Curriculum Vitae

Michael S. Crossley

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Research interests

I am an agricultural entomologist and molecular ecologist who integrates eco-informatics and population genomics approaches to understand how changing agricultural landscapes and management practices affect insect ecology and evolution. My research specifically explores the role of rapid evolution in driving pest success, and seeks to develop and refine innovative pest management strategies that benefit growers, the environment, and society.

Education

2019	Ph. D. in Entomology (minor in Geographic Information Systems), University of Wisconsin-Madison. GPA 3.90/4.0
2014	M. S. in Entomology, University of Wisconsin-Madison GPA: 3.90/4.0
2011	B. S. in Entomology, University of Wisconsin-Madison. GPA: 3.72/4.0

Employment

2019-2021	Postdoctoral Associate, University of Georgia, Dr. Bill Snyder
2019	Predoctoral Fellow, USDA NIFA AFRI ELI
2019	Teaching Fellow, WISCIENCE
2016-2018	NSF IGERT, Novel Ecosystems, UW-Madison
2014-2016	Graduate research assistant, UW-Madison, Dr. Sean Schoville
2012-2014	Graduate research assistant, UW-Madison, Dr. David Hogg
2011	Field research assistant, UW-Madison, Dr. David Hogg
2008-2011	Lab research assistant, UW-Madison, Dr. Richard Lindroth
2010	Vegetable crops pest scout, West Michigan IPM, Private Pest Management Consulting
2009	Field research assistant, UW-Madison, Dr. Eileen Cullen
2008	Field research assistant, UW-Madison, Dr. Russell Groves

Publications (27; 16 lead-author)

Aigner, BL, **MS Crossley**, MR Abney. 2021. Biology and management of peanut burrower bug (Hemiptera: Cydnidae) in Southeast USA peanut. Journal of Integrated Pest Management (in press).

Crossley MS, OM Smith, TS Davis, SD Eigenbrode, GL Hartman, D Lagos-Kutz, SE Halbert, DJ Voegtlin, MD Moran, WE Snyder. 2021. Complex life histories predispose aphids to recent decline. *Global Change Biology* (in press). https://onlinelibrary.wiley.com/doi/pdf/10.1111/gcb.15739

Hemberger J, **MS Crossley**, C Gratton. 2021. 130 years of agricultural intensification has decreased the occurrence of North American bumble bees. *Ecology Letters* (in press). https://onlinelibrary.wiley.com/doi/10.1111/ele.13786

Fu Z, **MS Crossley**, B Epstein, C Bates, DW Crowder, AA Elling, PA Hohenlohe, R Jabbour, RA Ramirez, WE Snyder. 2021. Using fine-scale relatedness to infer natural enemy movement. *Biological Control* 160:104662. https://www.sciencedirect.com/science/article/pii/S1049964421001328

Krey KL, OM Smith, EG Chapman, **MS Crossley**, DW Crowder, Z Fu, JD Harwood, AS Jensen, CA Lynch, GB Snyder, WE Snyder. 2021. Prey and predator biodiversity mediate aphid predation by generalists. *Biological Control* 160:104650. https://www.sciencedirect.com/science/article/pii/S1049964421001201

Crossley MS, OM Smith, LL Berry, R Phillips-Cosio, J Glassberg, KM Holman, JG Holmquest, AR Meier, SA Varriano, MR McClung, MD Moran, WE Snyder. 2021. Recent climate change is creating hotspots of butterfly increase and decline across North America. *Global Change Biology* 27:2702-2714. https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.15582

Crossley MS, WE Snyder, MD Moran. 2021. MS Crossley et al. reply. *Nature Ecology & Evolution* 5:595-599. https://www.nature.com/articles/s41559-021-01429-9

Crossley, MS, SD Schoville, VC Radeloff. 2020. Recent collapse of crop belts and declining diversity of US agriculture since 1840. *Global Change Biology* 27:151–164. https://doi.org/10.1111/gcb.15396

Crossley, MS, and WE Snyder. 2020. What is the spatial extent of a *Bemisia tabaci* population? *Insects* 11: 813. https://www.mdpi.com/2075-4450/11/11/813

Gautam, S, **MS Crossley**, B Dutta, T Coolong, AM Simmons, A Silva, WE Snyder, and R Srinivasan. 2020. Low Genetic Variability in *Bemisia tabaci* MEAM1 Populations within Farmscapes of Georgia, USA. *Insects* 11:834. https://doi.org/10.3390/insects11120834

