

## Ryan L. Paul, PhD

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USDA-NIFA Postdoctoral Fellow  
Oregon State University  
USDA-ARS Horticultural Crops Research Unit  
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### Education

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- 2014-2020    **PhD, Ecology**  
Graduate Degree Program in Ecology (GDPE)  
Colorado State University, Fort Collins, CO  
Dissertation: Winners and losers in toxic relationships affecting parasitoid wasps  
Advisor: Paul J. Ode
- 2010-2014    **Bachelor of Science, Entomology**  
College of Agriculture and Honors College  
Michigan State University, East Lansing, MI

### Research Experience

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| <p><b>USDA-NIFA Postdoctoral Fellow / Postdoctoral Research Entomologist</b><br/>Nontarget impacts and foraging strategies of <i>Trissolcus japonicus</i><br/>Oregon State University and USDA-ARS Horticultural Crops Research Unit<br/>Advisor: Jana C. Lee<br/>Self-funded July 2021-present</p> | <b>2020-Present</b> |
| <p><b>Graduate Research Assistant, Colorado State University</b><br/>Chemical ecology and competitive interactions of parasitoids<br/>Bioagricultural Sciences and Pest Management Department (now Agricultural Biology)<br/>Advisor: Paul J. Ode</p>   | <b>2014-2020</b>    |
| <p><b>Research Intern – Insect Identification</b><br/>Butterfly Pavilion, Westminster, CO<br/>Family level ID of field collected insect samples<br/>Supervisor: Mario Padilla and Rich Reading</p>  | <b>2018-2020</b>    |
| <p><b>Research Assistant, Michigan State University</b><br/>Classical Biological Control of Brown Marmorated Stink Bug Program<br/>Supervisor: Ernest S. Delfosse</p>   | <b>2013-2014</b>    |
| <p><b>Data entry and organization assistant</b><br/>Enviro-weather, Michigan State University<br/>Supervisor: Beth Bishop</p>   | <b>2011-2013</b>    |

**Lab assistant, Acarology**

Museum of Zoology, University of Michigan  
Supervisor: Barry O'Connor

**May-Aug 2011, 2012****Teaching Experience****Instructor, Oregon State University****Spring Quarter 2022**

FES 412/512, Forest Entomology – 3 credits  
Department of Forests, Ecosystems, and Society  
55 students, mostly Junior/Senior undergraduate and graduate students  
3 hours instruction, 2 hours office hours  
Supervised Graduate Teaching Assistant (lecture assistant and grader)

**Graduate Teaching Assistant, Colorado State University****Spring Semester 2017, 2020**

Laboratory instructor - Life 103, Biology of Organisms – Animals and Plants  
Biology Department  
Led two lab sections per week, wrote lab practicals, supervised undergraduate teaching assistant  
Supervisor: Donna Weedman

**Graduate Teaching Assistant, Colorado State University****Fall Semester 2019**

BSPM 302, Fundamentals of Entomology  
Department of Bioagricultural Sciences and Pest Management (now Agricultural Biology)  
Primary grader, co-designed course assignments, co-wrote exams, led review sessions, weekly office hours  
Supervisor: Paul Ode

**Graduate Teaching Assistant, Colorado State University****Fall Semester 2015-2018**

Laboratory instructor - BZ 212, Animal Biology - Invertebrates  
Biology Department  
Led two lab sections per week, purchased semester lab supplies, co-wrote lab syllabus (2018), designed assignments, wrote lab practicals, supervised undergraduate teaching assistant  
Supervisor: Janice Moore (2015-2016); Corey Handelsman (2017-2018)

**Undergraduate Tutor, Fort Collins****2017-2019**

Ramtutor/Bufftutor, Boulder, CO  
Undergraduate biology and chemistry tutor  
Supervisor: Mogi Mogaka

**Tutor for Student-Athlete Support Services, Colorado State University****2017**

BZ 101 – Humans and other animals, BZ 110 – Biology of Animals,  
BZ 212 – Animal Biology - Invertebrates  
Athletics Department  
Individual and group tutoring with student athletes  
Supervisor: Cheryl Walther

