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Department of Entomology
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Academic Background

- 8/04 - 4/09 **Ph.D.**
Dept. of Zoology, University of British Columbia;
Supervisor: Leticia Avilés
- 9/98 - 6/02 **B.A.**
Biology and History, Williams College; *cum laude*, honors in Biology.

Positions

- 7/15 - present **Assistant Professor**
Dept. of Entomology, University of California, Riverside.
- 1/10 - 5/15 **Postdoc**
Dept. of Ecology & Evolution, U. of Lausanne;
Supervisor: Michel Chapuisat.
- 6/09 - 12/09 **Lecturer and Postdoc**
Dept. of Zoology, University of British Columbia.
- 1/05 - 6/09 **Teaching Assistant**
Dept. of Zoology, University of British Columbia.
- 9/03 - 7/04 **Research Intern**
Theoretical Ecology Dept., Lund University; Supervisor: Anders Brodin.

Publications

† Denotes student author

Articles accepted or published in refereed journals

Avril A †, **Purcell J**, Béniguel S †, Chapuisat M. In press. Maternal effect killing by a supergene controlling ant social organization. *Proceedings of the National Academy of Sciences of the USA*.

West M †, **Purcell J**. 2020. Size-based task partitioning in ants lacking discrete morphological worker subcastes. *Behavioral Ecology and Sociobiology* 74: 66.

de la Mora A*, Sankovitz M *†, **Purcell J**. 2020. Ants (Hymenoptera: Formicidae) as host and intruder: recent advances and future directions in the study of exploitative strategies. *Myrmecological News* 30: 53-71. (* authors contributed equally)

Brelsford A*, **Purcell J***, Avril A †, Tran Van P, Zhang J, Brütsch T †, Sundström L, Helanterä H, Chapuisat M. 2020. An ancient and eroded social supergene is widespread across *Formica*

ants. *Current Biology* 30: 304-311. (* authors contributed equally)

Purcell J, Pruitt J. 2019. Are personalities genetically determined? Inferences from subsocial spiders. *BMC Genomics* 20:867.

Fisher K †*, West M †*, Lomeli A †, Woodard SH, **Purcell J**. 2019. Are societies resilient? Challenges faced by social insects in a changing world. *Insectes Sociaux* 66: 5-13. (* authors contributed equally)

Avril A †, **Purcell J**, Brelsford A, Chapuisat M. 2019. Asymmetric mate choice between social forms contributes to the maintenance of a supergene controlling ant social organization. *Molecular Ecology* 28: 1428-1438.

Hale A †, Bougie T †, Henderson E †, Sankovitz M †, West M †, **Purcell J**. 2018. Notes on hunting behavior of the spider *Euryopsis californica*, a novel predator of *Veromessor pergandei* harvester ants. *Pan-Pacific Entomologist* 94: 141-146.

Purcell J, Zahnd S †, Athanasiades A †, Türler R †, Chapuisat M, Brelsford A. 2016. Ants exhibit asymmetric hybridization in a mosaic hybrid zone. *Molecular Ecology* 25: 4866-4874.

Ingle S, Pruitt J, Scharf I, **Purcell J**. 2016. Social context, but not individual personality, alters immigrant viability in a spider with mixed social structure. *Animal Behaviour* 120: 153-161.

Avril A †, **Purcell J**, Chapuisat M. 2016. Ant workers exhibit specialization and memory during raft formation. *The Science of Nature* 103: 36.

Media coverage: Featured on NPR weekend edition and Discover magazine, among others

Purcell J *, Pirogan D * †, Avril A †, Bouyarden F †, Chapuisat M. 2016. Environmental influence on the phenotype of ant workers revealed by common garden experiment. *Behavioral Ecology and Sociobiology* 70: 357-367. (* authors contributed equally)

Media coverage: Featured on the Springer Animal Sciences blog

(<https://www.facebook.com/Springer-Animal-Sciences-1450678515186976/>)

Purcell J, Pellissier L, Chapuisat M. 2015. Social structure varies with elevation in an alpine ant. *Molecular Ecology* 24: 498-507.

Purcell J*, Brelsford A*, Wurm Y, Perrin N, Chapuisat M. 2014. Convergent genetic architecture underlies social organization in ants. *Current Biology* 24: 2728-2732. (* authors contributed equally)

Purcell J, Chapuisat M. 2014. Foster carers influence brood pathogen resistance in ants. *Proceedings of the Royal Society B* 281: 20141338.

- Recommended by Faculty of 1000.

