

JENNIFER J. WERNEGREN

CURRICULUM VITAE

Education

Yale University, New Haven, CT	Ph.D., Biology	1998
Earlham College, Richmond, IN	B.A., Biology	1992

Research Interests

- Evolutionary genomics of symbiotic bacteria, with a focus on endosymbionts of invertebrates.
- Convergent and divergent patterns of genome evolution in mutualistic and parasitic bacteria.
- Use of molecular evolution and population genetics to distinguish processes shaping natural variation.
- Mechanisms by which microbes respond to changing environments.

Appointments

8/2010- present	Associate Professor of Environmental and Evolutionary Genomics, Nicholas School of the Environment, Duke University, Durham, NC
8/2010- present	Faculty member of research unit in Duke's Institute for Genome Science and Policy (IGSP), which recently (7/2014) transitioned into the Center for Genomic and Computational Biology (GCB).
10/2009 – 8/2010	Senior Scientist, The Josephine Bay Paul Center for Comparative Molecular Biology and Evolution, The Marine Biological Laboratory (MBL), Woods Hole, MA.
2004 – 10/2009	Associate Scientist, The Josephine Bay Paul Center for Comparative Molecular Biology and Evolution, MBL, Woods Hole, MA.
2004 – 8/2010	Associate Professor (MBL), Department of Ecology and Evolutionary Biology, Brown University, Providence, RI.
2000 – 2004	Assistant Scientist, The Josephine Bay Paul Center for Comparative Molecular Biology and Evolution, MBL, Woods Hole, MA.
1998 – 1999	NIH Postdoctoral Fellow, Center for Insect Science/ Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ. Advisor: Dr. Nancy A. Moran.
1992 – 1997	Howard Hughes Pre-doctoral Fellow in the Biological Sciences, Department of Biology, Yale University, New Haven, CT. <i>Thesis title</i> : "A population-level and phylogenetic comparison of <i>Rhizobium</i> symbiotic and non- <i>sym</i> loci." Advisor: Dr. Margaret A. Riley.

Publications

- Yung, C.M., Vereen, M.K., Herbert, A., Davis, K.M., Yang, J., Kantorowska, A., Ward, C.S., Wernegreen, J.J., Johnson, Z.I., and Hunt, D.E. 2014. Thermally adaptive tradeoffs in closely-related marine bacterial strains. *Environmental Microbiology*, in press.
- McFall-Ngai M., Hadfield M.G., Bosch T.C., Carey H.V., Domazet-Lošo T., Douglas A.E., Dubilier N., Eberl G., Fukami T., Gilbert S.F., Hentschel U., King N., Kjelleberg S., Knoll A.H., Kremer N., Mazmanian S.K., Metcalf J.L., Nealson K., Pierce N.E., Rawls J.F., Reid A., Ruby E.G., Rumpho M., Sanders J.G., Tautz D., Wernegreen J.J. 2013. Animals in a bacterial world, a new imperative for the life sciences. *PNAS* 110(9):3229-36.
- Wernegreen J.J. 2013. First impressions in a glowing host-microbe partnership. *Cell Host Microbe* 14(2):121-3.
- Fan Y., Wernegreen J.J. 2013. Can't take the heat: high temperature depletes bacterial endosymbionts of ants. *Microbial Ecology* 66(3):727-33.
- Williams L.E. and Wernegreen J.J. 2013. Sequence context of indel mutations and their effect on protein evolution in a bacterial endosymbiont. *Genome Biology and Evolution* 5(3):599-605.
- Fan Y., Thompson J.W., Dubois L.G., Moseley M.A., Wernegreen J.J. 2013. Proteomic analysis of an unculturable bacterial endosymbiont (*Blochmannia*) reveals high abundance of chaperonins and biosynthetic enzymes. *J. Proteome Res.* 12(2):704-18
- Wernegreen J.J. 2012. Endosymbiosis. *Current Biology.* 22(14):R555-61.
- Wernegreen J.J. 2012. Mutualism meltdown in insects: Bacteria constrain thermal adaptation. *Current Opinion in Microbiology* 15(3):255-62.
- Wernegreen J.J. 2012. Strategies of genomic integration within insect-bacterial mutualisms. *Biological Bulletin* 223(1):112-22.
- Williams L.E. and J.J. Wernegreen. 2012. Purifying selection, sequence composition and context-specific indel mutations shape intraspecific variation in a bacterial endosymbiont. *Genome Biology and Evolution* 4(1):44-51.
- Wernegreen J.J. 2011. Reduced selective constraint in endosymbionts: elevation in radical amino acid replacements occurs genome-wide. *PLoS ONE* 6(12):e28905.
- Williams, L.E. and J. J. Wernegreen. 2010. Unprecedented loss of ammonia assimilation capability in a urease-encoding bacterial mutualist. *BMC Genomics*, Dec 2;11:687.
- Bordenstein, Seth R., C. Brothers, G. Wolfe, M. Bahr, R.L. Minckley, M.E. Clark, J.J. Wernegreen, Sarah R. Bordenstein, W.S. Reznikoff, and J.H. Werren. 2010. Using the *Wolbachia* bacterial symbiont to teach inquiry-based science: A high school laboratory series. *American Biology Teacher*, 72(8).
- Wernegreen J.J., and S.N. Kauppinen, P.H. Degnan. 2010. Slip into something more functional: Selection maintains ancient frameshifts in homopolymeric sequences. *Molecular Biology and Evolution* 27(4):833-9.
- Wernegreen, J.J., S.N. Kauppinen, S.G. Brady, and P.S. Ward. 2009. One nutritional symbiosis beget another: Phylogenetic evidence that the ant tribe Camponotini acquired *Blochmannia* by tending sap-feeding insects. *BMC Evolutionary Biology* 9:292.
- Wernegreen, J. J. and D. E. Wheeler. 2009. Remaining flexible in old alliances: Functional plasticity in constrained mutualisms. *DNA and Cell Biology* 28(8):371-82.
- Tamas I.*, J.J. Wernegreen*, B. Nystedt, S.N. Kauppinen, A.C. Darby, L. Gomez-Valero, D. Lundin, A.M. Poole, and S.G.E. Andersson. 2008. Endosymbiont gene functions impaired and rescued by

