

Caleb B. Hubbard

Curriculum Vitae

Department of Entomology • University of California
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Education

University of California	Riverside, CA
Ph.D. Entomology	2015-2021
Major: Medical and Veterinary Entomology	
Minors: Evolutionary Genetics, Animal Behavior	
Dissertation: “Mechanisms Conferring Behavioral Resistance to the Neonicotinoid: Imidacloprid in the House Fly (<i>Musca domestica</i> Linnaeus)”	
University of California	Riverside, CA
B.S. Biology	2011-2015

Research Experience

Western University of Health Sciences	Pomona, CA
<i>Adjunct Assistant Professor of Podiatric Medicine and Surgery</i>	2022 - present
University of California	Riverside, CA
<i>Postdoctoral Researcher</i>	2021 - present
Fly behavior and management in animal agriculture systems, insecticide toxicology, utilization of sensor technology to improve insect management and animal welfare	
<i>Graduate Research Assistant</i>	2015 - 2021
Physiological and behavioral resistance to insecticides, integrated pest management of filth flies, filth fly behavior, behavioral genetics	
<i>Undergraduate Research Assistant</i>	2012 - 2015
Evolution of cancer suppression in <i>Drosophila melanogaster</i> PI: Leonard Nunney (Evolution Ecology and Organismal Biology)	
Bioinformatics and development of mutant strains of <i>Neurospora crassa</i> PI: Katherine Borkovich (Plant Pathology and Microbiology)	

Research Grants & Fellowships

Pending

October 2022 - October 2023 PI: A. Gerry, Co-PIs: **C. Hubbard**, K. Hung
“Attractive Toxic Sugar Bait to Control House Flies near Crop Fields”
CVMVCD Research Program
Total Costs: \$31,709

Received- Direct costs totaling \$397,525

March 2023 - May 2026 PI: J. Jellyman, Co-PIs: **C. Hubbard**, A. Gerry, A. Murillo, E. Keogh
“Remote Sensing to evaluate sustainable pest management of biting flies in cattle”
CSU Agricultural Research Institute IPM
Total Costs: \$286,864

June 2022 - May 2023 PI: J. Jellyman, Co-PIs: **C. Hubbard**, A. Gerry, A. Murillo, E. Keogh
“Wearable sensors to record cattle fly-repelling behavior”
CSU Agricultural Research Institute
Total Costs: \$59,811

June 2022- December 2022 PI: **C. Hubbard**, Co-PI: A. Murillo
“Testing the Capture Efficiency of Zevo Light Traps”
Proctor and Gamble
Total Costs: \$18,430

June 2020-December 2020
Dissertation Year Program Fellowship
Total Direct Costs: \$12,970

August 2019-August 2024
ELN Professional Edition- 5-year Developmental Grant
Total Direct Costs: \$6,200

June 2018-August 2018 PI: Dr. Jaroslaw Krzywinski, Co-PI: **C. Hubbard**
“Advanced training in molecular and bioinformatics methods to study the biology of biting flies”
BBSRC UK-US partnering Fellowship
Total Direct Costs: \$4,250

September 2015-June 2016
UCR Chancellor’s Distinguished Fellowship
Total Direct Costs: \$4000.00

June 2015-September 2015
Special Incentive Award for STEM Summer Fellowship
Total Direct Costs: \$5000.00

Teaching Experience

Western University of Health Sciences, Pomona, CA
Adjunct Assistant Professor of Podiatric Medicine and Surgery
Insects and Medicine, 60 MS 1 and MS 2 students

2022 - present

University of California, Riverside, CA
Associate in Entomology (Primary lecturer)
ENTM 127: Insect Ecology, Winter 2021

- Responsible for teaching lectures, creating, and grading evaluations; 120 undergrad/graduate students

University of California, Riverside, CA
Teaching Assistant
ENTM 10: Natural History of Insects, Winter 2020

- Responsible for teaching discussion sections and creating and grading evaluations; 160 undergrad/graduate students; with Dr. E. Rankin

ENTM 154: Forensic Entomology, Spring 2019

- Responsible for teaching laboratory sections and creating and grading evaluations; 40 undergrad/graduate students; with Dr. A. Gerry

ENTM 126: Medical & Veterinary Entomology, Winter 2018

- Responsible for teaching laboratory sections and creating and grading evaluations; 40 undergrad/graduate students; with Dr. A. Gerry

