

Carrie Deans, Ph.D

pronouns: she, her, hers, herself

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Research Interests: I am an integrative biologist who focuses on understanding mechanisms of plasticity and adaptation. I utilize a systems biology approach that combines information from different levels of organization, including ecology, physiology, and molecular biology, to understand complex biological processes. Most of my research has been in the field of nutritional ecology, working predominantly in plant-insect systems with an emphasis on urban and agricultural insect pests.

Education

Aug. 2015 Ph.D in Entomology
Texas A&M University (College Station, TX)

Dec. 2011 M.S. in Ecology and Natural Resources
St. Cloud State University (St. Cloud, MN)

May 2005 B.A. in Biology; B.A. in Environmental Studies
University of St. Thomas (St. Paul, MN)

Research Experience

Jan. 2024- current Assistant Professor- Biological Sciences Department
University of Alabama Huntsville (Huntsville, AL)

Feb. 2022-Nov. 2023 Post-doctoral Researcher (Legislative-Citizen Commission on Minnesota Resources Grant)
Biocontrol of Bee Lawns in Parks and Landscapes
PI: Dr. Vera Krischik, University of Minnesota (St. Paul, MN)

Aug. 2018-Feb. 2022 Post-doctoral Researcher (Minnesota Department of Agriculture Crop Protection Grant)
Proactive Research to Counter the Threat of Insecticide Resistance in Spotted Wing Drosophila
PI: Dr. Bill Hutchison, University of Minnesota (St. Paul, MN)

Nov. 2015-2018 Post-doctoral Researcher (USDA BRAG Grant)
Nutritionally-Mediated Variation in Helicoverpa zea Susceptibility to Bt Transgenic
PI: Dr. Spencer Behmer and Dr. Gregory Sword, Texas A&M University (conducted at the University of Minnesota in Bill Hutchison's Lab, St. Paul, MN)

Aug. 2011-2015 Ph.D Dissertation Project: The Interaction between Nutrition and Insect Stress Response in a Cotton Model System Advisors: Dr. Spencer Behmer and Dr. Gregory Sword, Texas A&M University (College Station, TX)

Aug. 2008-Dec. 2011 Master's Thesis Project: The Influence of Stream N:P on Mayfly (Baetis) Growth in Enriched and Unenriched Detritus-Based Systems
Advisor: Dr. Neal Voelz, St. Cloud State University (St. Cloud, MN)

Jan. 2006-June 2006 Minnesota Department of Natural Resources Internship
Advisor: Dr. Kyle Zimmer, University of St. Thomas (St. Paul, MN)

Jan. 2006 Research Assistant (staff)
Advisor: Dr. Kyle Zimmer, University of St. Thomas (St. Paul, MN)

May 2005- Sept.2005 Research Assistant (student)
Advisor: Dr. Adam Kay, University of St. Thomas (St. Paul, MN)

Awards

May 2022	<u>AAUW Postdoctoral Leave Fellowship:</u> \$30,000
Sept. 2014	<u>AgriLife Genomics Grant:</u> College of Agriculture and Life Sciences (Texas A&M University): \$24,000
Aug. 2014	<u>Monsanto Research Travel Award:</u> ESA Conference: \$7,320
Aug. 2014	<u>USDA AFRI Student Travel Grant:</u> ESA Conference: \$500
Aug. 2014	<u>Dissertation Fellowship:</u> Office of Graduate Studies, Texas A&M University: 1 year of support (tuition/fees/stipend)
Jan. 2014	<u>Best PhD Student Oral Presentation (Insect Control section):</u> Beltwide Cotton Conference: \$500.00
August 2011	<u>C. Everette Salyer Fellowship in Cotton Research:</u> Entomology Department (Texas A&M University): tuition and support for 3 years
August 2011	<u>Excellence Fellowship:</u> College of Agriculture and Life Sciences (Texas A&M University): \$7000.00
Spring 2009	<u>Graduate Studies Research Award:</u> School of Graduate Studies (St. Cloud State University): \$950.00
Spring 2009	<u>Harold H. & Gladys I. Hopkins Scholarship:</u> Biology Department (St. Cloud State University): \$1000.00
Fall 2009	<u>Student Research Award:</u> Office of Sponsored Programs (St. Cloud State University): \$400.00
Fall 2008	<u>Student Research Award:</u> Office of Sponsored Programs (St. Cloud State University): \$950.00

