

**SANTIAGO R. RAMIREZ**

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Department of Evolution & Ecology  
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**CURRICULUM VITAE**

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**ACADEMIC POSITIONS:**

- 2018-present** Associate Professor, University of California, Davis.  
**2013-2018** Assistant Professor, University of California, Davis.

**EDUCATION & POSTDOCTORAL RESEARCH:**

- 2008-2013** Postdoctoral Fellow, University of California, Berkeley (Advisor Dr. Neil Tsutsui).  
**2002-2008** Ph.D., Harvard University (Advisor Dr. Naomi Pierce).  
**1996-2001** B.S., Biology, Universidad de los Andes, Bogotá, Colombia.

**ADDITIONAL TRAINING:**

- 2011** Comparative Genomics Workshop, Český Krumlov, Czech Republic  
**2009** Neural Systems & Behavior, MBL, Woods Hole, MA.  
**2007** Computational Phyloinformatics NESCent (Duke University), Durham, NC.  
**2006** Waters GC-MS training course, Beverly, MA.  
**2004** Workshop on Molecular Evolution, MBL, Woods Hole, MA.  
**2004** Applied Phylogenetics Workshop, UC Davis, Bodega Bay, CA.  
**2003** The Bee Course, Portal, AR.

**PUBLICATIONS:**

(\*denotes undergraduate students)

**Published:**

- Calfee, E, MN Agra, MA Palacio, SR Ramírez, G Coop (2020), Selection and hybridization shaped the rapid spread of African honey bee ancestry in the Americas. ***PLOS Genetics*** 16(10): e1009038.
- Freedman, MG., H Dingle, SY Strauss, SR Ramírez (2020) Two centuries of monarch butterfly collections reveal contrasting effects of range expansion. ***Proceedings of the National Academy of Sciences*** 117 (46) 28887-28893.
- Brand, P, IA Hinojosa-Díaz, R Ayala, M Daigle\*, CL Yurrita Obiols, T Eltz, SR Ramírez. An odorant receptor gene underlies reproductive isolation in perfume-collecting orchid bees. ***Nature Communications*** (2000) 11:244.
- Saleh, N & SR Ramírez. Sociality emerges from solitary behaviours and reproductive plasticity in the orchid bee *Euglossa dilemma*. ***Proceeding of the Royal Society B*** 86: 20190588.
- Freedman, MG, C Jason, SR Ramírez, SY Strauss (2019) Host plant adaptation during contemporary range expansion in the monarch butterfly. ***Evolution*** 74:377-391.

