

Place of Birth: Chicago, Illinois**Citizenship:** United States**E-mail:** joels@ucr.edu**Office:** 1-951-827-6357**Web:** www.sachslab.com**Updated:** August 2018**Google Scholar:** <https://scholar.google.com/citations?user=hZxtGocAAAAJ&hl=en>**Department of Evolution Ecology & Organismal Biology**

-Department of Microbiology and Plant Pathology (Cooperating Faculty)

-Department of Botany and Plant Sciences (Cooperating Faculty)

-Institute of Integrative Genomic Biology (Member)

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Professional Preparation:

University of California-Riverside	Biology	Professor	2018-Present
University of California-Riverside	Biology	Associate Professor	2012-Present
University of California-Riverside	Biology	Assistant Professor	2007-2012
University of California-Berkeley	Integrative Biology	Post-doc	2004-2007
University of Texas	Integrative Biology	PhD,	2004
University of North Dakota	Zoology	MS,	1998
University of Iowa	Biology	BA,	1993

Grants and Awards:

2017-2022 NSF-Dimensions in Biodiversity	- <i>Elucidating the drivers of mutualism variation in host-symbiont metapopulations</i> #1738028 (\$892,835 to UCR)	\$1,242,795
2016-2018 Academic Senate COR Award, UC-Riverside		\$9,000
2013-2015 Academic Senate COR Award, UC-Riverside		\$9,000
2012-2018 NSF-CAREER Award (DEB / IOS)	- <i>Evolution of host control over symbiosis, dysbiosis in anthropogenic landscapes</i> #1150278	\$587,486
2010-2011 NSF Research Experiences for Undergraduates supplement		\$22,475
2009-2010 Academic Senate Research Award, UC-Riverside		\$1,470
2009-2010 University of California-Riverside Research mentor of the year award		
2008-2012 NSF-DEB Grant	- <i>The evolution and origins of uncooperative rhizobia</i>	\$250,000
2008-2009 Academic Senate Research Award, UC-Riverside		\$2,100
2008-2009 Regents Fellowship, UC-Riverside		\$5,000
2006-2007 NIH Ruth Kirschstein National Research Service Award		
	<i>The evolution of parasitism in rhizobial bacteria.</i>	\$99,224
2003	Doctoral Dissertation Improvement Grant	
	<i>Experimental selection for cheating in a mutualistic symbionts</i>	\$9,212
2003-2004 Bess Heflin Fellowship, University of Texas		\$17,000
2003-2004 Zoology Scholarship for Excellence, University of Texas		\$1,050
2003-2004 Carl Gottfried Hartman Graduate Fellowship, University of Texas		\$5,000
2001	Excellence in Teaching Award-Nomination, University of Texas	
1999-2002 Dean's Excellence Fellowship, University of Texas		
1995-1998 University of North Dakota. Perfect GPA		
1995	University of North Dakota. APSAC Field Research Grant.	
1990-1993 University of Iowa Dean's List- Three semesters.		
1989	National Merit Commendation.	

Technical Publications:

1. Host investment into symbiosis varies among genotypes of the legume *Acmispon strigosus* but sanctions are uniform. Wendlandt, C.E., Regus, J.U., Hollowell, A.C., Quides, K.W., Lyu, J.Y., Adinata, E., **Sachs, J.L.**, 2018 *New Phytologist*. In Press.
2. Legumes versus rhizobia: a model for ongoing conflict in symbiosis. **Sachs, J.L.**, Quides, K.W., Wendlandt, C.E. 2018 *New Phytologist* 219: 1199-1206.
3. Pahua, V.J., Stokes, P.J.N., Hollowell, A.C., Regus, J.U., Gano-Cohen, K.A., Wendlandt, C.E., Quides, K.W., Lyu, J. Y., **Sachs, J.L.**. 2018 Fitness variation among host species and the paradox of ineffective rhizobia *Journal of Evolutionary Biology*. 31:599-610.
4. Masson-Boivin, C., **Sachs, J.L.** 2018 Symbiotic nitrogen fixation by rhizobia – the roots of a success story. *Current Opinion in Plant Biology*. 44:7-17.
5. Quides, K.W., Stomackin, G.M., Lee, H-H., Chang, J.H, **Sachs, J.L.** 2017. *Lotus japonicus* alters in planta fitness of *Mesorhizobium loti* dependent on symbiotic nitrogen fixation. *PLoS ONE* 12(9) e0185568.
6. Regus, J.U., Quides, K.W., O'Neill, M.R., Suzuki, R., Savory, E.A., Chang, J.H, **Sachs, J.L.** 2017. Cell autonomous sanctions in legumes target ineffective rhizobia in nodules with mixed infections *American Journal of Botany* 104: 1-14.
7. Regus, J.U., Wendlandt, C.E., Bantay, R.M., Gano-Cohen, K.A., Gleason, N.J., Hollowell, A.C., O'Neill, M.R., Shahin, K.K., **Sachs, J.L.** 2017. Nitrogen deposition decreases the benefits of symbiosis in a native legume 2016. *Plant and Soil*. 414: 159-170
8. Gano-Cohen, K.A., Stokes, P., Blanton, M.A., Wendlandt, C.E., Hollowell, A.C., Regus, J.U., Kim, D., Patel, S., Pahua, V. J., **Sachs, J.L.** 2016. Non-nodulating *Bradyrhizobium* spp. modulate the benefits of the legume-rhizobium mutualism *Applied and Environmental Microbiology*. 82:5259-5268
9. Hollowell, A. C., Regus, J. U., Turissini, D., Gano, K. A., Bantay, R., Bernardo, A., Moore, D. Pham, J., **Sachs, J. L.** 2016. Metapopulation dominance and genomic-island acquisition of *Bradyrhizobium* with superior catabolic capabilities. *Proceedings of the Royal Society*, 283: 20160496.
10. Hollowell, A. C., Regus, J. U., Gano, K. A., Bantay, R., Centeno, D., Pham, J., Lyu, J.Y., Moore, D. Bernardo, A., Lopez, G., Patil, A., Patel, S., Lii, Y., **Sachs, J.L.** 2016. Epidemic spread of symbiotic and non-symbiotic *Bradyrhizobium* genotypes across California *Microbial Ecology* 71(3) 700-710. DOI 10.1007/s00248-015-0685-5
11. Jones, E. I., Afkhami, M. E., Akcay, E., Bronstein, J. L., Bshary, R., Frederickson, M. E., Heath, K. D., Hoeksema, J., Ness, J H., Pankey, S., Porter, S. S., **Sachs, J.L.**, Scharnagl, K., Friesen. M.L. 2015. Cheaters must prosper: reconciling theoretical and empirical perspectives on cheating in mutualism *Ecology Letters* doi:10.1111/ele.12507
12. Mueller U.G., **Sachs, J.L.** 2015 Engineering microbiomes to improve plant and animal health *Trends in Microbiology*. <http://dx.doi.org/10.1016/j.tim.2015.07.009>
13. Exploitation of mutualisms **J.L. Sachs** . 2015 pp. 93-106., in: Bronstein, J., ed. *Mutualism*, Oxford University Press., Oxford.
14. Hollowell, A.C., Gano, K.A., Lopez, G., Shahin, K., Regus, J. U., Gleason, N., Greater, S., Pahua, V. **Sachs, J.L.** 2015. Native California soils are selective reservoirs for multidrug resistant bacteria *Environmental Microbiology Reports*. 7(3), 442-449
15. Regus, J. U., Gano, K. A., Hollowell, A .C., V. Sofish, and **Sachs, J.L.** 2015. *Lotus* hosts delimit the mutualism-parasitism continuum of *Bradyrhizobium*. *J. Evol. Biol.* 28:447-458.
16. Ehinger, M., Mohr, T. J., Starcevich, J. B., **Sachs, J. L.**, Porter, S. S., Simms, E. L. 2014 Specialization -generalization trade off in a *Bradyrhizobium* symbiosis with wild legume hosts *BMC Ecology*. 14:8
17. Regus, J. U., Gano, K. A., Hollowell, A. C., **Sachs, J. L.** 2014. Efficiency of partner choice and sanctions in *Lotus* is not altered by nitrogen fertilization. *Proceedings of the Royal Society of London*. 281, 20132587.