Presentations

Aug. 2022	Invited talk: UMN golf course management field day
June 2022	Invited talk: UMN sports turf management field day
March 2022	Invited talk: Minnesota Landscapers Association (Roseville, MN)
Feb. 2021	Invited talk: ELBE Symposium at Center for Systems Biology
Jan. 2020	Invited talk: NC246 Annual Meeting (Madison, WI)
March 2019	Invited talk: Entomological Society of America SE Branch Meeting (Mobile, AL)
Feb. 2019	Invited talk: Gordon Research Conference (Plant-Herbivore Interactions) (Ventura, CA)
Nov. 2018	Entomological Society of America/International Congress of Entomology: Presentation (Vancouver, BC)
Feb. 2018	Invited talk: Max Planck Institute for Ageing (Cologne, GER)
Nov. 2017	Entomological Society of America: Presentation (Denver, CO)
Oct. 2017	Invited talk: University of MN Departmental Seminar (St. Paul, MN) May 2017 USDA BRAG Annual Meeting: Poster (Washington D.C.)
Feb. 2017	Gordon Research Conference (Plant-Herbivore Interactions): Poster (Ventura, CA)
Feb. 2017	Invited talk: Gordon Research Seminar (Plant-Herbivore Interactions) (Ventura, CA)
Sept. 2016	Entomological Society of America/International Congress of Entomology: Presentation (Orlando, FL)
Jan. 2015	Beltwide Cotton Conference: Presentation (San Antonio, TX)
Nov. 2014	Entomological Society of America: Presentation (Portland, OR)
Jan. 2014	Beltwide Cotton Conference: Presentation (New Orleans, LA) Nov. 2013

Entomological Society of America: Presentation (Austin, TX)

Authored Grants

Dec. 2023 Minnesota Department of Agriculture Specialty Crop Block Grant
Co-authored with Vera Krischik: \$125,000 over 2 years (*funded*)

Nov. 2023 USDA CPPM Grant
Co-authored with Vera Krischik: 2 years of support (*not funded*)

Nov. 2023 RARF Minnesota Agricultural Experiment Station
Co-authored with Vera Krischik: 2 years of support (*not funded*)

March 2020 USDA Biotechnology Risk Assessment Research Grant
Co-authored with Bill Hutchison: 3 years of support (*not funded*)

Nov. 2017 Minnesota Department of Agriculture Crop Protection Grant (spotted- wing Drosophila)
Co-authored with Bill Hutchison: \$250,000 over 3 years (*funded*)

July 2017 Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC) Grant Co-authored with Bill Hutchison: \$600,000 over 4 years (*not funded*)

Aug. 2016 Minnesota Food Processor's Grant
Co-authored with Bill Hutchison: \$10,000 per year over 3 years (*funded*)

Aug. 2015 USDA Biotechnology Risk Assessment Research Grant
Co-authored with Greg Sword and Spence Behmer: \$500,000 (*funded*)

Jan. 2015 Monsanto Insect Knowledge Grant
Co-authored with Greg Sword and Spence Behmer: \$250,000 over 3 years (*not funded*)

Sept. 2014 AgriLife Genomics Grant
Co-authored with Greg Sword and Spence Behmer: \$24,000 (*funded*)

Dec. 2013 Texas AgLife Genomic Seed Grant
Co-authored with Spence Behmer: \$24,450 (*not funded*)

Nov. 2013 Monsanto Corn Rootworm Knowledge Research Program
Co-authored with Greg Sword and Spence Behmer: \$250,000 over 3 years (*not funded*)

Jan. 2014 EcoLab Research Grant
Author: \$9,500 (*funded*)

Teaching/Mentoring Experience

Spring 2022 Student Mentor (Krischik Lab, University of Minnesota)