ENTM 126: Medical & Veterinary Entomology, Winter 2017

- Responsible for teaching laboratory and lecture sections and creating and grading evaluations; 40 undergrad/graduate students; with Dr. O. Akbari

Guest Lecturer

- **Hubbard, C.** (2021) “Forensic Entomology” Natural History of Insects, Department of Entomology, University of California, Riverside, CA. *Via Distance Education*; Zoom lecture due to COVID-19
- **Hubbard, C.** (2020) “Veterinary Entomology: House flies, behavior and resistance” Natural History of Insects, Department of Entomology, University of California, Riverside, CA. *Via Distance Education*; Zoom lecture due to COVID-19
- **Hubbard, C.** (2020) “Muscomorpha Flies” Medical and Veterinary Entomology, Department of Entomology, University of California, Riverside, CA.
- **Hubbard, C.** (2019) “Alternative Career Paths: Life as a Research Scientist.” AP Biology, Yucaipa High School, Yucaipa, CA; 2 classes with 40 student’s total
- **Hubbard, C.** (2019) “Veterinary Entomology: Who are we and why do we do it.” Careers in Science, Lot Whitcomb Elementary School, Portland, OR. *Via Distance Education*; 1 class with 20 student total
- **Hubbard, C.** (2018) “Livestock Ectoparasites.” Agriculture Biology, Eureka High School, Eureka, IL. *Via Distance Education*; 2 classes with 60 student’s total
- **Hubbard, C.** (2018) “Principles of Epidemiology Part 1.” Medical and Veterinary Entomology, Department of Entomology, University of California, Riverside, CA. *Lecture and Lab Sections*
- **Hubbard, C.** (2018) “Principles of Epidemiology Part 2.” Medical and Veterinary Entomology, Department of Entomology, University of California, Riverside, CA. *Lecture and Lab Sections*
- **Hubbard, C.** (2017) “Biting and Nonbiting Muscoid Diptera/ Myiasis” Medical and Veterinary Entomology, Department of Entomology, University of California, Riverside, CA. *Lecture and Lab Sections*
- **Hubbard, C.** (2017) “Hemiptera: Bedbugs and Kissing Bugs” Medical and Veterinary Entomology, Department of Entomology, University of California, Riverside, CA. *Lecture and Lab Sections*
- **Hubbard, C.** (2017) “Mites and Ticks” Medical and Veterinary Entomology, Department of Entomology, University of California, Riverside, CA. *Lecture and Lab Sections*

Undergraduate Laboratory Assistant

BIOL 20: Dynamic Genome, Spring 2014, Winter 2015

- Responsible for assisting in the teaching of laboratory sections; Computational and Experimental approaches in investigating the genomes of plants and animals; 50 undergraduate students; with Dr. S. Wessler, and Dr. JM. Burnette

Mentorship

- During the past 5 years, I have mentored eight undergraduate and graduate (5 undergraduate, 3 graduate) students through independent research projects.

- Due to COVID-19 restrictions we have been unable to host students on-campus for research mentoring. To provide undergraduate students with an opportunity to learn about research methods and discuss current literature, I developed and led a weekly virtual mentoring meeting. Fifteen biology and entomology undergraduate students are a part of this meeting (2021).
- Currently mentoring 2 graduate students (1 Ph.D. and 1 Masters) and a research assistant in the lab of Dr. Amy Murillo (2021 – *present*)

Peer Reviewed Publications

Hubbard, C.B. and A. Murillo. 2022. Concentration dependent feeding on imidacloprid by behaviorally resistant house flies, *Musca domestica* L. (Diptera: Muscidae). Journal of Medical Entomology. <https://doi.org/10.1093/jme/tjac130>. *In Press*

Murillo, A.C., **C.B. Hubbard**, A.C. Gerry, H.C. Hinkle. 2021. Big problems with little house fly, *Fannia canicularis* (Diptera: Fanniidae). Journal of Integrated Pest Management. doi: 10.1093/jipm/pmaa023

Hubbard, C.B., and A.C. Gerry. 2021. Genetic evaluation and characterization of behavioral resistance to imidacloprid in the house fly. Pesticide Biochemistry and Physiology. doi: 10.1016/j.pestbp.2020.104741

Hubbard, C.B. and A.C. Gerry. 2020. Selection, reversion, and characterization of house fly (*Musca domestica*) behavioral resistance to the insecticide imidacloprid. Journal of Medical Entomology. doi: 10.1093/jme/tjaa105

Hubbard C.B. and A.C. Gerry. 2019. Evaluation of Spider Venom Toxin-Based Insecticide to Control House Flies, 2018. Arthropod Management Tests. doi: 10.1093/amt/tsz006.