- Ramírez, SR (2019) Pollinator specificity and seasonal patterns in the euglossine bee-orchid mutualism at La Gamba Biological Station. *Acta ZooBot Austria* 156, 2019:171-181.
- Pokorny, TE Millahn, P Schlutting, SR Ramírez, T Eltz (2019) Correlates of display activity and perch residency of male orchid bees in cage experiments. *Acta ZooBot Austria* 156, 2019: 159-169.
- Luo, Y, Y Zhang J Farine J Ferveur S Ramírez, A Kopp (2019) Evolution of sexually dimorphic pheromone profiles coincides with increased number of male-specific chemosensory organs in *Drosophila prolongata*. *Ecology and Evolution* 2019,9:13608-13618.
- Torres, CW, MA Tonione, SR Ramírez, JR Sapp, ND Tsutsui. (2018). Genetic and chemical divergence among host races of a socially parasitic ant. *Ecology and Evolution* 2018:1-14.
- Brand, P., V. Larcher, A. Cuoto, JC Sandoz, SR. Ramirez (2018). Sexual dimorphism in visual and olfactory brain centers in the perfume-collecting orchid bee *Euglossa dilemma* (Hymenoptera, Apidae). *Journal of Comparative Neurology* 526:2068-2077.
- Weber, MG, NI Cacho, MJQ Phan, C Disbrow, SR Ramírez, SY Strauss (2018) The evolution of floral signals in relation to range overlap in a clade of California Jewelflowers (*Streptanthus s.l.*). *Evolution* 72(4):798-807.
- Cridland, JM, SR Ramirez, CA Dean, A Sciligo, ND Tsutsui (2018) Genome sequencing of museum specimens reveals rapid changes in the genetic composition of honey bees in California. *Genome Biology and Evolution* 10(2):458-472.
- Cridland, JM, SR Ramirez, CA Dean, A Sciligo, ND Tsutsui (2018) Genome sequencing of museum specimens reveals rapid changes in the genetic composition of honey bees in California. *Genome Biology and Evolution* 10(2):458-472.
- Bogarín, D, M Fernández, A Borkent, A Heemskerk, F Pupulin, SR Ramírez, ES Fmls, B Gravendeel (2018) Pollination of *Trichosalpinx* (Orchidaceae: Pleurothallidinae) by biting midges (Diptera: Ceratopogonidae). *Botanical Journal of the Linnean Society* 186(4): 510–543.
- Brand, P & SR Ramírez (2017) The evolutionary dynamics of the odorant receptor gene family in corbiculate bees. *Genome Biology and Evolution* 9(8):2023-2036
- Brand, P, N Saleh, H Pan, C Li, KM Kapheim, SR Ramírez (2017) The nuclear and mitochondrial genomes of the facultatively eusocial orchid bee *Euglossa dilemma*. *G3: Genes, Genomes and Genetics* 7:2891-2898.
- Pokorny, P, I Vogler, R Losch, P Schlutting, P Juarez, N Bissantz, SR Ramirez, T Eltz (2017) Blown by the wind: the ecology of male courtship display behavior in orchid bees. *Ecology* 98(4):1140-1152.
- Cridland, J, ND Tsutsui, SR Ramirez (2016) The complex demographic history and evolutionary origin of the western honey bee, *Apis mellifera*. *Genome Biology and Evolution*, 98(4):1140-1152.
- Weber, MG, L Mitko, T Eltz, SR Ramirez (2016) Macroevolution of perfume signaling in orchid bees. *Ecology Letters* 19:1314-1323.
- Mitko, L, MG Weber, SR Ramirez, E Hedenström, WT Wcislo, and T Eltz (2016) Sensory olfactory specialization for perfume collection in male orchid bees. *Journal of Experimental Biology* 219:1467-1475 [Cover feature].
- Mathis, K, S. Philpott, SR Ramirez (2016) Variation in spatial scale of competing polydomous twig-nesting ants in coffee agroecosystems. *Insectes Sociaux* 63:447-456.
- Hetherington-Rauth, MC\*, SR Ramirez (2016) Evolution and diversity of floral scent chemistry in the euglossine bee-pollinated orchid genus *Gongora*. *Annals of Botany* 118:135-148.

