

Sheina Biason Sim

PERSONAL DETAILS

Address USDA-ARS DKI US-PBARC
64 Nowelo Street
Hilo, HI, USA, 96720

Mobile (562) 991-4207

E-Mail sheina.sim@ars.usda.gov

ACADEMIC QUALIFICATIONS

Ph.D. Evolutionary Genetics

2007-2013

University of Notre Dame, Notre Dame, IN, USA

Supervisor: Professor Jeffrey L. Feder

Thesis Title: The frontier of ecological speciation: investigating western populations of *Rhagoletis pomonella*.

Research focus:

- Understanding the invasion of the agricultural pest *Rhagoletis pomonella*, the apple maggot, into the Pacific Northwest from its native range in the eastern United States
- Elucidating the process of speciation in sympatry and determining if there is behavioral and genetic evidence of newly diverged host races of *R. pomonella* in the West
- Understanding the invasion of *R. pomonella* in the Mountain West region of the United States

B.S Ecology and Evolutionary Biology

2002-2006

University of California, Irvine, Irvine, CA, USA

Supervisor: Professor Arthur Weis

Thesis Title: Flowering phenology of *Brassica rapa* evolves in response to climate change in Southern California.

Research focus:

- Investigating the evolution of flowering time phenology of *B. rapa* in response to drought
- Usage of the resurrection paradigm to phenotype parental populations concurrently with offspring populations

PROFESSIONAL EXPERIENCE

Research Biologist

2017-present

USDA-ARS

Supervisor: Dr. Scott M. Geib

Research focus:

- Developing high-molecular weight DNA extraction protocols for long-read sequencing platforms
- Improving draft genome assemblies through long-read sequences, Hi-C sequencing, and traditional linkage mapping
- Using targeted genome editing to validate gene function and generate insect genetic sexing strains *de novo*.

Junior Research Faculty

2013-2017

University of Hawaii, Manoa

Supervisor: Dr. Daniel Rubinoff

Research focus:

- Generating genomic resources for economically important Tephritidae
- Identifying the genetic basis of traits necessary for SIT
- Developing diagnostic tool for species identification and source determination of intercepted material

Max Planck Institut für Pflanzenzüchtungsforschung

Supervisor: Prof. Johanna Schmitt

Research focus:

- Investigating genotype and environmental effects on life history traits in *Arabidopsis thaliana*
- Identifying the genetic basis of photoperiod sensitivity in *A. thaliana*

SELECTED PUBLICATIONS

1. Geib, S. M., Liang, G. H., Murphy, T. D. & Sim, S. B. Whole Genome Sequencing of the Braconid Parasitoid Wasp *Fopius arisanus*, an Important Biocontrol Agent of Pest Tephritid Fruit Flies. *G3: Genes, Genomes, Genetics* (2017).
2. Sim, S. B. & Geib, S. M. A Chromosome-Scale Assembly of the *Bactrocera cucurbitae* Genome Provides Insight to the Genetic Basis of white pupae. *G3: Genes—Genomes—Genetics* (2017).
3. Geib, S. M., Hall, B., DeRego, T. & Sim, S. Genome Annotation Generator: A simple tool for generating and correcting WGS annotation tables for NCBI submission. *GigaScience* (Accepted 2017).
4. Papanicolaou, A. *et al.* The whole genome sequence of the Mediterranean fruit fly, *Ceratitidis capitata* (Wiedemann), reveals insights into the biology and adaptive evolution of a highly invasive pest species. *Genome Biology* **17**, 192 (2016).
5. Shintaku, M. H. *et al.* Using genotyping by sequencing (GBS) to identify loci in *Colocasia esculenta* linked to *Phytophthora colocasiae* resistance in (International Society for Horticultural Science (ISHS), Leuven, Belgium, 2016), 131–138.
6. Sim, S. B., Yoneishi, N. M., Brill, E., Geib, S. M. & Follett, P. A. Molecular Markers Detect Cryptic Predation on Coffee Berry Borer (Coleoptera: Curculionidae) by Silvanid and Laemophloeid Flat Bark Beetles (Coleoptera: Silvanidae, Laemophloeidae) in Coffee Beans. *Journal of Economic Entomology* **109**, 100–105 (2016).
7. Sim, S. B., Calla, B., Hall, B., DeRego, T. & Geib, S. M. Reconstructing a comprehensive transcriptome assembly of a white-pupal translocated strain of the pest fruit fly *Bactrocera cucurbitae*. *Gigascience* **4** (2015).
8. Calla, B. *et al.* Transcriptome of the egg parasitoid *Fopius arisanus*: an important biocontrol tool for Tephritid fruit fly suppression. *GigaScience* **4**, 36 (2015).
9. Arcella, T. *et al.* Hybridization and the spread of the apple maggot fly, *Rhagoletis pomonella* (Diptera: Tephritidae), in the northwestern United States. *Evolutionary Applications* **8**, 834–846 (2015).
10. Sim, S. B. *The Frontier of Ecological Speciation: Investigating western populations of Rhagoletis pomonella* Thesis (2014).
11. Green, E. *et al.* Molecular Species Identification of Cryptic Apple and Snowberry Maggots (Diptera: Tephritidae) in Western and Central Washington. *Environmental Entomology* **42**, 1100–1109 (2013).
12. Hood, G. R. *et al.* The Geographic Distribution of *Rhagoletis pomonella* (Diptera: Tephritidae) in the Western United States: Introduced Species or Native Population? *Annals of the Entomological Society of America* **106**, 59–65 (2013).
13. Linn, C. E. *et al.* Behavioral evidence for fruit odor discrimination and sympatric host races of *Rhagoletis pomonella* flies in the western United States. *Evolution* **66**, 3632–3641 (2012).
14. Sim, S. B. *et al.* A field test for host fruit odour discrimination and avoidance behaviour for *Rhagoletis pomonella* flies in the western United States. *Journal of Evolutionary Biology* **25**, 961–971 (2012).

