et al., eds. Raven Press, New York, Vol. 1, pp. 699-709.

Russo, L. A., S. R. Rannels, K. S. Laslow, and D. E. Rannels. 1989. Stretch-related changes in lung cyclic AMP following partial pneumonectomy. Am. J. Physiol. 257:E261-E268.

Russo, L. A., and H. E. Morgan. 1989. Control of protein synthesis and ribosome formation in rat heart. In: Diabetes/Metabolism Reviews, R. A. DeFronzo, ed. John Wiley & Sons, New York, Vol. 5, pp. 31-47.

*Graduate student ** Undergraduate student

Assistant Professor **DR. TROY R. SHIRANGI**

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

Research

Males and females of all kinds of animals can differ greatly in behavior, expecially 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.

Selected Publications

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.

Assistant Professor **DR. ALYSSA Y. STARK**

Education

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

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 and geckos 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.

Selected Publications (for a complete list of publications, visit www.alyssaystark.com)

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

Stark, A. Y., S. Subarajan**, D. Jain, P. H. Niewiarowski & A. Dhinojwala. 2016. Superhydrophobicity of the gecko toe pad: biological optimization verses laboratory maximization. *Philosophical Transactions of the Royal Society A* 374(2073): 20160184

Stark, A. Y., J. Ohlemacher**, A. Knight** & P. H. Niewiarowski. 2015. Run don't walk: locomotor performance of geckos on wet surfaces. *Journal of Experimental Biology* 218(15): 2435-2441

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

Stark, A. Y., T. Sullivan** & P. H. Niewiarowski. 2012. The effect of surface water and wetting on gecko adhesion. *Journal of Experimental Biology* 215(17): 3080-3086

Hsu, P. Y., L. Ge, X. Li, **A. Y. Stark**, C. Wesdemiotis, P. H. Niewiarowski & A. Dhinojwala. 2011. Direct evidence of phospholipids in gecko footprints and spatula-substrate contact interface detected using surface-sensitive spectroscopy. *Journal of the Royal Society Interface* 9(69): 657-664

**Undergraduate student

Professor **DR. R. KELMAN WIEDER**

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

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.

Selected Publications

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.

Graham*, J.A, J.A. Hartsock*, D.H. Vitt, R.K. Wieder, and J.J. Gibson. 2015. Linkages between spatio-temporal patterns of environmental factors and distribution of plant assemblages across a boreal peatland complex. *Boreas* 45: 207-219

Shotyk, W., R. Belland, J. Duke, H. Kempter, M. Krachler, T. Noernberg, R. Pelletier, M. Vile, K. Wieder, C. Zaccone, and S. Zhang. 2014. *Sphagnum* mosses from twenty-one ombrotrophic bogs in the Athabasca Bituminous Sands region fail to reveal significant atmospheric contamination of "heavy metals." *Environmental Science and Technology* 48: 12603-12611.

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_2-fixation by methanotrophs sustains carbon and nitrogen accumulation in peatlands. *Biogeochemistry* 121: 317-328.

Yu, Z., D.H. Vitt and R.K. Wieder. 2014. Continental fens as effective carbon sinks during the Holocene in western Canada. *The Holocene* 24: 1090-1104.

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.

Wieder, R.K., M.A. Vile, K.D. Scott, D.H. Vitt, E. Brault**, M. Harris** and S.B. Mowbray*. 2012. Disturbance and the peatland carbon sink in the Oil Sands Administrative Area. Pages 13-22 in D.H. Vitt and J. Bhatti (eds.), Restoration and Reclamation of Boreal Ecosystems, Cambridge University Press.

House*, M., D.H. Vitt and R.K. Wieder 2012. Plant community recovery on "minimum disturbance" petroleum sites compared to burned sites in bogs of northern Alberta. Pages 202-217 in D.H. Vitt and J. Bhatti (ed.), Restoration and Reclamation of Boreal Ecosystems, Cambridge University Press.

Koropchak*, S., D.H. Vitt, R. Bloise*, and R.K. Wieder. 2012. Fundamental paradigms, foundation species selection, and early plant responses to peatland initiation on mineral soils. Pages 76-100 in D.H. Vitt and J. Bhatti (eds.), Restoration and Reclamation of Boreal Ecosystems, Cambridge University Press.

Vitt, D.H., R.K. Wieder, B. Xu, M. Kaskie and S. Koropchak. 2011. Peatland establishment on mineral soils: Effects of water level, amendments, and species after two growing seasons. *Ecological Engineering* 37: 354-363.