Fall 2021 Co-Instructor: Microbes, Insects, and Plants: The Ecology of Pest Management (University of Minnesota)

Spring 2019 Science Consultant (Science Museum of Minnesota)
Kitty Andersen Youth Science Center (KAYSC) STEM program for underserved youths

Fall 2019 Student Mentor (University of Minnesota)

Summer 2016-2019 Student Mentor (University of Minnesota)

Fall 2017, 2018 Instructor: Pests and Crop Protection-Entomology Section (University of Minnesota)

Summer 2016 Student Mentor (University of Minnesota)

Summer 2015 Instructor: Aquatic Ecology (State University of New York-ESF)

Summer 2013 REU Student Mentor (Texas A&M University)

Fall/ Spring 2008, 2009 Teaching Assistant: Organismal Diversity (St. Cloud State University)

Skills

Field: various aquatic sampling equipment and protocols (lentic and lotic environments), water quality monitoring, insect and plant monitoring/sampling methodologies, experimental design and field sampling techniques, experience with prairie and lakeshore restoration, prescribed burns, invasive species monitoring and removal, and wildland firefighting.

Bench: RNA/DNA extraction, PCR, qPCR, gel electrophoresis, biochemical analyses (soluble protein and digestible carbohydrate analyses), toxicological assays (ELISA), bacteria/fungal culturing, sterile technique, limited experience with respirometry and GC-FID analysis.

Computation: various univariate and multivariate statistical analyses (SPSS and JMP), R programming, NGS bioinformatics (quality processing, alignment, mapping, BLAST, gene ontology, functional analyses, etc.) for reference-based and *de novo* alignments, network analyses.

Other: insect bioassays, insect rearing skills (moths, stink bugs, plant bugs, grasshoppers, fruit flies), optimizing artificial diets, altering dietary components (P:C ratio and total macronutrient concentration), designing nutritional studies according to a geometric framework.

Publications

Krischik, V., Prouty, C., Deans, C.A., Murley, K., Johnson, A., and Keener, R. 2023. IPM Tactics to Reduce Insecticide Use and Manage Japanese Beetles in Lawns. *The Scoop, The Minnesota Nursery & Landscape Association*, 47(1): 51-54. https://issuu.com/minnesotanla/docs/mnla_scoop_jan_full_digital?fr=sYmYxYjY2NDcyMDc

Deans, C.A. and Krischik, V. 2023. The current state and future potential of microbial controls for scarab pests. *Applied Sciences (Special Issue: Frontiers in Biorational Insecticides and Novel Tactics in Pest Management)*, 13(2): 766. doi.org/10.3390/app13020766

Deans, C.A. and Hutchison, W.D. 2022. The importance of time in nutrient regulation: a case study with spotted-wing *Drosophila* (*Drosophila suzukii*). *Frontiers in Insect Science (Special Issue: New Advances in Understanding the Regulation of Appetite in Insects)*, 17(7): e0271417. doi.org/10.1371/journal.pone.0271417

Deans, C.A. 2022. Epigenetic processes as anticipatory mechanisms: insect polyphenism as an exemplar *In* Nadin (Ed.), *Epigenetics and Anticipation, Cognitive Systems Monographs*, 45. Springer: Cham. doi.org/10.1007/978-3-031-17678-4

Krischik, V., Deans, C.A., and Angstman, M. 2022. Biocontrol of Japanese beetles. *MGCSA Hole Notes*, 57(5): 16-25.

Deans, C.A. and Hutchison, W.D. 2022. Propensity for resistance development in the invasive berry pest, spotted-wing *Drosophila* (*Drosophila suzukii*). *Pest Management Science (in print)*.

Deans, C.A. and Hutchison, W.D. 2022. Hormetic and transgenerational effects in spotted-wing *Drosophila* (Diptera: Drosophilidae) in response to three commonly-used insecticides. *PLOS One*, 17: e0271417. [doi: 10.1371/journal.pone.0271417](https://doi.org/10.1371/journal.pone.0271417)

Deans, C.A., Sword, G.A., Vogel, H., Behmer, S. 2022. Effects of diet protein-carbohydrate ratios and amounts on insect herbivore gene expression. *Insect Biochemistry and Molecular Biology*, 145:103773. doi.org/10.1016/j.ibmb.2022.103773.

