

BIOGRAPHICAL SKETCH

Marcé D. Lorenzen, Ph.D.
Marce_Lorenzen@ncsu.edu
919-513-7857

Entomology Department – Campus Box 7613
North Carolina State University
Raleigh, NC 27695

EDUCATION & TRAINING

University of Rhode Island, Kingston, RI	B.S.	1994	Zoology
Kansas State University, Manhattan, KS	Ph.D.	2000	Biology

Positions and Employment

2015-present	Associate Professor, Department of Entomology, North Carolina State University
2009-2015	Assistant Professor, Department of Entomology, North Carolina State University
2004-2009	Research Molecular Biologist, USDA-ARS-GMPPRC, Manhattan, KS
2000-2004	Post Doctoral Researcher, Division of Biology, Kansas State University
1994-2000	Graduate Research Assistant, Division of Biology, Kansas State University

Selected invited scientific presentations and seminars (from total of 40):

- Lorenzen, M.D. (2017). Use of genomic and transcriptomic resources for development of species-specific transgenes. 26th IWGO Conference, Beijing, China
- Lorenzen, M.D. (2017). Basic steps for developing genetic technologies in a non-model organism. International Plant & Animal Genome Conference, San Diego, CA
- Lorenzen, M.D. (2016). Trials and tribulations associated with transforming non-model organisms. XXV International Congress of Entomology, Orlando, FL
- Lorenzen, M.D. (2016). Progress towards genome-wide insertional mutagenesis of the western corn rootworm. Bayer CropScience Seminar, Morrisville, NC
- Chu, F. and Lorenzen, M.D. (2016). Development of transgenic helper/donor *Diabrotica virgifera virgifera* strains for genome-wide mutagenesis. Monsanto Corn Academic Summit, St. Louis, MO

Publications

- Scott, M.J., Gould, F., Lorenzen, M.D., Grubbs, N., Edwards, O.R. and O'Brochta, D.A. (*in revision*) Agricultural Production: Assessment of the potential use of Cas9-mediated gene drive systems for agricultural pest control. *Journal of Responsible Innovation*.
- Chu F., Klobasa, W., Wu, P., Pinzi, S., Grubbs, N., Gorski, S., Cardoza, Y. and Lorenzen, M.D. (2017) Germline transformation of the western corn rootworm, *Diabrotica virgifera virgifera*. *Insect Mol Biol*. doi: 10.1111/imb.12305 <http://onlinelibrary.wiley.com/doi/10.1111/imb.12305/epdf>
- Kanost, M.R., Arrese, E.L., Cao, X., ... Lorenzen, M.D., ... *et al* (2016) Multifaceted biological insights from a draft genome sequence of the tobacco hornworm moth, *Manduca sexta*. *Insect Biochem Mol Biol* 2016 Aug 12. pii: S0965-1748(16)30094-7. doi: 10.1016/j.ibmb.2016.07.005. <http://www.sciencedirect.com/science/article/pii/S0965174816300947>
- Oppert, B., Guedes, R., Aikins, M.J., Perkin, ... Lorenzen, M.D., ... *et al* (2015) Genes related to mitochondrial functions are differentially expressed in phosphine-resistant and -susceptible *Tribolium castaneum*. *BMC Genomics* 16:968. <https://bmcgenomics.biomedcentral.com/articles/10.1186/s12864-015-2121-0>
- Grubbs, N., Haas, S., Beeman, R. and Lorenzen, M.D. (2015) The ABCs of eye color in *Tribolium castaneum*: Orthologs of the *Drosophila white*, *scarlet*, and *brown* genes. *Genetics* 199: 749–759. <http://www.genetics.org/content/199/3/749.long>
- Broehan, G., Kröger, T., Lorenzen, M.D. and Merzendorfer, H. (2013) Functional analysis of the ATP-binding cassette (ABC) transporter gene family of *Tribolium castaneum*. *BMC Genomics* 14(1):6. <https://bmcgenomics.biomedcentral.com/articles/10.1186/1471-2164-14-6>
- Oppert, B., Dowd, S.E., Bouffard, P., Li, L., Conesa, A., Lorenzen, M.D., Toutges, M., Marshall, J., Huestis, D.L., Fabrick, J., Oppert, C., and Jurat-Fuentes, J.L. (2012). Transcriptome profiling of the intoxication response of *Tenebrio molitor* larvae to *Bacillus thuringiensis* Cry3Aa protoxin. *PLoS One* 7(4): e34624. <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0034624>