Wieder, R.K. D.H. Vitt, M. Burke-Scoll*, K.D. Scott, M. House and M.A. Vile. 2010. Nitrogen and sulfur deposition and the growth of *Sphagnum fuscum* in bogs of the Athabasca Oil Sands Region. *Journal of Limnology* 69 (Suppl. 1): 161-170.

*Graduate student

**Undergraduate student

Associate Professor **DR. JAMES W. WILSON**

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

Research

We study genes and environmental conditions that regulate or modify bacterial growth, survival, and virulence. Many of these genes are previously unexplored yet highly-conserved across Gram negative genera. There is a critical need for new antibiotic and vaccine targets in Enterobacteriaceae and other Gram negative species, and the genes and conditions on which we focus can potentially be used toward this end. Some recent projects are: **(1) The bacterial *iprA* gene.** This gene is highly conserved among Enterobacteriaceae but is completely uncharacterized in the literature. We discovered that *Salmonella* Typhimurium, *Escherichia coli*, and *Enterobacter cloacae* strains containing Δ*iprA* mutations are between 20 – 80,000 fold more resistant to hydrogen peroxide stress compared to isogenic controls. Examples of negative regulators of oxidative stress of this magnitude are very rare, and we are currently working to understand how the iprA gene functions mechanistically. **(2) RNA-Seq analysis of the *dbrA* (formerly *ydcI*) gene.** We have previously reported our discovery of the role of the *dbrA* gene (formerly *ydcI*) in several phenotypes in *S.* Typhimurium and *E. coli* bacteria. We also demonstrated that the DbrA protein is a DNA-binding transcriptional regulator. However, a broad, systematic analysis of the genes regulated by DbrA has not been performed previously. We have obtained RNA-Seq data that compares WT and Δ*dbrA* strains of both *S.* Typhimurium and *E. coli* in log and stationary phases of growth. This data will open new doors into understanding how the DbrA protein works to regulate different phenotypes across bacteria. **(3) The cloned SPI-1 type III secretion system displays altered behavior outside of *Salmonella*.** We have cloned the SPI-1 type III secretion system genes using a plasmid vector that can easily transfer between bacterial cells. This clone functions very well in *Salmonella* strains, but interestingly, displays an expression defect in other Gram negative bacterial strains. We are working to understand the nature of this defect and the steps that can be taken to circumvent this issue in order to achieve beneficial engineering of bacterial cells using this clone.

Selected Publications

Herman, A, Jacquelyn Serfecz, Alexandra Kinnally, Kathleen Crosby, Matthew Youngman, Dennis Wykoff, and James W. Wilson. 2016. The bacterial iprA gene is conserved across Enterobacteriaceae, involved in oxidative stress resistance, and influences gene expression in Salmonella enterica serovar Typhimurium. J. Bacteriol. 198(16): 2166-2179. Featured as Spotlight article.

Cangelosi C, Hannagan S, Santiago CP, and **Wilson JW**. 2015. Transfer of the cloned *Salmonella* SPI-1 type III secretion system and characterization of its expression mechanisms in Gram negative bacteria in comparison with cloned SPI-2. Microbiol Res. 2015 Nov;180:57-64.

Solomon L, Shah A, Hannagan S, and **Wilson JW**. 2014. Bacterial genus-specific tolerance for YdcI expression. Curr Microbiol. 2014 Nov;69(5):640-8.

Soni A, O'Sullivan L, Quick LN, Ott CM, Nickerson CA, and **Wilson JW**. 2014. Conservation of the Low-shear Modeled Microgravity Response in Enterobacteriaceae and Analysis of the *trp* Genes in this Response. Open Microbiol J. 2014 Jun 13;8:51-8.

Cangelosi, C., C. Shank, C.P. Santiago , and **J.W. Wilson**. 2013. Engineering large functional plasmids for biosafety. Plasmid 70 (2013) 385–392.

Wilson, J.W., C.P. Santiago, J. Serfecz, and L.N. Quick. 2012. Recombination and conjugation as tools for targeted genomic cloning. In " Genetic Manipulation of DNA and Protein – Examples from Current Research ", ed. Dr. David Figurski, InTech Publishing.

Jennings ME, Quick LN, Ubol N, Shrom S, Dollahon N, and **J.W. Wilson**. 2012. Characterization of Salmonella Type III Secretion Hyper-Activity Which Results in Biofilm-Like Cell Aggregation. PLoS ONE 7(3): e33080.

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 ydcI Gene, Which Encodes a Conserved DNA Binding Protein Required for Full Acid Stress Resistance. J. Bacteriol. 193(9):2208-17.