- Pokorny T, SR Ramírez, MG Weber, T Eltz (2015) Cuticular hydrocarbons as potential close range recognition cues in orchid bees. *Journal of Chemical Ecology*: 41:1080-1094.
- Brand P, SR Ramírez, F Leese, J. Javier G. Quezada-Euan, R Tollrian, and T Eltz (2015) Rapid evolution of chemosensory receptor genes in a pair of sibling species of orchid bees (Apidae: Euglossini). *BMC Evolutionary Biology*: 15:176.
- Hetherington-Rauth, MC\*, SR Ramírez (2015) Evolutionary trends and specialization in the euglossine bee-pollinated orchid genus *Gongora*. *Annals of the Missouri Botanical Garden* 100:271-299.
- Ramírez, SR, C Hernandez\*, A Link, MM Lopez-Uribe, (2015) Seasonal cycles, phylogenetic assembly, and functional diversity of orchid bee communities. *Ecology and Evolution* 5(9):1896-1907.
- Karban R, WC Wetzel, K Shiojiri, S Ishizaki, SR Ramírez, JD Blande (2014) Deciphering the language of plant communication: volatile chemotypes of sagebrush. *New Phytologist* 204:380-385.
- Pringle EG, SR Ramírez, TC Bonbroke, DM Gordon, R Dirzo (2012) Diversification and phylogeographic structure in widespread Azteca plant-ants from the northern Neotropics. *Molecular Ecology* 21, 3576–3592.
- Dong-Hwan, C, SR Ramírez, ND Tsutsui (2012) A silica-based method for the extraction of surface hydrocarbons from insects. *Journal of Chemical Ecology* 38:176–187.
- Ramírez, SR T Eltz, MK Fujiwara\*, B Goldman-Huertas, G Gerlach, ND Tsutsui, NE Pierce (2011) Asynchronous diversification in a specialized plant-pollinator mutualism. *Science* 333:1742-1746.
- Eltz T, F Fritsch\*, J Ramirez-Pech, Y Zimmermann, J Quezada-Euan, SR Ramirez, B Bembé (2011) Characterisation of the orchid bee *Euglossa viridissima* and a new cryptic sibling species by morphological, chemical, and genetic characters. *Zoological Journal of the Linnean Society* 163: 1064-1076.
- Lopez-Uribe M, A Green, SR Ramírez, S Bogdanowicz, BN Danforth (2010) Isolation and cross-species characterization of polymorphic microsatellites for *Eulaema meriana* (Hymenoptera: Apidae: Euglossini) *Conservation Genetics Resources* 3:21-23.
- Ramírez SR, T Eltz, F Fritsch\*, R Pemberton, EG Pringle, N Tsutsui (2010) Intraspecific geographic variation of fragrances collected by orchid bees in native and introduced populations *Journal of Chemical Ecology* 36: 873–884.
- Ramírez, SR, DW Roubik, C Skov, NE Pierce (2010) Phylogeny, biogeography and diversification of the orchid bees (Hymenoptera: Euglossini). *Biological Journal of the Linnean Society* 100: 552-572.
- Ramírez, SR, JC Nieh, TB Quental, DW Roubik, V Imperatriz-Fonseca, NE Pierce (2010) A molecular phylogeny of the stingless bee genus *Melipona* (Hymenoptera: Apidae). *Molecular Phylogenetics and Evolution* 56(2): 519-525.
- Ramírez, SR (2009) Orchid bees. *Current Biology* 19(2):1061-1063.
- Zimmermann, Y, SR Ramírez, T Eltz (2009) Chemical niche differentiation among sympatric orchid bees. *Ecology* 90(11):2994-3008 [cover feature].
- Singer, RB, B Gravendeel, H Cross, SR Ramírez (2008) Structural variation, taxonomic utility and evolutionary patterns of orchid pollinia. *Selbyana* 29(1):6–19.
- Ramírez, SR, B Gravendeel, RB Singer, CR Marshall, NE Pierce (2007) Dating the origin of the Orchidaceae from a fossil orchid with its pollinator. *Nature* 448:1042-1045 [cover feature].
- Ramírez, S (2006) *Euglossa samperi* n. sp., a new species of orchid bee from the Ecuadorian Andes (Hymenoptera:Apidae). *Zootaxa* 1272:61-68.

- Parra-H\*, A, R Ospina-Torres, S Ramírez (2006) *Euglossa natesi* n. sp., a new species of orchid bee from the Chocó region of Colombia and Ecuador (Hymenoptera: Apidae). *Zootaxa* 1298:29-36.
- Ramírez, S (2005) *Euglossa paisa*, a new species of orchid bee from the Colombian Andes (Hymenoptera: Apidae). *Zootaxa* 1065: 51-60.
- Nieh, JC; FAL Contreras; S Ramírez, VL Imperatriz-Fonseca (2003) Variation in the communication of resource height by stingless bees from different habitats. *Animal Behaviour*. 66:1129–1139.
- Nieh, JC, S Ramírez, P Nogueira-Neto (2003) Multi-source odor-marking of food by a stingless bee, *Melipona mandacaia* *Behavioral Ecology and Sociobiology* 54:578-586.
- Ramírez, S, SA Cameron (2003) Army ant attacks by *Eciton hamatum* and *E. rapax* on nests of the Amazonian bumble bee, *Bombus transversalis* (Hymenoptera: Apidae) *Journal of the Kansas Entomological Society* 76 (3): 533-535.
- Ramírez\*, S, RL Dressler, M Ospina\* (2002) Euglossine bees (Hymenoptera: Apidae) from the Neotropical Region: A species checklist with notes on their biology *Biota Colombiana* 3(1):7-118.
- Cameron, SA & S Ramírez\* (2001) Nest architecture and nesting ecology of the orchid bee *Eulaema meriana* (Hymenoptera: Apinae: Euglossini) *Journal of the Kansas Entomological Society* 74 (3):142-165.
- Whitfield, JB, SA Cameron, S Ramírez\*, K Roesch\*, S Messinger\*, OM Taylor\* & D Cole\* (2001) Review of the *Apanteles* species (Hymenoptera: Braconidae) attacking Lepidoptera in *Bombus* (Hymenoptera: Apidae) colonies in the New World, with Description of a New Species from South America. *Annals of the Entomological Society of America* 94(6):851-857.