15. Cha, D. H. *et al.* Identification of Host Fruit Volatiles from Domestic Apple (*Malus domestica*), Native Black Hawthorn (*Crataegus douglasii*) and Introduced Ornamental Hawthorn (*C. monogyna*) Attractive to *Rhagoletis pomonella* Flies from the Western United States. *Journal of Chemical Ecology* **38**, 319–329 (2012).
16. Ragland, G. J., Sim, S. B., Goudarzi, S., Feder, J. L. & Hahn, D. A. Environmental interactions during host race formation: host fruit environment moderates a seasonal shift in phenology in host races of *Rhagoletis pomonella*. *Functional Ecology* **26**, 921–931 (2012).
17. Michel, A. P. *et al.* Widespread genomic divergence during sympatric speciation. *Proceedings of the National Academy of Sciences of the United States of America* **107**, 9724–9729 (2010).
18. Giakountis, A. *et al.* Distinct Patterns of Genetic Variation Alter Flowering Responses of Arabidopsis Accessions to Different Daylengths. *Plant Physiology* **152**, 177–191 (2010).
19. Ragland, G. J., Sim, S., Feder, J. L. & Hahn, D. A. Divergence of diapause physiology in a speciating insect: do changes in diapause energetics accompany the evolution of seasonal timing in the apple maggot fly? *Integrative and Comparative Biology* **49**, E140–E140 (2009).
20. Wilczek, A. M. *et al.* Effects of Genetic Perturbation on Seasonal Life History Plasticity. *Science* **323**, 930–934 (2009).
21. Franks, S. J., Sim, S. & Weis, A. E. Rapid evolution of flowering time by an annual plant in response to a climate fluctuation. *Proceedings of the National Academy of Sciences of the United States of America* **104**, 1278–1282 (2007).

SELECTED PRESENTATIONS AND INVITED SYMPOSIA *

1. Sim, S. B. & Geib, S. M. *Utilizing loci linked to genetic sexing traits to develop a robust diagnostic assay for discriminating SIT medfly from wild individuals* in *Third FAO-IAEA International Conference on Area-wide Management of Insect Pests: Integrating the Sterile Insect and Related Nuclear and Other Techniques* (Vienna, Austria, May 2017).
2. Geib, S. M. & Sim, S. B. *Characterization of genetic sexing traits in established mass-rearing lines for transfer to economically important tephritid fruit fly species* in *Third FAO-IAEA International Conference on Area-wide Management of Insect Pests: Integrating the Sterile Insect and Related Nuclear and Other Techniques* (Vienna, Austria, May 2017).
3. Sim, S. B., Scully, E. & Geib, S. M. ***From sequence to validation, finding the genetic basis of a sexing trait in Bactrocera cucurbitae*** in *Sequencing, Finishing, and Analysis in the Future* (Santa Fe, NM, May 2017).
4. Sim, S. B., Scully, E. & Geib, S. M. ***An integrative approach to finding the genetic basis of a genetic sexing trait white pupae in Bactrocera cucurbitae*** in *Plant and Animal Genome Conference* (San Diego, CA, Jan. 2017).
5. Sim, S. B. & Geib, S. M. *Integrating classical genetics with chromosome-scale genome assembly to characterize a genetic sexing system in Bactrocera cucurbitae* in *XXV International Congress of Entomology Meeting* (Orlando, FL, Sept. 2016).
6. Sim, S. B. & Geib, S. M. ***Flying by the seat of our pants: integrating classical genetics and merging genomics to control tephritid pests*** in *Ecology, Evolution, and Conservation Biology Seminar* (Honolulu, HI, Nov. 2015).
7. Sim, S. B. & Geib, S. M. ***Population and genomic analysis in Tephritidae; contributions to an applied research program.*** in *USDA-ARS Daniel K. Inouye US PBARC Seminar* (Hilo, HI, June 2015).
8. Sim, S. B. & Geib, S. M. *Using GBS to generate a high density linkage map and map traits in mass-reared SIT strains* in *Arthropod Genomics Meeting* (Manhattan, KS, June 2015).
9. Sim, S. B. & Geib, S. M. ***Bringing Mendel back: Integrating NGS with classical approaches to map traits necessary for the rearing of sterile insect colonies for mass release.*** in *Pacific Branch Meeting of the Entomological Society of America* (Honolulu, HI, Apr. 2016).