Publications in Preparation

Hubbard, C.B., A.C.Gerry, and A.C. Murillo. Stability of behavioral resistance to imidacloprid in the house fly (*Musca domestica* L.) Diptera: Muscidae). Journal of Medical Entomology.

Hubbard, C.B., J. Stajich, A.C. Gerry. Unravelling the molecular complexities of behavioral resistance to imidacloprid in the house fly (*Musca domestica* L.)

Gerry, A. C., L. Zahn, A. C. Murillo, **C.B. Hubbard**, and F. Jurjis, Efficacy of Fluralaner Solution Administered to Egg Layer Chickens through Drinking Water for Control of Northern Fowl Mite (*Ornithonyssus sylviarum*)

Extension Publications

Hubbard, C. and A. Murillo Backyard Poultry Fly Control. UC Cooperative Extension *Poultry Ponderings*. Fall 2016.

Select Press Coverage

Bernstein, J. UCR entomologists' reputations soar with new awards. *University of California Riverside News*. 24 Sep 2021

Peiser, J. 'Harris/Fly 2024': Debate viewers couldn't look away from the bug on Pence's head. *The Washington Post*. 8 Oct 2020

Larson, J., Green, J., and Skvarla, M. Insecticide Resistance with Caleb Hubbard. *Arthro-Pod Podcast*. 22 Jul 2020

Bernstein, J. Maggots and murder: what insects can teach us about crime. *University of California Riverside News*. 29 April 2019

Rivera, C. Universities are focusing more on undergraduate research projects. *Los Angeles Times*. 27 Nov 2014

Professional Presentations

25 presentations, 7 invited, 5 international

Hubbard, C., and A.C. Murillo. *Invited Speaker*. Concentration dependent feeding of imidacloprid in behaviorally resistant house flies (*Musca domestica* L). Entomological Society of America, Entomological Society of Canada, and Entomological Society of British Columbia Joint Annual Meeting, Vancouver, BC. 16 November 2022*

Hubbard, C. Highlights in Veterinary Entomology. *Invited Speaker*. Entomological Society of America, Entomological Society of Canada, and Entomological Society of British Columbia Joint Annual Meeting, Vancouver, BC. 14 November 2022*

Hubbard, C. Bugs and Bovids: Solving Veterinary Entomology Problems Utilizing Behavior. *Invited Speaker*. Department of Entomology Seminar Series. UC Riverside, Riverside, CA. 26 September 2022.

Hubbard, C., and A.C. Murillo. Concentration dependent detection of imidacloprid in behaviorally resistant house flies (*Musca domestica* L.). Livestock Insect Worker Conference Annual Meeting, Dallas, Texas. 6-9 June 2022.

Hubbard, C., A.C. Gerry, and A.C. Murillo. What we know about stability of behavioral resistance to imidacloprid in the house fly. S1076 Multi-State Research Virtual Meeting. 11 January 2022.

Hubbard, C., and A.C. Murillo. Stability of behavioral resistance to imidacloprid in the house fly (*Musca domestica*). Entomological Society of America Annual Meeting, Denver, Co. 31 October 2021.

Hubbard, C. What's Bugging Your Feet? Bites and Blood Suckers. *Invited Speaker*. Western University of Health Sciences: College of Podiatric Medicine, Chino Valley Medical Center and Kaiser Permanente Central Valley Medical Center Didactics Conference. 27 September 2021.

Hubbard, C., J.E. Stajich, and A.C. Gerry. *Invited Speaker*. Mechanisms Conferring Behavioral resistance to the Neonicotinoid: Imidacloprid in the House Fly. Entomological Society of America Virtual Pacific Branch Meeting Comstock Award Presentation. 5 April 2021.

Hubbard, C. Behavioral resistance to imidacloprid: Where We Were, Where We Are, & Where We're Going. S1076 Multi-State Research Virtual Meeting. 6 January 2021.

Hubbard, C. and A.C. Gerry. Genetic evaluation and characterization of behavioral resistance to imidacloprid in the house fly. Entomological Society of America Virtual Annual Meeting. 11-25 November 2020.