Media coverage: 24 heures Lausanne

Kocher SD, Pellissier L, Veller C, **Purcell J**, Nowak MA, Chapuisat M, Pierce NE. 2014. Transitions in social complexity along altitudinal gradients reveal a dual impact of climate on social evolution. *Proceedings of the Royal Society B* 281: 20140627.

Rasmann S, Buri A †, Gallot-Lavallée M, Joaquim J †, **Purcell J**, Pellissier L. 2014. Differential allocation and deployment of direct and indirect defences of *Vicia sepium* along elevation

gradients. *J. Ecology* 102: 930-938.

Purcell J, Avril A †, Jaffuel G †, Bates S †, Chapuisat M. 2014. Ant brood function as life preservers during floods. *PLOS ONE* 9: e89211.

Media coverage: partial list: Science Now, National Geographic, LA Times, NY Times

Purcell J, Chapuisat M. 2013. Bidirectional shifts in colony queen number in a socially polymorphic ant population. *Evolution* 67: 1169-1180.

Reymond A †, **Purcell J**, Cherix D, Guisan A, Pellissier L. 2013. Strategies in ant communities shift in response to colder conditions. *Ecological Entomology* 38: 364-373.

Purcell J, Chapuisat M. 2012. The influence of social structure on brood survival and development in a socially polymorphic ant: Insights from a cross-fostering experiment. *J. Evolutionary Biology* 25: 2288-2297.

Purcell J, Brelsford A, Avilés L. 2012. Co-evolution between sociality and dispersal: the role of synergistic cooperative benefits. *J. Theoretical Biology* 312: 44-54.

Avilés L, **Purcell J**. 2012. The evolution of inbred social systems in spiders and other organisms: From short-term gains to long-term evolutionary dead-ends? *Advances in the Study of Behavior* 44: 99-133.

Purcell J, Vasconcellos-Neto J, Gonzaga MO, Fletcher JA, Avilés L. 2012. Spatio-temporal differentiation and sociality in spiders. *PLOS ONE* 7: e34592.

Purcell J, Brüttsch T, Chapuisat M. 2012. Effects of the social environment on the survival and fungal resistance of ant brood. *Behavioral Ecology and Sociobiology* 66: 467-474.

Purcell J. 2011. Geographic patterns in the distribution of social systems in terrestrial arthropods. *Biological Reviews* 86: 475-491.

Reber A, **Purcell J**, Buechel SD, Buri P, Chapuisat M. 2011. The expression and impact of anti-fungal grooming in ants. *J. Evolutionary Biology* 24: 954-964.

Avilés L, **Purcell J**. 2011. *Anelosimus oritoyacu*, a cloud forest social spider with only slightly female-biased primary sex ratios. *J. Arachnology* 39: 178-182.

Purcell J, Avilés L. 2008. Gradients of precipitation and ant abundance may contribute to the altitudinal range limit of subsocial spiders: Insights from a transplant experiment. *Proceedings of the Royal Society B* 275: 2617-2625.

Purcell J, Brodin A. 2007. Factors influencing route choice by avian migrants: A dynamic programming model of Pacific brant migration. *J. Theoretical Biology* 249: 804-816.

Avilés L, Agnarsson I, Salazar P, **Purcell J**, Iturralde G, Yip E, Powers KS, Bukowski T. 2007. Altitudinal patterns of spider sociality and the biology of a new mid-elevation social *Anelosimus* species in Ecuador. *American Naturalist* 170: 783-792.

Purcell J, Avilés L. 2007. Smaller colonies and more solitary living mark higher elevation populations of a social spider. *J. Animal Ecology* 76: 590-597.

Purcell J, Brelsford A. 2004. Reassessing the causes of decline of *Polylepis*, a tropical subalpine forest. *Ecotropica* 10: 155-158.

Articles in review in refereed journals

Harrop TWR, Guhlin J, McLaughlin GM, Permina E, Stockwell P, Gilligan J, Le Lec MF, Gruber MAM, Quinn O, Graham B, Knapp R, Van Eeckhoven J, Lovegrove M, Duncan EJ, Remnant EJ, Wilson Rankin EE, **Purcell J**, Lester PJ, Dearden PK. Genomes from three invasive wasp species reveal expansions of olfactory receptor genes, targets for next-generation control and provide a comparative model for the evolution of eusociality. In revision, *Genes/Genomes/Genetics*.

Phan PT †, Wilson Rankin EE, **Purcell J**. *Formica francoeuri* responds to pheromones and defensive chemical cues of social bees. In review, *Insectes Sociaux*.

Tawdros S †, West M †, **Purcell J**. Isometric scaling in ants with continuous worker size variation. In review, *Insectes Sociaux*.