- Semeao, A.A., Campbell, J.F., Beeman, R.W., Lorenzen, M.D., Whitworth, R.J., and Sloderbeck, P.E. (2012). Genetic structure of *Tribolium castaneum* (Coleoptera: Tenebrionidae) populations in mills. *Environ Entomol* 41: 188–199. <https://academic.oup.com/ee/article-lookup/doi/10.1603/EN11207>
- Alves, A.P., Lorenzen, M.D., Beeman, R.W., Foster, J.E. and Siegfried, B.D. (2010). RNA interference as a method for target-site screening in the western corn rootworm, *Diabrotica virgifera virgifera*. *Journal of Insect Science* 10:162. <https://academic.oup.com/jinsectscience/article-lookup/doi/10.1673/031.010.14122>
- Trauner, J., Schinko, J., Lorenzen, M.D., Shippy, T.D., Wimmer, E.A., Beeman, R.W., Klingler, M., Bucher, G. and Brown, S.J. (2009). Large-scale insertional mutagenesis of a coleopteran stored grain pest, the red flour beetle *Tribolium castaneum*, identifies embryonic lethal mutations and enhancer traps. *BMC Biology* 7:73. <https://bmcbiol.biomedcentral.com/articles/10.1186/1741-7007-7-73>
- Kim, H.S., Murphy, T., Xia, J., Caragea, D., Park, Y., Beeman, R.W., Lorenzen, M.D., Butcher, S., Manak, J.R. & Brown, S.J. (2009). BeetleBase in 2010: Revisions to provide comprehensive genomic information for *Tribolium castaneum*. *Nucleic Acids Research* 38: D437–42. <https://academic.oup.com/nar/article-lookup/doi/10.1093/nar/gkp807>
- Morris, K., Lorenzen, M.D., Hiromasa, Y., Tomich, J.M., Oppert, C., Elpidina, E.N., Vinokurov, K., Jurat-Fuentes, J.L., Fabrick, J. & Oppert, B. (2009). *Tribolium castaneum* larval gut transcriptome and proteome: A resource for the study of the coleopteran gut. *Journal of Proteome Research* 8: 3889–3898. <http://pubs.acs.org/doi/abs/10.1021/pr900168z>
- Fabrick, J., Oppert, C., Lorenzen, M.D., Oppert, B. and Jurat-Fuentes, J.L. (2009). Cadherin is a putative receptor for *Bacillus thuringiensis* Cry3Aa in *Tenebrio molitor* larvae. *J Biol Chem* 27: 18401–18410. <http://www.jbc.org/content/284/27/18401.long>
- Siebert, K.S., Lorenzen, M.D., Brown, S.J., Park, Y. and Beeman, R.W. (2008). Identification of the *Tubulin* superfamily genes in *Tribolium castaneum* and use of a *Tubulin* promoter to drive transgene expression. *Insect Biochem Mol Biol* 38: 749–755. <http://www.sciencedirect.com/science/article/pii/S0965174808000714>
- Lorenzen, M.D., Gnirke, A., Margolis, J., Campbell, M., Stuart, J.J., Aggarwal, A., Richards, S., Park, Y. and Beeman, R.W. (2008). The maternal-effect, selfish genetic element *Medea* is associated with a *Tc1* transposon. *Proc Natl Acad Sci USA* 105: 10085–10089. <http://www.pnas.org/content/105/29/10085.long>
- Tribolium Genome Sequencing Consortium* (2008). The first genome sequence of a beetle, *Tribolium castaneum*, a model for insect development and pest biology. *Nature* 452: 949–55. <https://www.nature.com/nature/journal/v452/n7190/full/nature06784.html>
- Wang, J.L., Lorenzen, M.D., Beeman, R.W. and Brown, S.J. (2008). Analysis of repetitive DNA distribution patterns in the *Tribolium castaneum* genome. *Genome Biol* 9(3):R61. <https://genomebiology.biomedcentral.com/articles/10.1186/gb-2008-9-3-r61>
- Park, Y., Aikins, J., Wang, J.L., Beeman, R.W., Oppert, B., Lord, J.C., Brown, S.J., Lorenzen, M.D., Richards, S., Weinstock, G.M. and Gibbs, R.A. (2008). Analysis of transcriptome data in the red flour beetle, *Tribolium castaneum*. *Insect Biochem Mol Biol* 38: 380–386. <http://www.sciencedirect.com/science/article/pii/S0965174807002238>
- Lorenzen, M.D., Kimzey, T., Shippy, T.D., Brown, S.J., Denell, R.E. and Beeman, R.W. (2007). *piggyBac*-based insertional mutagenesis in *Tribolium castaneum* using donor/helper hybrids. *Insect Mol Biol* 16: 235–275. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2583.2007.00727.x/abstract>
- The Honeybee Genome Sequencing Consortium* (2006). Insights into social insects from the genome of the honeybee *Apis mellifera*. *Nature* 443: 931–949. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2048586/>
- Arakane, Y., Muthukrishnan, S., Kramer, K.J., Specht, C.A., Tomoyasu, Y., Lorenzen, M.D., Kanost, M. and Beeman, R.W. (2005). The *Tribolium* chitin synthase genes *TcCHS1* and *TcCHS2* are specialized for synthesis of epidermal cuticle and midgut peritrophic matrix. *Insect Mol Biol* 14: 453–463. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2583.2005.00576.x/abstract>
- Lorenzen, M.D., Doyungan, Z., Savard, J., Snow, K., Crumly, L.R., Shippy, T.D., Stuart, J.J., Brown,