**Graduate Teaching Assistant, Colorado State University** **2014**

Life 102, Attributes of Living Systems  
Biology Department

Two lab sections per week, supervised undergraduate teaching assistant, wrote lab practicals  
Supervisor: Donna Weedman

**Outreach presenter** **2010-2013**

Bug House, Michigan State University  
Supervisor: Barb Stinnett, Courtney Smith

**Publications**


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**R.L. Paul**, P.K. Abram, J.C. Lee. 2022. Host patch quality increases parasitoid locomotor activity despite risk of egg limitation. *Ecological Entomology*. 1-12.  
<https://doi.org/10.1111/een.13171>

B.J. Pinto, J.J. Weis, T. Gamble, P.J. Ode, **R.L. Paul**, J.M. Zaspel. 2021. A chromosome-level genome assembly of the parasitoid wasp, *Cotesia glomerata* (Hymenoptera: Braconidae). *Journal of Heredity*. 112, 6: 558-564.

**R.L. Paul**, I.S. Pearse, P.J. Ode. 2021. Fine-scale defence variability increased top-down control of an herbivore. *Functional Ecology*. 00:1-11. <https://doi.org/10.1111/1365-2435.13808>

O.L. Cope, Z. Becker\*, P.J. Ode, **R.L. Paul**, I.S. Pearse. 2020. Associational effects of plant ontogeny on damage by a specialist herbivore. *Oecologia* 193: 593-602.  
<https://doi.org/10.1007/s00442-020-04702-z>

D.K. Vyas, **R.L. Paul**, M. Gates, T.D. Kubik\*, J.A. Harvey, B. Kondratieff, P.J. Ode. 2020. Shared enemies exert differential mortality on two competing parasitic wasps. *Basic and Applied Ecology* 47: 107-119. <https://doi.org/10.1016/j.baae.2020.04.007>

D.K. Vyas, J.A. Harvey, **R. Paul**, G.E. Heimpel, P.J. Ode. 2019. Ecological dissociation and re-association with a superior competitor alters host selection behavior in a parasitoid wasp. *Oecologia* 191: 261-270. <https://doi.org/10.1007/s00442-019-04470-5>

I.S. Pearse, **R. L. Paul**, P.J. Ode. 2018. Variation in plant defense suppresses herbivore performance. *Current Biology* 28: 1981-1986. <https://doi.org/10.1016/j.cub.2018.04.070>

**Manuscripts in progress**


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E. Ghosh, **R.L. Paul**, P.J. Ode. Host plant chemistry enhances herbivore cellular immunity with differential effectiveness against two parasitoid species. *In revision – Functional Ecology*.

**R.L. Paul**, D.K. Vyas, P.J. Ode. Oviposition fluids from adult female wasps mediate interspecific competition between larval parasitoids. *Submitted – Ecological Entomology*

**R.L. Paul**, S. Goldin\*, F. Dayan, P.J. Ode. Plants induce defense chemicals based on identity of a parasitoid attacking an herbivore. *In prep.*

\*indicates undergraduate student mentee

## Research Presentations

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J.C. Lee, **R. Paul**, E. Janasov, K. Velasco-Graham, R. Chave, K. Park, G. Tait, V. Walton, S. Dorman, J. Myers, R. Schmidt-Jeffris, D. Beal, P. Smytheman, B. Beers, B. Hogg, J. Stahl, K. Daane. Areawide releases of *Ganaspis brasiliensis* in the West Coast. Entomological Society of America Annual Meeting 2022, Vancouver, BC, CA, Nov 2022.

**R.L. Paul** and J.C. Lee. Incorporating ecology into laboratory evaluations of parasitoids for biological control. Entomological Society of America Annual Meeting, Vancouver, BC, CA, Nov 2022

**R.L. Paul**. Variable plant defense interactions in tri-trophic systems. Mississippi State University Department of Biochemistry, Molecular Biology, Entomology, & Plant Pathology Seminar Series (Invited).