Hubbard, C. and A.C. Gerry. Genetics and inheritance of behavioral resistance to imidacloprid in the house fly. Poster uploaded digitally for the 29th Annual UCR Urban Pest Management Conference, UC Riverside, Riverside CA. *Conference rescheduled due to COVID-19*.

Hubbard, C. Pests of the hospital. *Invited Speaker*. Western University of Health Sciences: College of Podiatric Medicine, Chino Valley Medical Center and Kaiser Permanente Central Valley Medical Center Didactics Conference. 12 December 2019.

Gerry, A. C., L. Zahn, A. C. Murillo, **C. Hubbard** and Faris Jirjis. Control of northern fowl mite (*Ornithonyssus sylviarum*) on layer chickens using a fluralaner solution administered through drinking water. Entomological Society of America Annual Meeting, St. Louis, Mo. 19 November 2019.

Hubbard, C. and A.C. Gerry Autosomal linkage analysis and inheritance of behavioral resistance to imidacloprid in house flies. Entomological Society of America Annual Meeting, St. Louis, Mo. 18 November 2019.

Hubbard, C., J.G. Scott, A.C. Gerry. Autosomal linkage analysis of behavioral resistance to imidacloprid in the house fly. Poster presented at the Department of Entomology Graduate Student Seminar Day, UC Riverside, Riverside, CA. 17 September 2019

Hubbard, C. and A.C. Gerry. Evaluation of a Novel Spider Venom Toxin-Based Insecticide to Control House Flies. Poster presented at the 28th Annual UCR Urban Pest Management Conference, UC Riverside, Riverside, CA. 20 March 2019

Hubbard, C. and A.C. Gerry. To feed or not to feed: The flaw of traditional resistance screening. Entomological Society of America, Entomological Society of Canada, and Entomological Society of British Columbia Joint Annual Meeting, Vancouver, BC. 11-14 November 2018*

Hubbard, C. and A.C. Gerry. To feed or not to feed: Physiological resistance to insecticides, the flaw of traditional screening practices. Department of Entomology Graduate Student Seminar Day, UC Riverside, Riverside, CA. 19 September 2018

Hubbard, C. Behavioral resistance to imidacloprid in house flies: What We Know and What We Don't. *Invited Speaker*. Vector Molecular Biology Research Group Meeting, Pirbright Institute, Pirbright, United Kingdom. 3 August 2018. *

Hubbard, C. and A.C. Gerry. High throughput Screening of feeding behavior of house flies selected for behavioral resistance to the Neonicotinoid: Imidacloprid. Poster presented at 27th Annual UC Riverside Urban Pest Management Conference, Riverside, CA. 21 March 2018

Hubbard, C. and A.C. Gerry. Evaluation of the landing preference of house flies selected for behavioral resistance to the Neonicotinoid: Imidacloprid. 7th International Society of Vector Ecology Meeting, Palma de Mallorca, Spain, 1-7 October 2017*

Hubbard, C. and A.C. Gerry. Screening of feeding behavior of house flies selected for behavioral resistance to the Neonicotinoid: Imidacloprid. Poster presented at Department of Entomology Graduate Student Seminar Day, UC Riverside, Riverside, CA. 18 September 2017

Hubbard, C. and A.C. Gerry. Evaluation of the feeding preference of house flies selected for behavioral resistance to the Neonicotinoid: Imidacloprid. Livestock Insect Worker Conference Annual Meeting, Savannah, GA. 25-28 June 2017.

Zahn, L., A.C. Gerry, **C. Hubbard**. Survival Time of House Flies (Diptera: Muscidae) Exposed to a Novel Granular Bait. Livestock Insect Worker Conference Annual Meeting, Savannah, GA. 25-28 June 2017.

Hubbard, C. and A.C. Gerry A solution to the pesky house fly (*Musca domestica L.*): Behavioral Resistance to Imidacloprid. Department of Entomology Graduate Student Seminar Day, UC Riverside, Riverside, CA. 14 September 2016.

* Denotes international presentations

Select Extension & Outreach Presentations

Hubbard, C. My journey as an entomologist. UC Riverside undergraduate Veterinary Entomology Research Lab Meeting. *Via Zoom*. 3 May 2021.

Hubbard, C. Life as a Scientist: The Good, The Bad, and The Ugly. Yucaipa High School Mito Science Club General Meeting. *Via Zoom*. 10 December 2020.