#### **GRANTS AND AWARDS:**

<b>2017-2022</b>	National Science Foundation (NSF): Dimension of Biodiversity grant (DEB-1737889) for \$114,012 as a co-PI (from a total award amount of \$1,993,127).	
<b>2015-2019</b>	National Science Foundation (NSF): <b>Functional, Genomic, and Evolutionary Analysis of Chemical Courtship Signals in Euglossine Bees.</b> DEB1457753. (S. Ramirez only PI).	\$735,887
<b>2014-2019</b>	Packard Fellowship. David & Lucile Packard Foundation (S. Ramirez only PI).	\$875,000
<b>2011-2015</b>	Moore Foundation. Using Genomics, Isotopes and Pollen to Illuminate the Past and Predict the Future of California Bees (co-written with Neil Tsutsui).	\$379,000
<b>2010</b>	Foundation Alejandro Angel, Highest Scientific Distinction in Natural Sciences Colombia	
<b>2009</b>	Lola Ellis Robertson & Surdna Foundation Scholarship, MBL	\$1,500
<b>2006-2008</b>	NSF (DEB-0608409) Dissertation Improvement Grant.	\$11,999
<b>2007</b>	Green Fund Student Research Award, Harvard University.	\$4,000
<b>2007</b>	Goelet Summer Research Award, Harvard University.	\$5,000
<b>2006</b>	Harvard research program to support undergraduate research	\$1,000
<b>2006</b>	Goelet Summer Research Award, Harvard University.	\$4,900

2005	Fondo Colombia Biodiversa, FAAE, Colombia.	\$1,300
2005	Teaching Excellence Distinction, Derek Bok Center, Harvard Univ.	
2005	Putnam Expedition Grant, Museum of Comparative Zoology.	\$5,000
2004	Rockefeller Center for Latin American Studies Research grant.	\$1,000
2004	Society of Systematic Biologists Award for Graduate Student Research	\$2,000
2003	Rockefeller Center for Latin American Studies Research grant.	\$1,200
2002-2008	OEB Student Research Grant, Harvard University.	\$8,000

#### **RECENT PRESENTATIONS AND SEMINARS:**

2020	<i>Invited speaker.</i> <b>Department of Biology, Washington University, Seattle, WA.</b>
2019	<i>Invited speaker.</i> <b>San Francisco Orchid Society. San Francisco, CA.</b>
2018	<i>Invited speaker.</i> <b>UC Davis Honey and Pollination Center. Davis, CA.</b>
2016	<i>Invited speaker.</i> <b>Harvard University, Cambridge Entomological Society, MA.</b>
2016	<i>Invited speaker.</i> <b>Universidad de Costa Rica, San Jose, Costa Rica.</b>
2015	<i>Invited speaker.</i> <b>University of Arizona, Tucson, AR.</b>
2014	<i>Invited speaker.</i> <b>Evolution Institute at University California Berkeley, Berkeley, CA.</b>
2014	<i>Invited speaker.</i> <b>Universidade de Sao Paulo, Sao Paulo, Brazil.</b>
2014	<i>Invited speaker.</i> <b>Gordon Conference, Ventura, CA.</b>
2014	<i>Invited speaker.</i> <b>University of Idaho, Moscow, ID.</b>
2014	<i>Invited speaker.</i> <b>University of California – Santa Barbara, CA.</b>
2013	<i>Invited speaker.</i> <b>University of California – San Diego, CA.</b>
2013	<i>Invited speaker.</i> <b>Harvard University, Cambridge MA.</b>
2013	<i>Invited speaker.</i> <b>University of California - Merced, CA.</b>
2012	<i>Invited speaker.</i> <b>San Francisco Orchid Society - San Francisco, CA.</b>
2012	<i>Invited speaker.</i> <b>University of California - Riverside, CA.</b>
2012	<i>Invited speaker.</i> <b>University of California - Santa Cruz, CA.</b>
2012	<i>Invited speaker.</i> <b>University of Wisconsin - Madison, WI.</b>
2012	<i>Invited speaker.</i> <b>University of Missouri - St. Louis, MO.</b>
2011	<i>Contributed talk.</i> <b>Honey Bee Genomics &amp; Biology, Cold Spring Harbor, NY.</b>
2011	<i>Contributed talk.</i> <b>Evolution meetings, Norman, OK.</b>
2010	<i>Invited speaker.</i> <b>University of Bochum, Germany.</b>
2010	<i>Contributed talk.</i> <b>Evolution meetings, Portland, OR.</b>
2010	<i>Invited speaker.</i> <b>University of Memphis, TN.</b>
2010	<i>Invited speaker.</i> <b>Universidad de los Andes, Colombia.</b>