**R.L. Paul** and J.C. Lee. Incorporating ecological concepts in understanding parasitoid interactions in biological control. Oregon State University Department of Horticulture seminar series, Corvallis, OR; Apr 2022 (Invited)

**R.L. Paul** and J.C. Lee. Integrating ecology into evaluation of parasitoids for biocontrol. Entomological Society of America Pacific Branch annual meeting, Santa Rosa, CA; Apr 2022. (Invited)

**R. L. Paul** and J.C. Lee. Laboratory evaluation of nontarget host exploitation by *Trissolcus japonicus*. International Symposium on Biological Control of Arthropods, virtual. Mar 2022. (Early career research award)

**R.L. Paul** and J.C. Lee. Foraging behaviors of *Trissolcus japonicus*, a potential biological control agent of brown marmorated stink bug. Pacific Northwest Insect Management Conference, virtual; Jan 2022.

**R.L. Paul** and J.C. Lee. Foraging strategies of *Trissolcus japonicus*. Entomological Society of America annual meeting, Denver, CO; Nov 2021

**R.L. Paul** and J.C. Lee. Foraging strategies of *Trissolcus japonicus*. Entomological Society of America Pacific Branch annual meeting, virtual; April 2021

**R.L. Paul** and J.C. Lee. Ecological factors influencing foraging and fitness of the samurai wasp, *Trissolcus japonicus*. Pacific Northwest Insect Management Conference, virtual; Jan 2021

**R.L. Paul**, D.K. Vyas, and P.J. Ode. Oviposition fluids of a solitary parasitoid aid in physiological suppression of intrinsic competitors. Entomological Society of America Annual Meeting 2020, virtual. (1<sup>st</sup> place student competition winner).

**R.L. Paul** and P.J. Ode\*. Induction of plant defenses by parasitized herbivores is parasitoid species specific. Entomological Society of America Annual Meeting, 2020, virtual. \*presenting author

**R.L. Paul**. Winners and losers in toxic relationships affecting parasitoid wasps. USDA-ARS HCRU Seminar Series, Corvallis, OR; Oct 2020 (Invited)

**R.L. Paul**, F. Dayan, S. Goldin, D.K. Vyas, P.J. Ode. Plants induce defense chemicals based on identity of parasitoid attacking an herbivore. American Chemical Society Fall Virtual Meeting; Aug 2020 (Graduate Student AGRO Award, Invited)

**R.L. Paul**, D.K. Vyas, P.J. Ode. Population dynamics of the imported cabbageworm and its biological control agent. Entomological Society of America Annual Meeting, St. Louis, MO; Nov 2019

**R.L. Paul**, F. Dayan, D.K. Vyas, P.J. Ode. Plant chemical responses to herbivory by the imported cabbageworm and two parasitic wasps. American Chemical Society Fall Meeting, San Diego, CA; Aug 2019 (AGRO Grad Student Travel Award, Invited)

**R.L. Paul**. Does plant defense variability affect a parasitoid wasp? Front Range Student Ecology Symposium, Colorado State University, Fort Collins, CO; Feb 2019

**R.L. Paul**, I.S. Pearse, P.J. Ode. Does plant defense variability affect development of a polyembryonic parasitoid? Entomological Society of America Meeting, Vancouver, BC; Nov 2018. (1<sup>st</sup> place competition winner)

**R.L. Paul**, I.S. Pearse. P.J. Ode. Reduced plant variability impacts on third trophic level. Ecological Society of America Meeting, Aug 2018.

**R.L. Paul**, D. Vyas, P. Ode. Plant response to a gregarious versus solitary parasitoid. Entomological Society of America Annual Meeting, Denver, CO; Nov 2017.

**R.L. Paul**, P. Ode, and D. Vyas. Effects of cultivated and wild plants on foraging decisions in a crucifer pest system. Invited talk, BSPM Department Professional Development Series, Colorado State University Fort Collins, CO; Nov 2016

**R.L. Paul**, P. Ode, and D. Vyas. Effects of cultivated and wild plants on foraging decisions in a crucifer pest system. Entomological Society of America North Central Branch Annual Meeting, Cleveland, OH; June 2016

**R.L. Paul**, D. Vyas, P. Ode, D. Lecain and D. Blumenthal. A glimpse of changes to come: effects of elevated CO<sub>2</sub> on a tri-trophic system. Entomological Society of America Annual Meeting, Minneapolis, MN; Nov 2015