Crossley MS, AR Meier, EM Baldwin, LL Berry, LC Crenshaw, GL Hartman, D Lagos-Kutz, DH Nichols, K Patel, S Varriano, WE Snyder, MD Moran. 2020. No net insect abundance and diversity declines across US Long Term Ecological Research sites. *Nature Ecology & Evolution* 4:1368–1376 https://doi.org/10.1038/s41559-020-1269-4

Crossley MS, WE Snyder, NB Hardy. 2021. Insect-plant relationships predict the speed of insecticide adaptation. *Evolutionary Applications* 14:290-296. https://doi.org/10.1111/eva.13089

Yang F, N Liu, **MS Crossley**, P Wang, Z Ma, J Guo, R Zhang. 2020. Cropland connectivity affects genetic divergence of Colorado potato beetle along an invasion front. *Evolutionary Applications* 14:553-565. https://doi.org/10.1111/eva.13140

Dively GP, **MS Crossley**, SD Schoville, N Steinhauer, DJ Hawthorne. 2020. Regional differences in gene regulation may underlie patterns of sensitivity to novel insecticides in *Leptinotarsa decemlineata*. *Pest Management Science* 76:4278-4285. https://doi.org/10.1002/ps.5992

Miller T, **MS Crossley**, F Zhen, AR Meier, DW Crowder, WE Snyder. 2020. Exposure to predators, but not intraspecific competitors, heightens herbivore susceptibility to entomopathogens. *Biological Control* 151:104403. https://doi.org/10.1016/j.biocontrol.2020.104403

Williams, J, K Burke, **MS Crossley**, D Grant, V Radeloff. 2019. Land use and climatic causes of environmental novelty in Wisconsin over the past century. *Ecological Applications* 29:e01955. https://doi.org/10.1002/eap.1955

Crossley, MS, SI Rondon, SD Schoville. 2019. Effects of contemporary agricultural land cover on Colorado potato beetle genetic differentiation in the Columbia Basin and Central Sands. *Ecology and Evolution* 6:9385-9394. https://doi.org/10.1002/ece3.5489

Crossley, MS, SI Rondon, SD Schoville. 2019. Patterns of genetic differentiation in Colorado potato beetle correlate with contemporary, not historic, potato land cover. *Evolutionary Applications* 12:804-814. https://doi.org/10.1111/eva.12757

Crossley, MS, SI Rondon, SD Schoville. 2018. A comparison of resistance to imidacloprid in Colorado potato beetle (*Leptinotarsa decemlineata* Say) populations collected in the Northwest and Midwest U.S. *American Journal of Potato Research* 95:495–503. https://doi.org/10.1007/s12230-018-9654-0

Crossley, MS, SD Schoville, DM Haagenson, SH Jansky. 2018. Plant resistance to Colorado potato beetle (Coleoptera: Chrysomelidae) in diploid F2 families derived from crosses between cultivated and wild potato. *Journal of Economic Entomology* 111:1875-1884. https://doi.org/10.1093/jee/toy120

Pélissié, B, **MS Crossley**, Z Cohen, SD Schoville. 2018. Rapid evolution in insect pests: the importance of space and time in population genomics studies. *Current Opinions in Insect Science* 26:8-16. https://doi.org/10.1016/j.cois.2017.12.008

Crossley, MS, B Pélissié, Z Cohen, SD Schoville. 2017. *Leptinotarsa decemlineata* (Coleoptera: Chrysomelidae) observed feeding on *Chamaesaracha* sp. in Eastern Colorado. *The Great Lakes Entomologist* 50:93-97. https://scholar.valpo.edu/tgle/vol50/iss2/10

Crossley, MS, YH Chen, RL Groves, SD Schoville. 2017. Landscape genomics of Colorado potato beetle provides evidence of polygenic adaptation to insecticides. *Molecular Ecology* 26:6284-6300. https://doi.org/10.1111/mec.14339

Crossley, MS, SA Steffan, DJ Voegtlin, KL Hamilton, DB Hogg. 2017. Variable isotopic compositions of host plant populations preclude assessment of aphid overwintering sites. *Insects* 8:128. http://dx.doi.org/10.3390/insects8040128