polymerase infidelity at poly(A) tracts. *Proceedings of the National Academy of Science USA* 105(39):14934-39. (*Shared first authorship.)

- Paraskevopoulos, C., S.R. Bordenstein, J.J. Wernegreen, J.H. Werren and K. Bourtzis. 2006. Towards a *Wolbachia* multilocus sequence typing system: Discrimination of *Wolbachia* strains present in *Drosophila* species. *Current Microbiology* 53(5):388-95.
- Bordenstein S.R., M L. Marshall, A.J. Fry, U. Kim, and J.J. Wernegreen. 2006. The tripartite associations between bacteriophage, *Wolbachia*, and arthropods. *PLoS Pathogens* 2(5):e43.
- Baldo L., S.R. Bordenstein, J.J. Wernegreen, and J.H. Werren. 2006. Widespread recombination throughout *Wolbachia* genomes. *Molecular Biology and Evolution* 23(2):437-449.
- Casiraghi M., S.R. Bordenstein, L. Baldo, N. Lo, T. Beninati, J.J. Wernegreen, J.H. Werren, and C. Bandi. 2005. Phylogeny of *Wolbachia* based on *gltA*, *groEL* and *ftsZ* gene sequences: Clustering of arthropod and nematode symbionts in the F supergroup and evidence for further diversity in the *Wolbachia* tree. *Microbiology* 151: 4015-22.
- Wernegreen, J.J. 2005. For better or worse: Genomic consequences of intracellular mutualism and parasitism. *Current Opinions in Genetics and Development* 15(6):572-83.
- Degnan P.H., A.B. Lazarus, and J.J. Wernegreen. 2005. Genome sequence of *Blochmannia pennsylvanicus* indicates parallel evolutionary trends among bacterial mutualists of insects. *Genome Research* 15(8):1023-1033.
- Schaber J., C. Rispe, J.J. Wernegreen, A. Bunes, F. Delmotte, F.J. Silva, and A. Moya. 2005. Gene expression levels influence amino acid usage and evolutionary rates in endosymbiotic bacteria. *Gene* 352:109-117.
- Herbeck J.T., P.H. Degnan, and J.J. Wernegreen. 2005. Nonhomogeneous model of sequence evolution indicates independent origins of primary endosymbionts within the Enterobacteriales (gamma- Proteobacteria). *Molecular Biology and Evolution* 22(3):520-532.
- Fry A.J. and J.J. Wernegreen. 2005. The roles of positive and negative selection in the molecular evolution of insect endosymbionts. *Gene* 355:1-10.
- Wernegreen J.J., and D.J. Funk. 2004. Mutation exposed: A neutral explanation for extreme base composition of an endosymbiont genome. *Journal of Molecular Evolution* 59(6):849-858.
- Bordenstein S.R., and J.J. Wernegreen. 2004. Bacteriophage flux in endosymbionts (*Wolbachia*): Infection frequency, lateral transfer, and recombination rates. *Molecular Biology and Evolution* 21:1981-91.
- Degnan P.H., A.B. Lazarus, C.D. Brock, and J.J. Wernegreen. 2004. Host-symbiont stability and fast evolutionary rates in an ant-bacterium association: cospeciation of *Camponotus* species and their endosymbionts, *Candidatus Blochmannia*. *Systematic Biology* 53(1):95-110.
- Wernegreen J.J. 2004. Endosymbiosis: Lessons in conflict resolution. *PLoS Biology* 2(3):E68.
- Herbeck, J.T., D.J. Funk, P.H. Degnan, and J.J. Wernegreen. 2003. A conservative test of genetic drift in the endosymbiotic bacterium *Buchnera*: Slightly deleterious mutations in the chaperonin *groEL*. *Genetics* 165:1651-60.
- Herbeck, J.T., D. Wall, and J.J. Wernegreen. 2003. Gene expression level influences amino acid usage, but not codon usage, in the tsetse fly endosymbiont *Wigglesworthia*. *Microbiology* 149:2585-96.
- Wernegreen, J.J., P.H. Degnan, A.B. Lazarus, C. Palacios, and S.R. Bordenstein. 2003. Genome evolution in an insect cell: distinct features of an ant-bacterial partnership. *Biological Bulletin* 204(2): 221-231.