D. Vyas\*, **R.L. Paul\***, P. Ode. Can two similar parasitoid wasps coexist? Front Range Student Ecology Symposium, CSU, Fort Collins, CO; Feb 2015. (Poster presentation). \*co-presenters

**R.L. Paul** and E. Delfosse. Biotic potential of *Trissolcus japonicus* (Ashmead), a solitary egg parasitoid of the brown marmorated stink bug, *Halyomorpha halys* (Say). Entomological Society of America Annual Meeting, Portland, OR; Nov 2014 (2<sup>nd</sup> place competition winner)

### **Other presentations**

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**Ryan L. Paul.** Host hijackers: wasp meets caterpillar. Biodiversity Ignite Night, Fort Collins, CO; Apr 2019. (Invited)

**Ryan L. Paul.** The enemy of my enemy is my friend. Colorado State University BSPM Department Recruitment Event, Fort Collins, CO; Feb 2018.

**Ryan L. Paul.** Wasps as weapons in the fight for food. BSPM Three Minute Thesis. Colorado State University, Fort Collins, CO; Nov 2018.

**Ryan L. Paul.** Parasitoids: masters of adaptation. IGNITE Presentation, Front Range Student Ecology Symposium, CSU, Fort Collins, CO; Feb 2016

### **Guest Lectures**

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Hexapoda. Guest lecture, BZ 212 - Biology of Invertebrates, Colorado State University, Fort Collins, CO; Nov 2019

Pollination. Guest lecture, BSPM 302 – General and Applied Entomology, Colorado State University, Fort Collins, CO; Oct 2019.

Insect thorax and flight. Guest lecture, BSPM 302 – General and Applied Entomology, Colorado State University, Fort Collins, CO; Oct 2019.

Insect abdomens. Guest lecture, BSPM 302 – General and Applied Entomology, Colorado State University, Fort Collins, CO; Oct 2019.

Hexapoda. Guest lecture, BZ 212 - Biology of Invertebrates, Colorado State University, Fort Collins, CO; Nov 2018.

Predators, parasites, and parasitoids. Guest lecture, BSPM 302 – General and Applied Entomology, Colorado State University, Fort Collins, CO; Oct 2018.

Mentor-mentee relationships. RMAIS Fellow workshop, GDPE, Colorado State University, Fort Collins, CO; June 2018.

Myriapoda and Hexapoda. Guest lecture, BZ 212 - Biology of Invertebrates, Colorado State University, Fort Collins, CO; Nov 2017.

Predators, parasites, and parasitoids. Guest lecture, BSPM 302 – General and Applied Entomology, Colorado State University, Fort Collins, CO; Oct 2017.

Semiochemicals and behavior. Guest lecture, BSPM 302 – General and Applied Entomology, Colorado State University, Fort Collins, CO; Oct 2016.

## **Grants Awarded**

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#2020-67034-31769 (PI: Ryan Paul)

USDA-NIFA Postdoctoral Fellowship

\$165,000

2021-2023

Exploring factors affecting foraging success and nontarget impacts of a newly introduced biological control agent

GDPE Small Grant Award, 2018

Colorado State University

\$1260

GDPE Small Grant Award, 2016

Colorado State University, Graduate Degree Program in Ecology

\$1800

## **Awards and Scholarships**

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International Organization for Biological Control Early Career Researcher award, 2022

\$650

American Chemical Society AGRO Education Award, 2020

ACS Fall Virtual Meeting

Graduate School Travel Award, 2019

Colorado State University

\$250

American Chemical Society AGRO Education Award, 2019

ACS Fall Meeting, San Diego, CA

\$845

GDPE Travel Award, 2019

Colorado State University

\$495

Outstanding Graduate Teaching Award

Colorado State University, Bioagricultural Sciences and Pest Management Dept.