Scarpato G †, Rugman-Jones P, Gebiola M, Di Giulio A, **Purcell J**. Social parasite distancing: RADseq reveals high levels of inbreeding in the social parasite *Microdon myrmicae* but low philopatry for host ant nest. In review, *Ecological Entomology*.

Non-refereed contributions

Sankovitz M, **Purcell J**. 2019. Scientific serendipity at Granite Mountain leads to description of novel ant hunting behaviors of spiders. *Mojave National Preserve Science Newsletter* 15-16.

Purcell J. 2018. Ant research in the genomic era: advances and prospects. *Myrmecological News Blog*, invited contribution.

Purcell J. 2009. Ecological influences and the biogeographic distribution of sociality in *Anelosimus* spiders. University of British Columbia Doctoral Thesis.

Purcell J, Brelsford A, Kessler M. 2004. The world's highest forest: Properties of Andean woodlands and implications for conservation. *American Scientist* 92: 454-461.

Purcell J. 2002. Dispersal behavior: natural selection at the individual level versus population dynamics. Williams College Undergraduate Thesis.

Selected Awards, Grants, and Fellowships

2020	NSF CAREER	US\$750,000
2019	USDA NIFA HIS Training grant (PI, with 8 co-PIs)	US\$1,000,000
2019	George Brown Award (UC Mexus)	US\$2500
2019	UC Mexus/CONACYT collaborative grant (PI, with Fernando Varela)	US\$22,518
2018	Binational Science Foundation Grant (with Alan Brelsford, Eyal Privman)	US \$270,000
2018	NSF-DEB Small Grant (co-PI with PI Alan Brelsford)	US \$199,690
2017	NSF-DEB Small Grant (PI, co-PI: Erin Wilson Rankin)	US \$149,929
2016	UC Riverside Regents' Faculty Fellowship	US \$5000
2015	UC Riverside Collaborative Seed Grant (co-PI: Erin Wilson Rankin)	US \$10,000
2013	University of Lausanne Fondation du 450e Anniversaire	CHF 12,000
2011	Fondation Herbette, Funding to initiate genotyping-by-sequencing project,	

	collaborator on application of PI Michel Chapuisat.	CHF 25,000
2005-2008	US NSF Graduate Research Fellow	US \$90,000
2004-2008	UBC Graduate Tuition Award.	CAD 30,000
2004-2005	UBC Graduate Entrance Scholarship.	CAD 5000
2005	U.S. National Science Foundation Student Travel Grant.	US \$ 1500
2002-2003	U.S. Fulbright Fellow in Bolivia.	US \$12,500

Teaching and Mentorship Experience

Course instruction

2018	Instructor, U. California Riverside (UCR): Bugging Out in the Alps study abroad
2017-2020	Instructor, UCR: Core Areas of Entomology (graduate).
2016-2020	Instructor, UCR: Evidence for Evolution (non-majors course).
2009	Instructor, U. of British Columbia (UBC): Advanced Ecology (graduate).

Supervision

*** denotes students who are co-authors on published articles.**

UCR, Postdocs and Graduate Students Mentored

2017-2019	Aldo de la Mora (UC Mexus Postdoc 2018-2019) "Biogeographic patterns in the distribution of social parasites"
2017-present	Madison Sankovitz *, UCR Entomology PhD Program (USDA fellow) "Ants as soil engineers: biogeographic patterns and experimental tests"
2016-present	Mari West *, UCR Entomology PhD Program "Division of labor in ants lacking morphological castes"
2015-2016, 2018	Junxia Zhang, Postdoctoral Scholar (UCR) "The evolutionary history of a supergene underlying social organization"
2016-2018	Amanda Hale *, UCR Microbiology Graduate Program "Ant microbiomes: contributions to range size and invasion potential"

UCR, Undergraduate Students Mentored

2019-present	Guadalupe Gonzalez, Darin McGuire, and Ka Wu
2018-2019	Jeneane Hamideh "Associative learning in ants depends upon head size"
2017-2019	Kiera Donoghue "Constructing a linkage map of the social wasp <i>Dolichovespula maculata</i> "
2017-2019	Shirley Tawdros "Allometric scaling in ants with continuous worker size variation."
2017-2019	Alyssa Canova "High-density genetic linkage map for the wasp <i>Vespula consobrina</i> "
2017-2018	Garrett Keating "Reproductive partitioning by nestmate queens in yellowjacket wasps"
2016-2018	Joel Castelan "Do ant/soil interactions benefit plant growth?"
2017	Taha Farooqi "Assessing cooperative food burying strategies in a desert ant"
2015-2017	Daniel Pierce "Social organization and population genetics of <i>Formica francoeuri</i> "
2016	Fabian Vazquez

