

CURRICULUM VITAE

Dalton Ludwick

Address:

Appalachian Fruit Research Station
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Education:

Ph.D. Plant, Insect, and Microbial Sciences (emphasis in Entomology), Division of Plant Sciences, University of Missouri-Columbia

- Co-Advisors: Drs. Deborah Finke & Bruce Hibbard
- GPA: 3.841/4.0
- Date of completion: May 2018

B.S. Plant Sciences (emphasis in Plant Protection), University of Missouri-Columbia

- GPA: 3.5/4.0
- Date of completion: May 2014

Work Experience:

06/2018-present **Post-doctoral Associate**, Entomology, USDA-ARS/Virginia Tech

- Re-discovered *Trissolcus japonicus* in West Virginia
- Developed colonies of *T. japonicus* from West Virginia collections
- Conducted a survey of arthropods interacting with brown marmorated stink bug egg masses in West Virginia
- Document behavioral responses of *T. japonicus* to brown marmorated stink bug egg masses stored at several conditions
- Document suitability of brown marmorated stink bug egg masses stored at several conditions for mass rearing of *T. japonicus*
- Document impact of insecticides on *T. japonicus* in field and lab situations
- Identify and quantify arthropods associated with different orchard management systems
- Mentor and manage undergraduate students

08/2014-05/2018 **Graduate Research Assistant**, Division of Plant Sciences, University of Missouri-Columbia

- Evaluated plant-based bioassays of western corn rootworm for resistance detection
- Evaluated wild type populations of western corn rootworm for resistance to corn expressing *Bacillus thuringiensis* Berliner (Bt) proteins
- Evaluated laboratory colonies of western corn rootworm for Bt resistance via diet toxicity assays
- Evaluated Bt proteins on new artificial diet for screening of western corn rootworm larvae

- Surveyed microbiota present in all life stages of laboratory western corn rootworm colonies and evaluated the effect of soils on the insect microbiome
- Determined effects of temperature and length of exposure to cold temperatures on non-diapausing strains of western corn rootworm
- Evaluated various factors associated with northern corn rootworm rearing
- Developed a non-diapausing strain of northern corn rootworm
- Mentored undergraduate students in the laboratory for professional development, graduate school applications, and research

08/2017-10/2017 **Graduate Teaching Assistant**, Livestock Production and Management Research Methods, Division of Animal Sciences, University of Missouri-Columbia

- Developed an awareness for properly applied biostatistics
- Demonstrated and taught students different methods for analyzing data
- Instructed students to gain familiarity with SAS
- Provided written feedback for presentation of results, analyses, and correct interpretations

08/2015-12/2016 **Graduate Teaching Assistant**, Insect Diversity, Division of Plant Sciences, University of Missouri-Columbia

- Instructed students on how to distinguish insects at the order and family levels
- Constructed exams to evaluate students' understanding of insect family identification
- Instructed students on collecting and insect preservation methods
- Supervised multiple collecting trips for aquatic and terrestrial sampling
- Adapted to new situations to meet student needs

08/2012-07/2014 **Student Assistant**, Plant Genetics Research Unit, USDA-ARS, Columbia, MO

- Performed a cost-efficiency analysis of multiple bioassays
- Participated in behavioral research of western corn rootworm larvae
- Assisted with analysis of graduate student projects
- Led a western corn rootworm adult emergence tent study in the field
- Reared western corn rootworm

05/2013-08/2013 **Trait Characterization & Development Intern**, DuPont Pioneer, Champaign, IL

- Intern project concerned artificial infestation of maize with European corn borer
- Accurately recorded data of transgenic maize trials
- Infested field maize experiments with fall armyworm, European corn borer, and western corn rootworm

05/2012-08/2012 **Maize Product Development Intern**, DuPont Pioneer, Miami, MO

- Intern project concerned pollination and temperature interactions
- Carefully recorded data on multiple projects
- Inoculated plants with *Fusarium* to test plant resistance

08/2010-05/2012 **Student Assistant**, Wilbur R. Enns Entomology Museum, Columbia, MO

- Assisted Collections Manager with projects, including digitization of the collection
- Organized specimens and catalogued species