Deans, C.A., Hutchison, W.D. 2021. The protein-paradox: Elucidating the complex nutritional ecology of the invasive berry pest, spotted-wing *Drosophila* (Diptera: *Drosophila suzukii*). *Frontiers in Insect Science*, 1:787169. [10.3389/finsc.2021.787169](https://doi.org/10.3389/finsc.2021.787169)

- Deans, C.A. 2021. Biological prescience: The role of anticipation in organismal processes. *Frontiers in Physiology*, 12, 672457. 10.3389/fphys.2021.672457
- Deans, C.A., Sword, G.A., Behmer, S.T., Burkness, E., Puzstai-Carey, M., Hutchison, W. 2020. Population effects on diet-*Bt* interactions in *Helicoverpa zea* (Lepidoptera: Noctuidae): gene-by-environment interactions in agricultural pest management. bioRxiv doi: 10.1101/2020.361170. *Preprint*.
- Deans, C.A., Sword, G.A., Behmer, S.T. 2019. First evidence of nutrient regulation in a plant bug (*Lygus hesperus*), *Journal of Insect Physiology*, 116: 118-124. 10.1016/j.jinsphys.2019.05.004
- Deans, C.A., Sword, G.A., Lenhart, P.A., Burkness, E., Hutchison, W.D., Behmer, S.T. 2018. Quantifying plant soluble protein and digestible carbohydrate content, using corn (*Zea mays*) as an exemplar. *JoVE*, 138: e51864. 10.3791/58164
- Deans, C.A., Behmer, S.T., Tessnow, A.E., Tamez-Guerra, P., Puzstai-Carey, M., Sword, G.A. 2017. Nutrition affects insect susceptibility to *Bt* toxins. *Scientific reports*, 7: 39705. 10.1038/srep39705
- Deans, C.A., Behmer, S.T., Fiene, J., Sword, G.A. 2016. Spatio-temporal, genotypic, and environmental effects on plant soluble protein and digestible carbohydrate content: implications for insect herbivores with cotton as an exemplar. *Journal of Chemical Ecology*, 42(11): 1151-1163. 10.1007/s10886-016-0772-1
- Deans, C.A., Sword, G.A., Behmer, S.T. 2016. Nutrition as a neglected factor in insect herbivore susceptibility to *Bt* toxins. *Current Opinion in Insect Science*, 15: 97-103. 10.1016/j.cois.2016.04.005
- Deans, C.A., Sword, G.A. and Behmer, S.T. 2015. Revisiting macronutrient regulation in the polyphagous herbivore *Helicoverpa zea* (Lepidoptera: Noctuidae): New insights via nutritional geometry. *Journal of Insect Physiology*, 81: 21-27. 10.1016/j.jinsphys.2015.06.015
- Deans, C.A., Maggert, K.A., 2015. What do you mean, "epigenetic"? *Genetics*, 199(4): 887-896. 10.1534/genetics.114.173492
- Deans, C.A., Behmer, S.T., Kay, A.D., and Voelz, N.J. 2014. The importance of dissolved N:P ratios on mayfly (*Baetis* spp.) growth in high-nutrient detritus-based streams. *Hydrobiologia* 742: 15-26. 10.1007/s10750-014-1958-6
- Verant, M.L., Konsti, M.L., Zimmer, K.D., and Deans, C.A. 2007. Factors influencing nitrogen and phosphorus excretion rates of fish in a shallow lake. *Freshwater Biology* 52(10): 1968- 1981. 10.1111/j.1365-2427.2007.01820.x
- Smith, C.R., Oettler, J., Kay, A.D., and Deans, C.A. 2007. First recorded mating flight of hypogeic ant, *Acropyga epedana*, with its obligate mutualist mealybug, *Rhizoecus colombiensis*. *Journal of Insect Science* 11: 1-5. 10.1673/031.007.1101