\$1000

First Prize Student Competition, 2018  
Entomological Society of America Annual Meeting  
Vancouver, BC

GDPE Travel Award, 2018  
Colorado State University  
\$175

William Brown Professional Development Award, 2018  
Colorado State University, Bioagricultural Sciences and Pest Management Dept.  
\$500

William Brown Professional Development Award, 2016  
Colorado State University, Bioagricultural Sciences and Pest Management Dept.  
\$500

GDPE Travel Award, 2016  
Colorado State University, Graduate Degree Program in Ecology  
\$350  
Runner up for President's Prize, 2014  
Annual Meeting, Entomological Society of America  
Portland, Oregon

Hutson Funds for Entomological Society of America meeting travel, 2012  
Michigan State University, Entomology Department  
\$400

Hutson Study Abroad Scholarship, 2012  
Michigan State University, Entomology Department  
\$600

OSA Academic Excellence Award, 2012  
Michigan State University, Office of Study Abroad  
\$750

Forest Akers Endowed Scholarship, 2012  
Michigan State University, Office of Study Abroad  
\$1000

Entomology Undergraduate Scholarship, 2011 and 2012  
Michigan State University, Entomology Department  
\$500



## **International Activities**

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Rainforests and Reality in Nicaragua, Michigan State University Study Abroad; March 2013  
Sustainable Tropical Agriculture Systems in Sri Lanka, Michigan State University Study Abroad; May-June 2012

## **Fellowships**

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Entomological Society of America Professional Advancement Career Training, 2022-present  
USDA-NIFA Postdoctoral Fellow, 2021-present (listed under grants)  
Sustainability Leadership Fellow, School of Global Environmental Sustainability, CSU, 2018-2019  
Research Mentoring for Advancement of Inclusivity in STEM Fellow, 2018

## **Leadership Roles and Professional Memberships**

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International Organization for Biocontrol – Nearctic Regional Section member, 2022-present  
Entomological Society of America member, 2012-present  
American Chemical Society member, 2019-2020  
Ecological Society of America member, 2018-2019  
President (2016-2017), Vice President (2015-2016, 2017-2018), CSU Entomology Club  
CSU Entomology Club Representative for (College) Ag Council; 2018  
Education Chair for Student Liaison Committee, BSPM Dept, CSU; 2017-2018  
Colorado State University Representative on Student Advisory Committee for North Central Branch of Entomological Society of America; 2017-2018  
Undergraduate representative for Graduate and Undergraduate Entomological Student Society (GUESS) on Curriculum Committee; MSU 2013-2014

## **Other service activities**

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Co-organizer – Section symposium, “Integrating ecological theory into biological control evaluation”, Entomology 2022  
Peer reviewer – *Entomologia Experimentalis et Applicata*, *Journal of Economic Entomology*, *Canadian Entomologist*, *Pest Management Science*  
Student competition judge (Grad 10-min papers), Entomological Society of America Pacific Branch meeting, 2022  
Student competition judge, Pacific Northwest Insect Management Conference, 2022  
Grant reviewer, Graduate Degree Program in Ecology Small Grant Awards, CSU  
Volunteer and research intern with Butterfly Pavilion in Westminster, CO  
Outreach event and volunteer coordinator for CSU Entomology Club  
Outreach presenter with CSU Bug Zoo  
K-12 presentations on entomology at local schools  
Organized workshop on fellowship proposal writing led by Dr. Jonathan Jacobs  
Organizer for visiting seminar presenters – Drs. Justin Schmidt, Paula Cushing, Ian Kaplan

Secured university and department funds for visiting Entomology Club speaker, Dr. Justin Schmidt

Session moderator at Front Range Student Ecology Symposium

Lab Students mentored:

Hannah Porter, India Gerhart, Kassia Wallner, Rachel Worley, Leo Morag, Sam Mutchler-Aldine, Zoe Becker\*, Stephanie Goldin\*, Jason Miller, Theresa Demaree, Stephanie Ripsom, Robert Zhao, Hobson Allen, Adrianna Tompros, Nolan Bunting, Chris Tenant, Braden Ruddy, Evan Smith, Tia Meyers, Megan Racicot, Tristan Kubik\*, Amy Bagby, John Adams, Kera Kovats, Jayne Ellis, Nathan Comai, Graham Cross

\*Coauthors for manuscripts published or in prep