Crossley, MS, DB Hogg. 2015. Potential overwintering locations of soybean aphid (Hemiptera: Aphididae) colonizing soybean in Ohio and Wisconsin. *Environmental Entomology* 44:210-222. http://dx.doi.org/10.1093/ee/nvv012

Crossley, MS, DB Hogg. 2015. *Rag* virulence among soybean aphids (Hemiptera: Aphididae) in Wisconsin. *Journal of Economic Entomology* 108:326-338. http://dx.doi.org/10.1093/jee/tou022

Meehan, TD, **MS Crossley**, RL Lindroth. 2010. Impacts of elevated CO_2 and O_3 on aspen leaf litter chemistry and earthworm and springtail productivity. *Soil Biology and Biochemistry* 42: 1132-1137. http://dx.doi.org/10.1016/j.soilbio.2010.03.019

Publications in review (5) / in prep (2)

Crossley MS, TS Davis, GL Hartman, D Lagos-Kutz, DJ Voegtlin, WE Snyder. (in review). Precipitation change accentuates or reverses temperature effects on aphid dispersal. *Ecological Applications.*

Crossley MS, CE Latimer, CM Kennedy, WE Snyder. (in review). Past and recent farming degrades aquatic insect genetic diversity. *Molecular Ecology.*

Crossley MS, B Pélissié, Z Cohen, SI Rondon, D Hawthorne, YH Chen, A Alyokhin, SD Schoville. (in review). Limiting a superpest: Ecological and evolutionary factors mitigating Colorado potato beetle adaptation to insecticides. *Chapter in: Insect Pests of Potato 2nd Edition.*

Pélissié B, YH Chen, **MS Crossley**, ZP Cohen, DJ Hawthorne, V Izzo, SD Schoville. (in review). Genome resequencing reveals rapid, repeated evolution in the Colorado potato beetle, *Leptinotarsa decemlineata*. *Molecular Biology and Evolution.*

Cohen ZP*, **MS Crossley***, RF Mitchell, P Engsontia, YH Chen, SD Schoville. (in review). Chemosensory genes linked to potato-feeding are under positive selection in *Leptinotarsa decemlineata*. *Heredity.* *co-equal first authors

Lynch CA, OM Smith, EG Chapman, **MS Crossley**, DW Crowder, Z Fu, JD Harood, AS Jensen, KL Krey, GB Snyder, WE Snyder. (in review). Alternative prey and farming system mediate predation of Colorado potato beetles by generalists. *Biological Control*

Thaler J, T Ugine, **MS Crossley**, S Finkner, E Bueno, Y Chen, SD Schoville, B Pélissié, MB Baker. (In Prep). Novel costs of insecticide resistance: prey responses to predators cause strong reductions in growth. *Target journal: Journal of Applied Ecology*

Grants (total funding acquired: **$85,090**)

Crossley MS, WE Snyder, MR Abney. 2020. Sources of burrower bug infestations in peanut. *National Peanut Board, Southeastern Peanut Research Initiative* **$25,000**

Crossley MS, M Hubert. 2018. Rapid adaptation to agricultural chemicals: Testing the role of pre-existing genetic variation and new mutations using historical samples*. IGERT Competitive Innovation Incentive Fund* **$2,870**

Crossley MS, BM Havlicek. 2017. Can humans facilitate continent-wide species redistributions? A case study with the Colorado potato beetle. *IGERT Competitive Innovation Incentive Fund* **$3,420**

Crossley, MS, RL Groves, SD Schoville. 2015. Adaptation in spatially structured agroecosystems: managing Colorado potato beetles in working landscapes. Wisconsin Potato & Vegetable Growers Association **$12,000**

Crossley MS, SD Schoville. 2016. Summer Agricultural Research Station Internship **$4,800**

Crossley MS, DB Hogg, and S Steffan. 2015. Determining the sources of soybean aphids colonizing soybean in Wisconsin. Wisconsin Soybean Marketing Board **$12,200**

Crossley MS, SD Schoville. 2015. Summer Agricultural Research Station Internship **$4,800**

Crossley MS, C Grau, DB Hogg. 2012. Mechanisms of plant resistance to soybean aphid and resistance-defeating aphid biotypes. Wisconsin Soybean Marketing Board **$20,000**

Fellowships & awards (total funding received: **$269,191**)