18. **Sachs, J. L.**, Skophammer, R.G., Bansal, N., Stajich, J. E. 2014 Evolutionary origins and diversification of proteobacterial mutualists *Proceedings of the Royal Society of London*. 281, 20132146
19. Pietrasiak, N, Regus, J. U., Johansen, J. R., Lam, D., **Sachs, J. L.**, Santiago, L. S. 2013. Biological soil crust communities differ in key ecological functions *Soil Biology and Biochemistry* 65:168-171.
20. **Sachs, J. L.** Gano, K. A., Hollowell, A. C., Regus, J. U. **The legume-rhizobium symbiosis** 2013 *Oxford Bibliographies in Ecology*.
21. Kimbrel, J.A., Thomas, W. J., Jiang, Y., Creason, A.L., Thireault, C.A **Sachs, J.L.**, Chang, J.H. 2013 Mutualistic coevolution of type III effector genes in *Sinorhizobium fredii* and *Bradyrhizobium japonicum* *PLoS Pathogens* 9: 2, e1003204
22. **Sachs, J.L.**, and Hollowell, A. C. 2012. **The origins of cooperative bacterial communities.** *mBIO* e00099.
23. **Sachs, J.L.** 2011. Origins, evolution and breakdown of bacterial symbioses. *Encyclopedia of Biodiversity* 2nd Edition, Edited by S. A. Levin.
24. **Sachs, J.L.**, Russell, J. E. and Hollowell, A. C. 2011. Evolutionary instability of symbiotic function in *Bradyrhizobium*. *PLoS One* 6:11:26370.
25. Friesen, M.L., Porter, S.S., Stark, S.C., & von Wettberg, E.J. **Sachs, J.L.**, Martinez-Romero, E. 2011. Microbially-mediated Plant Functional Traits. *Annual Review of Ecology Evolution and Systematics*. 43: 23-46.
26. **Sachs, J.L.**, Skophammer, R.G., and Regus, J.U. 2011. Evolutionary transitions in bacterial symbiosis. *Proceedings of the National Academy of Sciences USA*. 108:10800-10807
27. **Sachs, J.L.**, Essenberg, C. and Turcotte, M. M. 2011. New paradigms for the evolution of beneficial infections. *Trends in Ecology and Evolution*. 26: 202-209.
28. Abbot, P. et al. 2011 (135 authors). Inclusive theory and eusociality. *Nature* 471, E1-E4.
29. **Sachs, J.L.**, Russell, J. E., Lii, Y. E., Black, K. C., Lopez, G., and Patil, A. S. 2010. Host control over infection and proliferation of a cheater symbiont. *Journal of Evolutionary Biology* 23:1919-1927.
30. **Sachs, J.L.**, Ehinger, E. O., & Simms, E. L. 2010. Origins of cheating and loss of symbiosis in wild *Bradyrhizobium*. *Journal of Evolutionary Biology* 23:1075-1089.
31. Medina, M., **Sachs, J.L.** 2010. Symbiont genomics; Our new tangled bank. *Genomics* 95:129-137.
32. **Sachs, J.L.**, Kembel, S.W., Lau, A.H., and Simms, E.L. 2009. In situ phylogenetic structure and diversity of wild *Bradyrhizobium* communities. *Applied & Environmental Microbiology* 75: 4727-4735.
33. **Sachs, J.L.** and Simms, E.L. 2008. The origins of uncooperative rhizobia. *Oikos* 117: 961-966
34. **Sachs, J.L.** 2008. Resolving the first steps to multicellularity. *Trends in Ecology and Evolution* 23:245-248.
35. **Sachs, J.L.** and Rubenstein, D. R. 2007. The evolution of cooperative breeding; is there cheating? *Behavioral Processes* 76:131-137.
36. **Sachs, J.L.**, Hughes, C.R., Nuechterlein, G.L., and Buitron, D. 2007. The evolution of colonial breeding in birds: A test of hypotheses with the red-necked grebe. *The Auk* 124:628-642.
37. **Sachs, J.L.**, Simms, E.L. 2006. Pathways to mutualism breakdown. *Trends in Ecology and Evolution* 21:585-592.
38. **Sachs, J.L.** 2006. Cooperation within and among species. *Journal of Evolutionary Biology* 19:1415-1418.
39. **Sachs, J.L.** and Wilcox, T.P. 2006. A shift to parasitism in the jellyfish symbiont *Symbiodinium microadriaticum*. *Proceedings of the Royal Society of London. B*. 273:425-429
40. Simms, E. L., Taylor, D. L., Povich, J., Shefferson, R. P., **Sachs, J.L.**, Urbina, M., Tauszick, Y. 2006. An empirical test of partner choice mechanisms in a wild legume-rhizobium interaction. *Proceedings of the Royal Society of London. B*. 273:77-81.
41. **Sachs, J.L.** and Bull, J.J. 2005. Experimental evolution of conflict mediation between genomes. *Proceedings of the National Academy of Sciences USA* 102:390-395
42. **Sachs, J. L.**, Mueller, U. G., Wilcox, T. P., and Bull, J. J. 2004. The Evolution of Cooperation, *Quarterly Review of Biology* 79:135-160.

43. Nuechterlein, G.L., Buitron, D., **Sachs, J.L.** and Hughes, C.R. 2003. Red-necked Grebes become semi-colonial when prime nesting habitat is available, *Condor*. 105: 80-94.
44. **Sachs, J.L.**, Hughes, C.R. 1999. Characterization of microsatellite loci for red-necked grebes *Podiceps grisegena*. *Molecular Ecology*. 8, 687-688.