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- Wernegreen J.J., A.B. Lazarus, and P.H. Degan 2002. Small genome of *Candidatus Blochmannia*, the bacterial endosymbiont of *Camponotus*, implies irreversible specialization to an intracellular lifestyle. *Microbiology* 148:2551-6.
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- Wernegreen, J.J., Richardson, A.O, and N.A. Moran. 2001. Parallel acceleration of evolutionary rates in symbiont genes underlying host nutrition. *Molecular Phylogenetics and Evolution* 19(3): 479-85.
- Wernegreen, J.J. and Moran, N.A. 2001. Vertical transmission of biosynthetic plasmids in aphid endosymbionts (*Buchnera*). *Journal of Bacteriology* 183:785-790.
- Funk, D.J., J.J. Wernegreen, and N.A. Moran. 2001. Intraspecific variation in symbiont genomes: Bottlenecks and the aphid-*Buchnera* association. *Genetics* 157: 477-489.
- Wernegreen, J.J. and N.A. Moran. 2000. Decay of mutualistic potential in aphid endosymbionts through silencing of biosynthetic loci: *Buchnera* of *Diuraphis*. *Proceedings of the Royal Society B* 267:1423-1431.
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- Funk D.J., L. Helbling, J.J. Wernegreen, and N.A. Moran. 2000. Intraspecific phylogenetic congruence among multiple symbiont genomes. *Proceedings of the Royal Society B* 267:2517-21.
- Moran N.A. and J.J. Wernegreen. 2000. Lifestyle evolution in symbiotic bacteria: Insights from genomics. *Trends in Ecology and Evolution* 15:321-326.
- Clark, M.A., N.A. Moran, P. Baumann, and J.J. Wernegreen. 2000. Cospeciation between bacterial endosymbionts (*Buchnera*) and a recent radiation of aphids (*Uroleucon*) and pitfalls of testing for phylogenetic congruence. *Evolution* 54(2): 517-524.
- Wernegreen, J.J. and N.A. Moran. 1999. Evidence for genetic drift in endosymbionts (*Buchnera*): analyses of protein-coding loci. *Molecular Biology and Evolution* 16(1): 83-97.
- Wernegreen, J.J. and M.A. Riley. 1999. Comparison of the evolutionary dynamics of symbiotic and housekeeping loci: A case for the genetic coherence of rhizobial lineages. *Molecular Biology and Evolution* 16(1): 98-113.
- Wernegreen, J.J., E.E. Harding, and M.A. Riley. 1997. *Rhizobium* gone native: Unexpected plasmid stability of indigenous *Rhizobium leguminosarum*. *Proceedings of the National Academy of Science USA* 94: 5483-5488.

Book Chapters

- Wernegreen, J.J. 2007. Genomic signatures of intracellularity: Evolutionary patterns and paces in bacterial mutualists and parasites. Pp. 196-212 in Bacterial Pathogenomics, M. J. Pallen, K. E. Nelson, and G. M. Preston, Eds. ASM Press, Washington, DC.

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