2021 USDA NIFA AFRI EWD Postdoctoral Fellowship **$154,952**

2018 USDA NIFA AFRI ELI Predoctoral Fellowship **$43,739**

2016 NSF Integrative Graduate Education & Research Traineeship (IGERT) - UW-Madison **$62,000**
Gureen Gulstein Research Fellowship **$1,000**
UW-Madison Graduate School – Student Research Travel Award **$500**

2012 Travel Grant from Entomological Society of America, Student and Young Professionals Committee. *Funding to attend the 2012 International Congress of Entomology (ICE) held in Daegu, South Korea* **$1,500**

2011 Undergraduate Achievement Award, Plant-Insect Ecosystems Section, Entomological Society of America **$1,500**

2010 University Book Store Academic Excellence **$1,000**

2009 Holstrom Environmental Scholarship **$3,000**

Teaching & mentoring

2020 Guest Lecture: Insects and the Environment (ENTO 2010)
Topic: Case study – geographic variation in rates of adaptation to insecticides

2019 Guest Lecture: Insect Ecology (ENTO 8500)
Topic: What makes a pest a pest?

2018 WISCIENCE teaching fellow (teaching “Exploring Biology” – INTEGSCI 100)

Fellows received training in scientific teaching best-practices, then collaboratively developed and taught an introductory course in the biological sciences to 1st year students, included some first-generation college students.

BIOLOGY 152 (Introductory Biology) Independent Research Mentor

2017 Guest lecture & lab tutorials: Molecular Ecology ENTOM 624

Taught lectures and developed hands-on data analysis learning activities on the topics of: 1) *Population structure*, 2) *Genome scans*

BIOLOGY 152 Independent Research Mentor

2016 BIOLOGY 152 Independent Research Mentor

2015 Promega Youth Apprenticeship Program student mentor

Mentored a high school student in molecular lab techniques and field research.

2013 BIOCORE 382 (Evolution, Ecology & Genetics Lab) Teaching Assistant

Taught a lab section of 24 2nd-3rd year students, guiding students through the conception, implementation, and communication of four research projects.

2012 Guest lecture: Principles of Economic Entomology (ENTOM 351)

Topic: Host Plant Resistance

BIOLOGY 152 Independent Research Mentor

2011 Principles of Economic Entomology (ENTOM 351) Practicum in Teaching

Developed and graded quizzes and exams.

Outreach

2018 PEOPLE program summer science internship mentor

The PEOPLE program recruits and prepares students from underrepresented groups to succeed in college, and this internship specifically exposes students to STEM research experiences.

Molecular Ecology lab outreach (Darwin Day, Saturday Science)

2017 Middle school Science Symposium mentor

This program involved middle school students to semester-long independent research projects. Schools I served included Badger Rock Middle School, a charter school serving predominantly black and Latinx students from low-income neighborhoods.

PEOPLE program summer science internship mentor

Molecular Ecology lab outreach (Darwin Day, Saturday Science)

2016 PEOPLE program summer science internship mentor

Middle school Science Symposium mentor

Math tutor**,** 3rd grade, John Muir Elementary School

2011-2016 Insect Ambassadors (Entomology education/inspiration for youth)

Media

Kozik, LA, 2021. More agriculture, less crop variety, fewer bumble bees. https://7c140796.flowpaper.com/agbeecomic/#page=1

Wurst, J. 2021. *Athens News Matters: Climate Impact on Butterflies*. https://www.wuga.org/post/athens-news-matters-climate-impact-butterflies#stream/0

McDermott, A. 2020. *News Feature: To understand the plight of insects, entomologists look to the past*. Proceedings of the National Academy of Sciences. https://www.pnas.org/content/early/2020/12/16/2018499117#ref-16

Weaver, M. 2020. Climate helps battle against Colorado potato beetle. Capital Press. https://www.capitalpress.com/ag_sectors/research/climate-helps-battle-against-colorado-potato-beetle/article_22d4b5de-4200-11ea-86a8-67d01fcbb04e.html

Crossley, MS. 2017. "*Holding off a potato super-pest"* Potato Country. January issue (pgs. 14-16) http://reader.mediawiremobile.com/ColumbiaMediaGroup/issues/110338