05/2011-08/2011 **Student Assistant**, Crop Physiology Lab, University of Missouri, Columbia, MO

- Assisted with projects of graduate students, including collections of plant tissue and soil samples
- Processed plant tissue samples of multiple crops

Publications:

1. **Ludwick, D.C.** and R.W. Sites. 2015. Descriptions of the female and nymphal instars of *Decarloa darlingtoni* La Rivers (HEMIPTERA: HETEROPTERA: NAUCORIDAE). Proceedings of the Entomological Society of Washington. 117 (1): 14-21.
2. **Ludwick, D.C.**, L.N. Meihls, K.R. Ostlie, B.P. Potter, L. French, and B.E. Hibbard. 2017. Minnesota field population of western corn rootworm (Coleoptera: Chrysomelidae) shows incomplete resistance to Cry34Ab1/Cry35Ab1. Journal of Applied Entomology. 141: 28-40.
3. **Ludwick, D.C.** and B.E. Hibbard. 2016. Rootworm Management: Status of GM Traits, Insecticides, and Potential New Tools. CAB Reviews. doi: 10.1079/PAVSNNR201611048.
4. Huynh, M.P., L.N. Meihls, B.E. Hibbard, S.L. Lapointe, R.P. Niedz, **D.C. Ludwick**, and T.A. Coudron. 2017. Diet improvement for western corn rootworm (Coleoptera: Chrysomelidae) larvae. PLoS ONE. 12 (11): e0187997.
5. **Ludwick, D.C.**, A. Zukoff, M. Higdon, and B.E. Hibbard. 2017. Protandry of the western corn rootworm (Coleoptera: Chrysomelidae) partially due to earlier egg hatch of males. Journal of the Kansas Entomological Society. 90 (2): 94-99.
6. **Ludwick, D.C.**, L.N. Meihls, M.P. Huynh, A.E. Pereira, B.W. French, T.A. Coudron, and B.E. Hibbard. 2018. A new artificial diet for western corn rootworm larvae is compatible with and detects resistance to all current Bt toxins. Scientific Reports. 8: 5379. doi: 10.1038/s41598-018-23738-z.
7. Meihls, L.N., M.P. Huynh, **D.C. Ludwick**, T.A. Coudron, B.W. French, K. Shelby, A.J. Hitchon, A.W. Schaafsma, A.E. Pereira, and B.E. Hibbard. Comparison of six artificial diets for support of western corn rootworm bioassays and rearing. Journal of Economic Entomology. In Press.
8. **Ludwick, D.C.**, A.C. Ericsson, L.N. Meihls, M.L. Gregory, T.A. Coudron, B.E. Hibbard, and K.S. Shelby. Survey of microbes associated with all western corn rootworm life stages reveals no difference between insects reared on different soils. Submitted to PLoS ONE.
9. Geisert, R.W., **D.C. Ludwick**, and B.E. Hibbard. Effects of cold storage on non-diapausing eggs of the western corn rootworm (*Diabrotica virgifera virgifera*). Submitted to the Journal of Economic Entomology.

Presentations:

1. **Ludwick, D.C.**, L.N. Meihls, T.A. Coudron, & B.E. Hibbard. (2014, November) Evaluation of plant-based Western corn rootworm bioassays for cost effectiveness and detection of resistance to Bt traits. Poster presented at the annual meeting of the Entomological Society of America, Portland, Oregon.
2. Meihls, L., **D.C. Ludwick**, T.A. Coudron, and B.E. Hibbard. (2014, November) Evaluation of artificial diets for use in western corn rootworm bioassays. Oral paper presented at the annual meeting of the Entomological Society of America, Portland, Oregon.
3. **Ludwick, D.C.**, L.N. Meihls, K.R. Ostlie, B.D. Potter, L. French, and B.E. Hibbard. (2015, June) A Minnesota field population shows varying levels of resistance to both Cry3Bb1 and Cry34/35Ab1-expressing corn. Oral paper presented at the North Central Branch meeting of the Entomological Society of America, Manhattan, Kansas.
4. Huynh, M., L. Meihls, **D.C. Ludwick**, A. Hitchon, L. Bjostad, E. Bernklau, A.W.