- S.J. and Beeman, R.W. (2005). Genetic linkage maps of the red flour beetle, *Tribolium castaneum*, based on bacterial artificial chromosomes and expressed sequence tags. *Genetics* 170: 741–747. <http://www.genetics.org/content/170/2/741.long>
- Goodwin, T.J., Poulter, R.T., Lorenzen, M.D. and Beeman, R.W. (2004). DIRS retroelements in arthropods: identification of the recently active *TcDirs1* element in the red flour beetle *Tribolium castaneum*. *Mol Genet Genomics* 272: 47–56. <https://dx.doi.org/10.1007/s00438-004-1028-2>
- Lorenzen, M.D., Berghammer, A.J., Brown, S.J., Denell, R.E. Klingler, M. and Beeman, R.W. (2003). *piggyBac*-mediated germline transformation in the beetle *Tribolium castaneum*. *Insect Mol Biol* 12: 433–440. <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2583.2003.00427.x/abstract>
- Lorenzen, M.D., Brown, S.J., Denell, R.E. and Beeman, R.W. (2002). Transgene expression from the *Tribolium castaneum* Polyubiquitin promoter. *Insect Mol Biol* 11: 399–407. <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2583.2002.00349.x/abstract>
- Lorenzen, M.D., Brown, S.J., Denell, R.E. and Beeman, R.W. (2002). Cloning and characterization of the *Tribolium castaneum* eye-color genes encoding tryptophan oxygenase and kynurenine 3-monooxygenase. *Genetics* 160: 225–234. <http://www.genetics.org/content/160/1/225.long>
- Brown, S.J., Mahaffey, J.P., Lorenzen, M.D., Denell, R.E. and Mahaffey, J.W. (1999). Using RNAi to investigate orthologous homeotic gene function during development of distantly related insects. *Evol Dev* 1: 11–15. <http://onlinelibrary.wiley.com/doi/10.1046/j.1525-142x.1999.99013.x/abstract>

Recently Submitted

- Chu F., Klobasa, W., Grubbs, N. and Lorenzen, M.D. (submitted). Development and use of a *piggyBac*-based jumpstarter system in *Drosophila suzukii*. *Insect Mol Biol*.

Conference & Proceedings Papers

- Chu F. and Lorenzen, M.D. (2014). Genetics and Genomics of *Tribolium Medea* Elements. 11th International Working Conference on Stored Product Protection, Chiang Mai, Thailand.
- Semeao, A.A., Campbell, J.F., Beeman, R.W., Whitworth, R.J., Sloderbeck, P.E. and Lorenzen, M.D. (2012). Genetic structure of *Tribolium castaneum* (Coleoptera: Tenebrionidae) populations in mills. 10th International Working Conference on Stored Product Protection, Estoril, Portugal.

Books and Book Chapters

- Hodgson, E., Roe, M., Mailman, R. and Chambers, J. (2014). Dictionary of Toxicology, 3rd Edition, Elsevier.
- Aronstein, K., Oppert, B. and Lorenzen, M.D. (2011). “RNAi in Agriculturally-Important Arthropods” pgs 157-180 In Paula Grabowski Ed. *RNA Processing*. In-Tech Publishers.
- Brown, S.J., Shippy, T.D., Miller, S., Bolognesi, R., Beeman, R.W., Lorenzen, M.D., Bucher, G., Wimmer, E.A. and Klingler, M. (2009). The red flour beetle, *Tribolium castaneum* (Coleoptera): a model for studies of development and pest biology. *Cold Spring Harb Protoc* 2009 Aug;2009(8):pdb.emo126.

Selected Grants Received

Career total (2009-present): \$1,883,513

- Monsanto, Corn Rootworm Knowledge Research Program, 2013-2017 (4 years). Development of a Germline Transformation System for *Diabrotica virgifera virgifera*. \$595,446. (PIs: Lorenzen, M.D. & Cardoza, Y)
- National Science Foundation, Division of Molecular and Cellular Biosciences, Genetic Mechanisms, 2013-2017 (4 years). Uncovering the Molecular Mechanisms of Selfish Genetic Elements. \$645,060. (PI: Lorenzen, M.D.)
- United States Department of Agriculture, ARS-SCA, 2015-2020 (5 years). Development of Genetic Tools for the Control of Stored Product Pests. \$120,000. (PI: Lorenzen, M.D.)