Technical book reviews:

45. **Sachs, J.L.** 2007. The nature of human culture. *Book Review of 'The Origin and Evolution of Cultures'* 2005 Robert Boyd and Peter J. Richerson, Oxford University Press, New York, U.S.A. *Quarterly Review of Biology* 82:183-184.
46. **Sachs, J.L.** 2006. A clash of biology and culture. *Book Review of 'Techno-cultural Evolution, Cycles of Creation and Conflict.'* 2006 William McDonald Wallace, Potomac Books, Dulles, Virginia, U.S.A. *Quarterly Review of Biology* 81:425-426.
47. **Sachs, J.L.** 2005. A biohistory of ascendance and decline. *Book Review of 'The Biology of Civilisation, Understanding Human Culture As a Force In Nature.'* 2004 Stephen Boyden, University of New South Wales Press, Sydney. *Quarterly Review of Biology* 80:507-508.
48. **Sachs, J.L.** 2004. The evolving field of cooperation. *Review of 'Genetic and Cultural Evolution of Cooperation.'* 2003. Dahlem workshop report. Peter Hammerstein, Ed. Dahlem University Press, Cambridge. *Quarterly Review of Biology* 79:458-459.

Press and Scientific Coverage

- Fast friends, sworn enemies. L. Pennisi 2003. *Science* 302:774-775.
- Evolution of cooperation: The benefits of ridesharing. G. J. Velicer 2005. *Heredity* 95:116-117.
- How genomics has affected the concept of microbiology. N. Ward & C. M. Fraser 2005. *Current Opinion in Microbiology* 8:1-8.
- Perfect Strangers. B Borrell. 2005. *Berkeley Science Review* 5 (2):14-15.
- On the origin of cooperation. L. Pennisi 2009. *Science* 325:1196-1199.
- Nature's recourse. S. Milius 2010. *Science News* 178:22

Selected Invited Technical lectures *Upcoming

*2019 June 22, Discussion leader, GRC on Animal-Microbe Symbiosis, Mt. Snow, Vt
*2018 December 15, Keynote Speaker, West Coast Bacterial Physiologists Meeting, Pacific Grove, CA
2018 September 13, Invited Outreach Seminar, *Bayer Microbials* San Diego, CA
2018 July 20, Plenary Speaker, International Symbiosis Society Congress, Corvallis, Oregon
2018 June 20, Plenary Speaker, Wild & Tamed Phytobiomes, State College, Pennsylvania
2018 April 6, University of California, Irvine, California
2018 March 6, California State University, Northridge, California
2017 November 6, Workshop: Symbiosis in the microbial world, Sussex, England
2017 July 12, Gordon Research Conference, Section leader
2017 June 6, Bacterial Genomics & Ecology Meeting, Aberdeen, Scotland
2016 May 30, CERES, Ecole Normale Supérieure, Paris, France
2015 August 31, Miami University, Miami, Florida
2015 September 8, Occidental College, Los Angeles, California
2015 September 28, University of Pittsburgh, Pittsburgh, Pennsylvania
2015 February 12, University of California, San Diego, California
2014 February 6, University of Texas, Austin, Texas
2014 January 31, Keynote Speaker: Evolution of Symbioses University of Brest, France
2013 December 9, University of Arizona, Tucson, Arizona
2013 November 2, Kellogg Biological Station, Hickory Corners, Michigan

2013 November 1, Michigan State University, East Lansing, Michigan
2012 March 4, McMaster University, Hamilton, Ontario, Canada
2012 March 2, University of Toronto, Ontario, Canada
2012 February 9, University of Maryland, College Park, Maryland
2012 February 6, University of Montana, Missoula, Montana
2011 December 8, Illinois State University, Bloomington, Illinois
2011 December 1, Brigham Young University, Provo, Utah
2011 November 21, University of California, Los Angeles
2011 September 26, Universität Wien, Vienna, Austria
2011 March 10 Harvey Mudd College, Claremont, California
2011 January 26, University of Illinois, Champaign, Illinois.
2011 January 21, Evolution of Microbial Cooperation Workshop. Bath, England
2011 January 6, National Academy of Sciences Sackler Colloquium. Irvine, California.
2010 September 22, Royal Netherlands Academy of Arts and Sciences, Amsterdam, Netherlands
2010 August 21, Canadian Institute For Advanced Research. Seattle, Washington.
2010 June 26, Society for the Study of Evolution, Portland, Oregon.
2010 January 19, Portland State University. Department of Biology, Portland, Oregon.
2009 August 19, American Academy for Advancement of Sciences, San Francisco, California.
2009 August 17, International Symbiosis Society Meeting, Madison, Wisconsin.
2008 October 25, Max Planck Institute for Evolutionary Biology. *Plön*, Germany.
2008 April, 14 Coevolution Workshop, Center for Population Biology, UC Davis