- Schaafsma, R.P. Niedz, S.L. Lapointe, T.A. Coudron, B.E. Hibbard. (2015, November) Optimization of an artificial diet for western corn rootworm, *Diabrotica virgifera virgifera*, bioassays. Oral paper presented at the annual meeting of the Entomological Society of America, Minneapolis, Minnesota.
5. **Ludwick, D.C.**, S. Zukoff, K. Ostlie, B.D. Potter, L. Meihls, A. Zukoff, L. French, M. Ellersieck, W. French, and B.E. Hibbard. (2015, November) Comparing different assays for Bt resistance detection in western corn rootworm. Oral paper presented at the annual meeting of the Entomological Society of America, Minneapolis, Minnesota.
 6. Meihls, L., T.A. Coudron, **D.C. Ludwick**, M. Huynh, E. Bernklau, and B.E. Hibbard. (2015, November) Efficacy of plant and diet-based assays for Bt resistance detection in western corn rootworm populations. Oral paper presented at the annual meeting of the Entomological Society of America, Minneapolis, Minnesota.
 7. Huynh, M., L. Meihls, **D.C. Ludwick**, R.P. Niedz, S.L. Lapointe, T.A. Coudron, and B.E. Hibbard. (2015, November) Continuous rearing of the western corn rootworm, *Diabrotica virgifera virgifera*, on an artificial diet. Poster presented at the annual meeting of the Entomological Society of America, Minneapolis, Minnesota.
 8. **Ludwick, D.C.**, S. Zukoff, L.N. Meihls, M. Huynh, K.R. Ostlie, B.E. Hibbard. (2016, September) Does Cry3Bb1 Resistance Persist Following Removal from Selection? Oral paper presented at the 25th meeting of the International Congress of Entomology, Orlando, Florida.
 9. Hibbard, B.E., **D.C. Ludwick**, L.N. Meihls, J. Dietloff, and A. Gassmann. (2016, September) Selection of resistance in western corn rootworm to Cry3Bb1, mCry3A, eCry3.1Ab, and Cry34/35Ab1 transgenic corn: Variations in traits in the laboratory and the field. Oral paper presented at the 25th meeting of the International Congress of Entomology, Orlando, Florida.
 10. Hibbard, B.E., M.P. Huynh, L.N. Meihls, **D.C. Ludwick**, K.S. Shelby, S. Lapointe, and T.A. Coudron. (2017, February) Improved artificial diet for western corn rootworm assays. Oral paper presented at the Academic Corn Summit at Monsanto.
 11. Hibbard, B.E., M.P. Huynh, L.N. Meihls, **D.C. Ludwick**, K.S. Shelby, S. Lapointe, and T.A. Coudron. (2017, April) Improved artificial diet for western corn rootworm assays. Oral paper presented at the 26th International Working Group on *Ostrinia* and other maize pests.
 12. **Ludwick, D.C.**, M.P. Huynh, A.E. Pereira, L.N. Meihls, T.A. Coudron, B.W. French, and B.E. Hibbard. (2017, June) A universal diet for resistance monitoring programs associated with western corn rootworm. Oral paper presented at the North Central Branch meeting of the Entomological Society of America, Indianapolis, IN.
 13. Huynh, M.P., L.N. Meihls, **D.C. Ludwick**, A.E. Pereira, S.L. Lapointe, R.P. Niedz, B.W. French, B.E. Hibbard, and T.A. Coudron. (2017, November) Diet development for the western corn rootworm and northern corn rootworm bioassays. Oral paper presented at the annual meeting of the Entomological Society of America, Denver, CO.
 14. **Ludwick, D.C.**, A. Ericsson, M. Gregory, L.N. Meihls, B.E. Hibbard, T.A. Coudron, and K.S. Shelby. (2017, November) Survey of the western corn rootworm (*Diabrotica virgifera virgifera* LeConte) microbiome across all life stages. Oral paper presented at the annual meeting of the Entomological Society of America, Denver, CO.
 15. Hibbard, B.E., **D.C. Ludwick**, M.P. Huynh, A.E. Pereira, Z. Zhao, K.S. Shelby, and T.A. Coudron. (2017, November) Rootworm resistance to Bt: an update. Oral paper presented