- “Integrating supergenes and phenotypes associated with sociality”
U. of Lausanne, Behavior, Evolution and Conservation Master Program Students Mentored
- 2014 Anouk Athanasiades* and Rebecca Türlér* (first step)
“Character displacement of ant communication system in a hybrid zone?”
- 2014 Sacha Zahnd* (master), co-mentor with A. Brelsford (U. Lausanne)
“Gene flow and selection in an ant hybrid zone”
- 2013 Oriol Cases Solanes (master), co-mentor with A. Avril (U. Lausanne)
“Genetics of social behavior: egg discrimination by ant workers”
- 2013 Dorin Pirogan* (master)
“Local adaptation to different altitudinal conditions in an ant”
- 2012 Marion Podolak (master), co-mentor with S. Kocher (Harvard U.)
“Variation in social systems across ecological gradients in sweat bees”
- 2012 Farid Bouyarden* (first step)
“Adaptation to altitude in an ant”
- Jessica Joachim* and Aline Buri* (first step), co-mentor with S. Rasmann (U. Lausanne) and L. Pellissier (U. Lausanne)
“Evolution of mutualism with ants in *Vicia sepium* along an elevation gradient”
- 2010 Sarah Bates* (first step)
“Rafting and response to floods in ants”
- University of Lausanne, Summer Undergraduate Research Program Student Mentored*
- 2011 Mentor for Johanne Boulat
“Ecology of a social polymorphism in an ant”
- University of Lausanne, Research Internships for Undergraduate Students Mentored*
- 2013 Mentor for Myriam Dridi
- 2013 Mentor for Aurélie Laurent
- 2011 Mentor for Amaury Avril*
- 2010 Mentor for Alain Reymond*

Teaching assistantships

- 2008-2009 UBC: Lab coordinator for Biometrics.
- 2008 UBC: Lab coordinator for Animal Behaviour.
- 2007 UBC: Designed laboratory manual and homework assignments for Animal Behaviour.
- 2007 UBC: Biometrics.
- 2005 UBC: Darwinian Medicine.
- 2000 Williams College: Ecology.
- 2000 Williams College: The Organism.

Pedagogical Training

- 2017 HHMI Mobile Summer Institute Participant
- 2016 Course Redesign Workshop, led by Purdue IMPACT Program
- 2015 New Faculty Teaching Excellence Seminar, led by UCR Academy of Distinguished Teachers

Additional Mentorship

- Student committees (currently 9 PhD students in two programs)
- Graduate student peer mentorship program faculty advisor

Selected Professional Talks and Posters

“Variation in social strategies along environmental gradients”

2019 Entomological Society of America annual meeting, St. Louis, MO, USA

“Insights from invasive species: Identifying the genetic basis of a recently evolved social phenotype.”

2019 Pacific Branch Meeting, Entomological Society of America, San Diego, CA, USA

“Why don't transitions in queen number lead to speciation?”

2018 International Union for the Study of Social Insects 2018, Guaruja, Brazil.

“Selfish gene, social outcome: Exploring the genetic basis of a complex social trait”

2019 **Student Invited Talk:** Biology Department, Cal State Fullerton, USA

2018 **Invited talk:** Biology Department, University of California Los Angeles, USA.

2018 **Invited (plenary) talk:** Cold Spring Harbor Labs, Biology and Genomics of Social Insects

“Integrating genetic and ecological underpinnings of social organization in *Formica* ants”

2017 **Invited talk:** Entomological Society of America Conference, Denver, CO, USA

“Causes and consequences of a social polymorphism.”

2017 **Plenary talk:** European Meeting of PhD Students in Evolutionary Biology, Krakow, Poland

2016 **Invited talk:** Biology Department, University of California San Diego, USA.

2016 **Invited talk:** Biology Department, University of California Riverside, USA.

2013 **Invited talk:** Pierce lab group, Harvard University, Cambridge, MA, USA.

2013 **Invited talk:** Laboratoire d'Ecologie Alpine, Université Joseph Fourier, Grenoble, France.

2012 **Invited talk:** Institute of Evolutionary Biology & Environmental Studies, University of Zürich, Switzerland.

2012 **Invited talk:** Behavioural Ecology Group, University of Bern, Switzerland.

“How arthropod societies cooperate”

2016 **Invited talk:** Department of Biology, Moreno Valley College, CA, USA.