Hubbard, C. Home invaders: Pests plaguing the home. 4th Annual Riverside Insect Fair. Riverside, CA. 27 April 2019

Hubbard, C. Controlling the pesky fly: Techniques to prevent and eliminate nuisance flies. Fifth annual Southern Area Animal Science Field Day. Walnut, CA. 22 September 2018

Hubbard, C. What's Bugging Your Farm Friends. Fourth Annual Southern Area Animal Science Field Day. Walnut, CA. 23 September 2017

Hubbard, C., and L. Zahn. Back Yard Bugs 3st Annual Riverside Insect Fair. Riverside, CA. 29 April 2017

Hubbard, C., E. McDermott, A. Murillo, and L. Zahn. Home Invaders (Fleas, Ticks, Flies) 2st Annual Riverside Insect Fair. Riverside, CA. 18 April 2016

Scholarships & Awards

2022 ESA Medical, Urban and Veterinary Entomology Early Career Award
 "This award recognizes an early professional member of the MUVE section of ESA who has demonstrated excellence in research, extension, teaching and/or outreach. The candidate has made outstanding contributions to Medical, Urban and/or Veterinary entomology appropriate to their early career status and demonstrates potential to be a leader in his chosen career, as well as a substantial contributor to the MUVE section of ESA."

Public Health Entomology for All (PHEFA) Travel Grant - \$12500.00
 ESA, ESC, and ESBC Joint Annual Meeting Travel Grant - \$750.00

2021 PBESA John Henry Comstock Award from the Entomological Society of America
 "This award recognizes the single top graduate student in each branch of the Society based upon academic and research achievement, service and professional activities, and letters of support from faculty. This award is considered the highest honor a graduate student in entomology can receive."

2020 MUVE Member Spotlight: December MUVEr in Veterinary Entomology
 Dissertation Year Program Fellowship- \$12970.00
 The Pacific Egg & Poultry Association Student Merit Award
 Carl Strom / Western Exterminator Company Scholarship - \$1000.00
 Novogene Life Sciences NovoBowl Sequencing award- \$250.00
 Tejal Reddy Endowed Graduate Award - \$6400.00

- 2019** *First place, Riverside Insect Fair, Best Educational Booth - \$100.00*
Carl Strom/ Western Exterminator Company Scholarship - \$400.00
- 2018** *Second Place, President's Prize runner-up, student oral presentation at ESA, ESC, and ESBC Joint Annual Meeting*
Graduate Student Affairs travel grant- \$500.00
Francis A. & Jane Davies Gunther Endowed Graduate Award in Entomology- \$2500.00
Carl Strom/ Western Exterminator Company Scholarship - \$400.00
- 2017** 7th International Congress of the Society for Vector Ecology Student Travel Grant- \$1500.00
- 2015** UCR Chancellor's Distinguished Fellowship - \$4000.00
Special Incentive Award for STEM Summer Fellowship - \$5000.00

Academic & Professional Service

Moderator, Entomological Society of America Conference (2021- *present*)

Subject Matter Expert, *eXtension* (www.eXtension.org) – respond to public inquiries submitted to the national extension community (eXtension) in the area of arthropod pests of animals (2020 - *present*).

Member, S1076 *Multistate Project*- Multistate project focused on management of arthropod pests of livestock (2019 – *present*)

Manuscript Reviewer

Pest Management Science (1)

Journal of Medical Entomology (6)

Journal of Economic Entomology (2)

Biocontrol Science & Technology (2)

University of California, Riverside, CA

Department of Entomology

Coach, University of California, Riverside Entomology Games Team (2021- *present*)

Outreach Coordinator, Winter 2016, Spring 2016

Neil A. Campbell Science Learning Laboratory

Treasurer, The Dynamic Genome Outreach Group, (2012-2015)

Professional Training

- Cheaters Beware: Appropriate Remote Assessments, University of California, Riverside, Spring, 2021
- Illumina Genomics Training Workshop, University of California, Riverside. Winter, 2020
- Advanced training in Molecular and Bioinformatics methods to study the biology of biting flies, The Pirbright Institute, Pirbright, Surrey, England. 25 June - 6 August 2018.
- Teaching Development Workshop, University of California, Riverside. Spring, 2018

- Teaching Assistant Orientation and Training, University of California, Riverside. Fall, 2016
- WebGIS and Mobile Data Collection Workshop, University of California, Riverside. 20 Oct. 2015

Professional Memberships

Association for Chemoreception Science, 2020-*present*

Society of Vector Ecology, 2016-*present*

Entomological Society of America, 2015-*present* (Early Career Professional Member)