- at the annual meeting of the Entomological Society of America, Denver, CO.
16. Pereira, A.E., B.W. French, C. Nielson, **D.C. Ludwick**, M.P. Huynh, T.A. Coudron, and B.E. Hibbard. (2017, November) Baseline susceptibility of a northern corn rootworm, *Diabrotica barberi* Smith & Lawrence, laboratory strain to Cry3 Bt. Poster presented at the annual meeting of the Entomological Society of America, Denver, CO.
 17. Pereira, A.E., **D.C. Ludwick**, and B.E. Hibbard. (2018, March) Optimizing egg recovery from wild northern corn rootworm beetles. Poster presented at the North Central Branch meeting of the Entomological Society of America, Madison, WI.
 18. **Ludwick, D.C.**, L.N. Meihls, and B.E. Hibbard (2018, March) Best method(s) for detecting Cry34/35Ab1 resistance. Oral paper presented at the North Central Branch meeting of the Entomological Society of America, Madison, WI.

Guest Lectures:

1. **Ludwick, D. C.** Bt Corn and Why Western Corn Rootworm Matters. Insect Pest Management. University of Missouri-Columbia. Spring 2016.
2. **Ludwick, D. C.** Plant Stressors and Responses. Plant Structure and Function. University of Missouri-Columbia. Spring 2017.

Invited Presentations:

1. **Ludwick, D. C.** Managing Bt resistance for western corn rootworm in New Mexico. New Mexico Crop Production Association. January 2018.

Symposia Organized:

1. Building the bridge from fundamental research to improving tomorrow's crops. Columbia, MO. February 2, 2017. First annual DuPont Plant Sciences Symposium at the University of Missouri-Columbia.
2. Beyond corn and soy: advances in the integrated pest management of underrepresented Midwest crops. Madison, Wisconsin. March 18-21, 2018. Program symposium at the North Central Branch meetings of the Entomological Society of America.

Professional Organizations:

- 06/2012-present Entomological Society of America
- 09/2010-present C.V. Riley Entomological Society
- 12/2010-09/2014 Students in Agronomy, Soil, and Environmental Sciences

Grants (Facilitated or Earned):

- \$15,000 - Evaluate northern corn rootworm beetle density and oviposition media for egg recovery from wild Missouri beetles. Monsanto Company to Debbie Finke and Bruce Hibbard (University of Missouri Master Services Agreement). 2016.
 - o Assisted with adult northern corn rootworm collection in northwest Missouri
 - o Prepare a manuscript for publication
- \$5,000 – Gift to the University of Missouri for work on northern corn rootworm diapause from MFA. 2016
 - o Assisted with adult northern corn rootworm collection in northwest Missouri
 - o Prepare a manuscript for publication
- \$10,000 – Develop a student-led symposium in the DuPont Plant Sciences Symposium Series. DuPont Pioneer to MU DuPont Pioneer Plant Sciences Symposium series organizing committee. 2016.

- Coordinated committee members to complete tasks associated with the symposium's development
- Selected members for the committee responsible for the development of the second annual symposium
- Organized a special symposium in conjunction with the Division of Plant Sciences
- \$900 - Develop a student-led symposium in the DuPont Plant Sciences Symposium Series. Interdisciplinary Plant Group (IPG) to MU DuPont Pioneer Plant Sciences Symposium series organizing committee. 2016.
- \$635 - Develop a student-led symposium in the DuPont Plant Sciences Symposium Series. Division of Plant Sciences to MU DuPont Pioneer Plant Sciences Symposium series organizing committee. 2016.
- \$250 - Develop a student-led symposium in the DuPont Plant Sciences Symposium Series. Division of Biological Sciences to MU DuPont Pioneer Plant Sciences Symposium series organizing committee. 2016.