- 2009 *Invited speaker. Harvard University Mutualism Symposium, MA*
- 2009 *Invited speaker. University of Düsseldorf, Germany.*
- 2008 *Contributed talk. Evolution meetings, Minneapolis, MN.*
- 2007 *Invited speaker. University College London. London, UK.*
- 2007 *Invited speaker. Orchid evolutionary biology and conservation RBG Kew, UK.*
- 2006 *Invited speaker. International Union for Study of Social Insects Washington, DC*

### **TEACHING EXPERIENCE:**

- 2016-onwards Graduate-level course. Core Population Biology course. Advanced topics in Evolutionary Biology. Enrollment 5-15 students. University of California Davis.
- 2014-onwards Course on Introduction to Evolution (EVE100). Sole instructor. Enrollment ~300 students. University of California Davis.
- 2010 Guest lecturer for *Paleobotany* University of California, Berkeley
- 2008-2011 Guest lecturer for *Insect Behavior* University of California, Berkeley
- 2008 Teaching fellow, Borneo Biodiversity Course, Harvard University.
- 2008 Honor's thesis adviser of Carlos Hernandez, Universidad de los Andes, Colombia.
- 2007 Teaching fellow, Comparative Methods in Ecology and Evolution, Harvard.
- 2006-2007 Honor's thesis co-adviser of Mikiko K Fujiwara, Harvard College.
- 2005 Undergrad summer research co-adviser of Jennifer Davis, Harvard College.
- 2005 Honor's thesis co-adviser of Jorge H Bermudez, Univ. Quindio, Colombia.
- 2004 Honor's thesis co-adviser of Maria M Lopez, Univ. Andes, Colombia.
- 2004 Head Teaching Fellow, Animal Behavior, Harvard University.
- 2003 Teaching fellow, Integrative Biology of Organisms, Harvard University.

### **OUTREACH:**

**Lectures for non-scientist audiences:** Fern Forest Reserve, Florida (2010), San Francisco Orchid Society (2012). **Recruiter** at Annual Biomedical Research Conference for Minority Students, San Diego, CA October 15-18, 2003. **Sally Ride Science (Children Books):** My research was featured in a four-page spread for a children book about the evolution of flowering plants. **Scientific American:** My research on the coevolution among euglossine bees and their orchid hosts was featured in an article and photo shoot for the April 2012 issue of *Scientific American*.

### **PROFESSIONAL SERVICE:**

**Editorial Board:** *Evolution*.

**Journal Reviews:** *Annals of the Entomological Society of America, Austral Ecology, Apidologie,*

*Biological Journal of the Linnean Society, Biota Colombiana, Caldasia, Conservation Genetics, Current Biology, Ecology, Ecology Letters, Evolution, Heredity, Journal of Animal Ecology, Journal of Insect Conservation, Journal of the Kansas Entomological Society, Genome Biology, Genome Biology and Evolution, Insect Conservation & Diversity, Insectes Sociaux, Neotropical Entomology, Molecular Ecology, Nature Communication, Plos One, Proceedings of the Royal Society B, Scientific Papers University of Kansas, Zootaxa.*

**Grant Reviews:** *National Science Foundation (NSF); German Science Foundation (DFG); National Geographic; Austrian Science Foundation (FWF); Czech Science Foundation; Universidad de Antioquia (Colombia)*

**LABORATORY & COMPUTATIONAL EXPERTISE:**

Sanger and Next Generation DNA Sequencing—Gas Chromatography-Mass Spectrometry—  
Extracellular Neurophysiology Recordings—Confocal Microscopy—Scanning Electron Microscopy—  
Programming in R, Matlab, Perl, Python, Unix Shell.

**LANGUAGES:**

English, Spanish.