10. Sim, S. B. & Geib, S. M. *Integrating Classical Genetics with Next Generation Sequencing for the Improvement of a Draft Genome Assembly and QTL Mapping in the Melon Fly *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae)* in *Plant and Animal Genome Conference* (San Diego, CA, Jan. 2016).
11. Sim, S. B. & Geib, S. M. ***Integrating genetic and genomic techniques to improve tephritid SIT programs*** in *USDA-APHIS Webinar* (Webinar, June 2016).
12. Sim, S. B. & Geib, S. M. *Trait mapping and improvement of the melon fly (*Bactrocera cucurbitae*) genome* in *Sequencing, Finishing, Analysis, in the Future Meeting* (Santa Fe, NM, June 2016).
13. Sim, S. B. & Geib, S. M. ***Using genome-wide SNPs to build diagnostic tools for *Bactrocera dorsalis* and *Ceratitis capitata**** in *USDA-APHIS Fruit fly meeting* (Sacramento, CA, Apr. 2016).
14. Sim, S. B., Haines, W., Rubinoff, D. & Geib, S. M. *Population genetics in Kamehameha Butterfly (*Vanessa tameamea*)* in *Tropical Conservation Biology and Ecological Sciences Symposium* (Hilo, HI, Apr. 2016).
15. Sim, S. B. ***Low-cost differential expression analysis using a 3' RNA seq methodology*** in *USDA-ARS Arthropod Genomics Research Webinar* (Webinar, Jan. 2017).
16. Sim, S. B., B., C., Hall, B. & Geib, S. M. ***Analysis and application of genome-wide SNP data in tephritid species*** in *Pacific Entomology Conference* (Honolulu, HI, Mar. 2015).
17. Sim, S. B. & Geib, S. M. ***A low-cost and high-throughput approach to phylogenomics; resolving evolutionary relationships between recently diverged species*** in *Plant and Animal Genome Conference* (San Diego, CA, Jan. 2015).
18. Sim, S. B. *et al.* *Genome-wide sequencing in *Ceratitis capitata* to identify informative molecular markers* in *Entomological Society of America Meeting* (Portland, OR, Nov. 2014).
19. Sim, S. B. *et al.* ***Genome-wide SNP data in *Bactrocera dorsalis* elucidates geographic sources of intercepted flies*** in *Plant and Animal Genome Conference Asia* (Singapore, Singapore, May 2014).

*Titles in bold denote an invited event

TEACHING

Teaching Assistant <i>University of Notre Dame</i> Grading	Spring 2013
Teaching Assistant <i>University of Notre Dame</i> Evolution	Fall 2012
Teaching Assistant <i>University of Notre Dame</i> Genetics Lab	Spring 2009
Teaching Assistant <i>University of Notre Dame</i> Intro to Biology Lab	Fall 2008

SELECTED AWARDS AND GRANTS

Post-Doctoral Fellowship <i>NIFA-AFRI Education & Literacy Initiative</i> \$152,000	2017-2019
Travel Award <i>NSF Insect Genetic Technologies Research Coordination Network</i> \$500	2015

PhD Fellowship <i>NSF Integrative Graduate Education and Research Traineeship</i> \$75,000	2007-2012
Post-Baccalaureate Fellowship <i>NSF Frontiers in Integrative Biological Research</i> \$35,000	2006-2007
Robert B. Ernst Prize <i>University of California, Irvine</i> Excellence in Research in Plant Sciences	2006
Undergraduate Research Support <i>University of California, Irvine UROP</i> \$250	2005
Undergraduate Fellowship <i>NSF Research Experience for Undergraduates</i> \$1,500	2004
Undergraduate Fellowship <i>University of California, Irvine SURP</i> \$1,500	2004

SPECIAL SKILLS

R	Advanced
LaTeX	Advanced
NGS Library Preparation	Advanced
High-Molecular Weight DNA Extraction	Advanced
Python	Proficient
Bash	Proficient
High Performance Computing	Proficient
Macro Photography	Proficient
Micro-injections	Proficient