2015 **Invited talk:** Department of Art, Cal State, Long Beach, CA, USA.

“Genetics and ecology of a social polymorphism”

2015 **Invited talk:** Entomological Society of America, Minneapolis, MN, USA.

“Genetic and ecological underpinnings of social organization in ants”

2014 **Invited talk:** Entomology Department, University of California Riverside, USA.

2014 **Invited talk:** Institute of Biology, University of Neuchâtel, Switzerland.

“Foster caregivers influence brood pathogen resistance in ants.”

2014 Biology 14, Geneva, Switzerland.

2013 European Society for Evolutionary Biology, Lisbon, Portugal. (Poster)

“Geographic patterns in the distribution of social systems in terrestrial arthropods.”

2012 **Invited talk:** Department of Organismal Biology, Queen Mary, University of

London, UK.

- 2011 **Invited talk:** Institute of Biogeography, University of Basel, Switzerland.
2011 Workshop: Adaptation to Climate from a Spatial Perspective, Lammi, Finland.
(Poster)
2009 **Invited talk:** Entomological Society of America, Indianapolis, IN, USA.
2008 International Society for Behavioral Ecology, Ithaca, NY, USA.

“The influence of social structure on brood survival and development in a socially polymorphic ant.”

2012 International Society for Behavioral Ecology, Lund, Sweden.

“Temporal shifts in queen number in a socially polymorphic ant population.”

- 2011 European Society for Evolutionary Biology, Tübingen, Germany.
2010 International Union for the Study of Social Insects, Copenhagen, Denmark.

“Gradients of precipitation and ant abundance may contribute to the altitudinal range limit of subsocial spiders: insights from a transplant experiment.”

- 2009 Evolution Meeting, Minneapolis, MN, USA.
2008 Canadian Society for Ecology and Evolution, Vancouver, BC, Canada.

“Distribución espacial de arañas sociales y subsociales: Causas y consecuencias.”

2005 Congreso Latinoamericano de Aracnología, Minas, Uruguay.

Manuscripts Reviewed

American Naturalist; Animal Behaviour; Annals of the Entomological Society of America; Axios Review; Behaviour; Behavioral Ecology; Behavioral Ecology and Sociobiology; Biological Invasions; Biological Journal of the Linnean Society; Biology Letters; BMC Ecology; Current Biology; Ecological Entomology; Evolution; Functional Ecology; Genetics and Molecular Biology; International Journal of Tropical Biology; Journal of Animal Ecology; Journal of Arachnology; Journal of Evolutionary Biology; Journal of Field Ornithology; Journal of Insect Behavior; Journal of Thermal Biology; Nature Communications; Nature Ecology and Evolution; Naturwissenschaften; Molecular Ecology; Molecular Ecology Resources; Oecologia; PLOS ONE; Proceedings of the Royal Society B.

Research Proposals Reviewed

US National Science Foundation Ad hoc reviewer and DEB Panelist, UC Mexus Program Dissertation Improvement Grant Panelist, Shipley Skinner Riverside County Endowment, UCR Undergraduate Minigrant Review Panelist, Austrian Science Fund Ad hoc reviewer, Israel Science Foundation Ad hoc reviewer, UK Natural Environment Research Council Ad hoc reviewer

Selected Service

- 2019-2020 UCR EEOB Evolutionary Genomics faculty search committee
2019-present Editorial Board Member, Neotropical Biodiversity
2019 Public outreach lectures: Riverside Recreational Trails
2017-present Editorial Board Member, Biology Letters
2017-present UCR Entomology Teaching Evaluation Committee Member
2015-2019 UCR Entomology Student Curriculum and Admissions Committee
Member
2017 Public outreach lectures at Hi-Desert Museum, Idyllwild Nature Center

2017	UCR Search Committee Member, Urban Entomology Endowed Chair
2016-2017	UCR Entomology Museum Committee Member
2016-present	UCR PhD student qualifying exam committees (Entomology, Microbiology, EEOB graduate programs)
2015-2017	UCR Entomology Seminar Committee Member
2012-2015	UNIL Master in Behavior, Evolution and Conservation Program, Expert Panel Member
2010-2014	Organizer for weekly Internal Seminar, Dept. of Ecology and Evolution, UNIL
2008-2009	Co-organizer, Pacific Ecology and Evolution Conference (PEEC), Bamfield, B.C.
2004-2008	Zoology representative to graduate student society (GSS), UBC

Personal

Citizenship: United States

Languages: English (native), Spanish (fluent), French (basic)

Computer Programming Experience: C++, Matlab, R, Unix