Research presentations

Invited talks

1. *Ecoinformatics of declines and rebounds amidst the "Insect Apocalypse"*. Entomological Society of America 2021 (invited contribution to upcoming "Early Career Professional Recognition Symposium")
2. *Linking warmer temperatures, greater insecticide use, and worsening pest outbreaks.* Entomological Society of America 2021 (invited contribution to upcoming section symposium "Ecology, Epidemiology, and Management of Whiteflies and Whitefly-transmitted Viruses")
3. *Are insects broadly in decline?* Department of Entomology seminar, University of Georgia, Fall 2020.
4. *Beyond candidate genes: Genomics of Colorado potato beetle adaptation to insecticides*. Member Symposium: Applications of Molecular Ecology and Ecological Genomics to Agriculture and Pest Management. ESA 2019
5. *Novelty of Wisconsin landscapes relative to historic baselines: Assessing the relative role of climate, land-use, and forest changes.* Biodiversity and Conservation in Human-Dominated Landscapes: A Symposium on Novelty in Ecosystems. UW-Madison 2018
6. *Landscape genomics of Colorado potato beetle provides evidence of polygenic adaptation to insecticides*. Member Symposium: Genomics of Adaptation: Linking the Next Generation of Genome-Wide Analysis to Understand and Manage Complex Traits. ESA 2017
7. *Consequences of lignin modification in biofuel poplar for insect pest susceptibility: Do we have a green light?* ESA 2011

Contributed talks and posters

8. *Colorado potato beetle adaptation to changing agricultural landscapes and management practices*. PhD exit seminar, UW-Madison 2019
9. *Changing agricultural landscapes drive genetic differentiation in Colorado potato beetle".* Entomological Society of America annual meeting (talk) 2018
10. *Assessing population structure among Colorado potato beetles (Leptinotarsa decemlineata) in the Midwest with genotyping-by-sequencing*. (talk) ESA 2016
11. *Gene flow and resistance in Colorado potato beetle*. (poster) ESA 2015
12. *Seasonal dispersal and population genetics of soybean aphid (Aphis glycines) occurring in Wisconsin*. (talk) ESA 2014
13. *Rag virulence at a low frequency among soybean aphids (Aphis glycines) occurring in Wisconsin*. (poster) ESA 2014
14. *Challenges managing soybean aphid: Plant resistance and population genetics*. UW-Madison Dept. of Plant Pathology students and postdocs seminar. (talk) 2014
15. *Distribution of virulent soybean aphid (Aphis glycines) biotypes in Wisconsin*. (talk) ESA 2013
16. *Taking on Popeye of the arthropods: A novel approach to managing Garden Symphylan in hoop-houses.* (poster) ESA 2013

Extension presentations

Invited talks

1. *Limiting a superpest: Colorado potato beetle in the Pacific Northwest*. 11th Washington - Oregon Potato Conference 2019
2. *Colorado potato beetle resistance management*. Hermiston Farm Fair 2016

3. *Examples of pesticide resistance: how it happens and how we can stop it*. Hermiston Farm Fair 2016
4. *Understanding the spread of neonicotinoid resistance among Colorado potato beetle populations at regional and local scales.* UW Extension & Wisconsin Potato and Vegetable Growers Association conference (**UWEX-WPVGA**) 2014

Contributed talks

5. *Do the nightshades in my field help Colorado potato beetle?* UWEX-WPVGA 2019
6. *Colorado potato beetle genetics over the landscape: A comparison between the Central Sands and Columbia Basin*. UWEX-WPVGA 2018
7. *Gene flow and evolution of insecticide resistance in Colorado potato beetle*. UWEX-WPVGA 2016
8. *CALS: The fast track to a career in science*. College of Agricultural and Life Sciences, Alumni Breakfast & Board of Visitors Meeting 2011

Professional Service

Contributor to the Bumble Bee Watch https://www.bumblebeewatch.org/

Manuscript reviewer since 2014 https://publons.com/researcher/1346719/michael-crossley/

American Journal of Potato Research, Arthropod-Plant Interactions, *Atmosphere*, *Communications Biology*, *Ecology and Evolution*, *Environmental Entomology*, *Evolutionary Applications, Global Ecology and Biogeography, Insects, Journal of Economic Entomology*, *Molecular Ecology, Molecular Ecology Resources, Pest Management Science, Scientific Data, Scientific Reports, Trends in Ecology and Evolution*

Student Volunteer and/or Moderator. Entomological Society of America Annual Meetings 2011-2018