Professor & Dennis M. Cook Endowed Gregor Mendel Chair in Genetics **DR. DENNIS WYKOFF**

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

Research

My laboratory is interested in how complexity arises from an ancestral signal transduction pathway and what selective pressures tailor a pathway for growth in diverse niches. We study the phosphate starvation response (PHO) pathway in the ascomycete lineage of fungi because (1) the PHO pathway is well-understood in the model organism *S. cerevisiae* (or brewer's yeast), (2) many ascomycete genomes are sequenced, (3) the evolutionary distance between these species is greater than 100 Million years, and (4) many ascomycetes are tractable to molecular biology techniques and can be cultivated in standard yeast media. We utilize genetic, cell and molecular, and bioinformatic techniques to answer specific questions related to the PHO pathway.

Selected Publications

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. N2 -fixation by methanotrophs sustains carbon and nitrogen accumulation in pristine peatlands. Biogeochemistry 121: 317-328.

Corrigan MW@, Kerwin-Iosue CL, Kuczmarski 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.

Henry TC[@], Power JE[@], Kerwin CL, Mohammed A[@], Weissman JS[$], Cameron D, Wykoff DD. 2011 Systematic screen of *Schizosaccharomyces pombe* deletion collection uncovers parallel evolution of the phosphate signal transduction pathway in yeasts. Eukaryotic Cell 10:198-206.

Orkwis BR[*], Davies DL[@], Kerwin CL, Sanglard D, & Wykoff DD. 2010. Novel Acid Phosphatase in *Candida glabrata* Suggests Selective Pressure and Niche Specialization in the Phosphate Signal Transduction Pathway. Genetics 186:885-895.

Kerwin CL[*] & Wykoff DD. 2009. Candida glabrata PHO4 is necessary and sufficient for Pho2-independent Transcription of phosphate starvation genes. Genetics 182:471-479.

Wykoff DD, Rizvi AH, Raser JM, Margolin B, O'Shea EK. 2007. Positive feedback regulates switching of the complement of phosphate transporters in S. cerevisiae. Molecular Cell, 27:1005-1013.

* Graduate Student [@]=Undergraduate student

Assistant Professor **DR. ELAINE M. YOUNGMAN**

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

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.

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.

Gu W, Lee HC, Chaves D, **Youngman EM**, Pazour GJ, Conte D Jr, Mello CC. CapSeq and CIP-TAP Identify Pol II Start Sites and Reveal Capped Small RNAs as *C. elegans* piRNA Precursors. *Cell*. 2012 Dec 21;151(7):1488-500.

Lee HC, Gu W, Shirayama M, **Youngman EM**, Conte D Jr, Mello CC. C. elegans piRNAs mediate the genome-wide surveillance of germline transcripts. *Cell*. 2012 Jul 6;150(1):78-87.

Vasale JJ, Gu W, Thivierge C, Batista PJ, Claycomb JM, **Youngman EM**, Duchaine TF, Mello CC, Conte D Jr. Sequential rounds of RNA-dependent RNA transcription drive endogenous small-RNA biogenesis in the ERGO-1/Argonaute pathway. *Proc Natl Acad Sci USA*. 2010 Feb 23;107(8):3582-7.

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.

Brunelle JL, Shaw JJ, **Youngman EM**, Green R. Peptide release on the ribosome depends critically on the 2' OH of the peptidyl-tRNA substrate. *RNA*. 2008 Aug;14(8):1526-31.

Youngman EM, McDonald ME, Green R. Peptide release on the ribosome: mechanism and implications for translational control. *Annu Rev Microbiol*. 2008;62:353-73.

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]

Youngman EM, Cochella LC, He S, Brunelle JL, and Green R. Two distinct conformations of the conserved RNA-rich decoding center of the small ribosomal subunit are recognized by tRNAs and release factors. *Cold Spring Harb Symp Quant Biol.* 2006;71:545-9.

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

Assistant Professor **DR. MATTHEW J. YOUNGMAN**

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

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.

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.*

Kane, L.A., Youngman, M.J., Jensen, R.E., Van Eyk, J.E. 2010. Phosphorylation of the F_1F_o ATP synthase beta subunit: functional and structural consequences assessed in a model system. *Circ. Res.* 106(3):504-13.

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.

Meisinger, C., Pfannschmidt, S., Rissler, M., Milenkovic, D., Becker, T., Stojanovski, D., Youngman, M.J., Jensen, R.E., Chacinska, A., Guiard, B., Pfanner, N., and Wiedemann, N. 2007. The morphology proteins Mdm12/Mmm1 function in the major beta-barrel assembly pathway of mitochondria. *EMBO J*. 26(9):2229-39.

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_{60} and C_{70} from fullerene soot. *Talanta* 48:1203-1206.

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