Honors:

- 03/2018 Student Travel Award, North Central Branch meetings of the Entomological Society of America
- 06/2017 2nd place in Ph.D. Paper Session II, North Central Branch meetings of the Entomological Society of America
- 04/2016 Fred Clute Memorial Scholarship
- 05/2014 Fayette Honorary Chapter FFA Degree
- 04/2014 Chancellor's Award for Interdisciplinary Outreach
- 08/2010-05/2014 University of Missouri Flagship Scholarship for Clark County
- 10/2012 Students in Agronomy, Soil, and Environmental Sciences Golden Opportunity Scholar

Professional Service:

09/2018-present **Co-Coordinator**, Combined Federal Campaign of the Appalachian Fruit Research Station

06/2018-present **Member**, Appalachian Fruit Research Station Seminar Committee

04/2017-04/2018 **President**, C.V. Riley Entomological Society

- Organize club lunches, gatherings, outings, and social activities
- Inform club members of upcoming events
- Maintain club status with the university
- Procure supplies and/or aid available from Student Organization Allocation Committee and other resources

09/2016-present **Member**, Education and Outreach Committee of the Entomological Society of America

- Assist with fulfillment of the charge order by the President of the Entomological Society of America
- Subcommittee chair for increased entomological awareness in the National FFA Organization

04/2016-03/2017 **Chair**, MU DuPont Pioneer Plant Sciences Symposium Series Organizing Committee

- Oriented committee members with productive techniques to complete tasks

- Obtained symposium funds through discussions with various academic and industry organizations
 - Coordinated handling of symposium details with MU faculty and DuPont Pioneer contacts
 - Selected applicants to serve on committee responsible for the second annual symposium
- 02/2016-present **Peer Reviewer:**
- Journal of Economic Entomology, Journal of Agricultural and Urban Entomology, Canadian Entomologist
- 05/2015-05/2016 **Public Relations**, C.V. Riley Entomological Society
- Organize club activities such as pinning parties and lunch presentations
 - Communicate with members and officers about events
- 04/2014 **Volunteer Assistant**, Missouri State FFA Entomology Career Development Event
- Organized competitors for the entomology career development event
 - Distributed examination materials to competitors
 - Proctored the written examination
- 05/2012-04/2014 **Executive Assistant**, C.V. Riley Entomological Society
- Engaged undergraduate students to become active in C.V. Riley and explore entomological interests
 - Coordinated outreach and social activities for the group
- 05/2012-05/2013 **Vice-President**, Mizzou Agronomy Club
- Attended CAFNR Student Council meetings – served as voice of the Agronomy Club
 - Collaborated with fellow officers for fundraising, community events, and career development
- 03/2012-present **Member**, C.V. Riley Entomological Society
- Assist with development of educational materials for outreach events
 - Communicate with public at outreach events to educate individuals about different areas of entomological research
- 04/2011-05/2012 **Peer Career Coach**, CAFNR Career Services
- Encouraged fellow students to pursue career development opportunities, including CAFNR Career Fair
 - Built relationships with employers interested in recruiting Plant Science students
- 01/2011-05/2014 **Advisor**, Fayette R-III High School FFA Chapter Entomology Career Development Event
- Developed a curriculum for the education of high school students to learn entomology
 - Prepared students for entomology career development events at District and State competition
 - Results: 2011: 2nd at Districts, 1st at State; 2012: 6th at Districts, 16th at State; 2014: 4th at Districts, 9th at State
- 07/2011 **Volunteer Judge**, Boone County 4-H Competition
- Examined entomological and reptilian materials for competition
- 08/2010-10/2013 **Member**, Mizzou Agronomy Club
- Assisted with development of materials used for South Farm Showcase
 - Assisted with professional networking events

Media Coverage and Activities:

- Wall, T. (Writer). (2018, May 11). What is Your Pet Really Thinking? [Television Series]. In R. Gornick (Producer), *Bill Nye Saves the World*. Los Angeles, CA: Netflix.
- Schmidt, S. (2017, January 18). Starting Off the Series. *CAFNR News*. Retrieved from <https://cafnr.missouri.edu/2017/01/starting-off-the-series/>
- Gallegos, J. (2017, April 14). 8 bee experts weigh in on pollinator decline & Cheerios' bid to save them. *Science Says*. Retrieved from <https://davissciencesays.com/2017/04/14/8-bee-experts-weigh-in-on-pollinator-decline-cheerios-bid-to-save-them/#comments>
- Begemann, S. (2018, June 15). Former "Billion Dollar Bug" is Mounting a Come Back. *AgWeb*. Retrieved from <https://www.agweb.com/article/former-billion-dollar-bug-is-mounting-a-come-back/>
- Brueck, H. (2017, May 19). Why A Bunch Of Scientists Are Heckling Bill Nye With #BillMeetScienceTwitter. *Forbes*. Retrieved from <https://www.forbes.com/sites/hilarybrueck/2017/05/19/why-a-bunch-of-scientists-are-heckling-bill-nye-with-billmeetsciencetwitter/#7099a15b1c63>
- Becker, R., & Potenza, A. (2017, May 19). With animal farts and singing mice, Twitter's scientists introduce themselves to Bill Nye. *The Verge*. Retrieved from <https://www.theverge.com/tldr/2017/5/19/15663446/bill-nye-neil-degrasse-tyson-meet-scientists-twitter-hashtag>
- Editor's Blog. (2017, May 23) Scientists Politely Troll Bill Nye The Science Guy, Bill Responds Brilliantly. *IFLScience*. Retrieved from <http://www.iflscience.com/editors-blog/scientists-politely-troll-bill-nye-the-science-guy-bill-responds-brilliantly/>
- Rabaiotti, D., Marquez, M.C., **Ludwick, D.**, & David, S. (2017, May 23) Bill Nye, Meet Science Twitter ---Guest Post---. *Living Alongside Wildlife*. Retrieved from <http://www.livingalongsidewildlife.com/2017/05/bill-nye-meet-science-twitter-guest-post.html>
- Editor's Blog. (2017, November 1) Scientists Are Sharing The One Thing They Want The World To Know About Their Fields. *IFLScience*. Retrieved from <http://www.iflscience.com/editors-blog/here-are-the-one-things-scientists-want-the-world-to-know-about-their-field/>
- Becker, R. (2017, October 31). Here's the one thing scientists want you to know. *The Verge*. Retrieved from <https://www.theverge.com/2017/10/31/16582162/one-thing-scientists-want-you-to-know-twitter-hashtag-science-facts>
- CBC Radio. (2017, November 9). What's the one thing scientists want the world to know about their field? *CBC Radio Quirks & Quarks with Bob McDonald*. Retrieved from <http://www.cbc.ca/radio/quirks/diy-dna-hacks-wounds-take-longer-to-heal-at-night-why-daydreams-are-good-quirks-bombs-and-more-1.4395576/what-s-the-one-thing-scientists-want-the-world-to-know-about-their-field-1.4395593>
- Rogers, M.J. (2017, July 6). #MeetScienceTwitter. *Christopher S. Bond Life Sciences Center*. Retrieved from <https://bondlsc.missouri.edu/2017/07/06/meetsciencetwitter/>
- Skwarecki, B. (2017, October 31). Octopuses Don't Have Tentacles, And Other Facts Scientists Want You To Know. *Lifehacker*. Retrieved from <https://vitals.lifehacker.com/1820020130>

- Skwarecki, B. (2017, November 1). Octopuses Don't Have Tentacles, And Other Facts Scientists Want You To Know. *Gizmodo*. Retrieved from <https://www.gizmodo.com.au/2017/11/octopuses-dont-have-tentacles-and-other-facts-scientists-want-you-to-know/>
- Thompson, A. (2017, November 2). Here's the One Thing Scientists Want You to Know About Their Fields. *Live Science*. Retrieved from <https://www.livescience.com/60844-tl-dr-here-s-the-one-thing-scientists-want-you-to-know-about-their-fields.html>
- Rozieres, P.G. (2017, November 2). Les scientifiques partagent LA chose que vous devriez connaître sur leur domaine. *HuffPost Science*. Retrieved from http://www.huffingtonpost.fr/2017/11/02/les-scientifiques-partagent-la-chose-que-vous-devriez-connaître-sur-leur-domaine_a_23264745/
- [The Roving Naturalist]. (2017, December 14). Explain Yourself: "My Corny Self" with Dalton. [Video File] Retrieved from <https://www.youtube.com/watch?v=YV2okWnXqQA>