

CURRICULUM VITAE

LAWREN SACK

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Education and Research Positions

- Associate Professor of Plant Ecology, Department of Ecology and Evolutionary Biology, and Affiliate Faculty Member, Institute of the Environment, Center of Tropical Research, University of California Los Angeles, 2007-
- Affiliate Faculty Member, Department of Botany, University of Hawai'i at Manoa, 2008-
- Assistant Professor of Plant Physiology and Ecology, Department of Botany, and Ecology; and Evolution and Conservation Biology Program, University of Hawai'i at Manoa, 2003-2007
- Postdoctoral Research Fellow in Plant Biology, Department of Organismic and Evolutionary Biology, Harvard University, 2000-2003
- Ph.D. in Plant Ecology and Physiology, Cambridge University, UK, 2001, "Plant Responses to Deep Shade Plus Drought"
- Bachelor of Science in Biochemistry and second major English Literature. Great Distinction. McGill University, Canada, 1995
- Research Assistantships, Experimental Evolution and Ecology, McGill University 1993-1995

Research Interests

- Ecology and physiology of plant species coexistence.
- Hydraulics of plant water transport.
- Evolution and functional consequences of diversity in leaf size, shape and venation.
- Forest dynamics and ecohydrology.
- Conservation physiology.

Grants, Awards, Fellowships, and Organized Working Groups

- “*PROMETHEUS*: toward a web wiki for protocols and standard methods in plant ecology and physiology”. Multi-participant workshop proposed and organized for the Australian Vegetation Research Network (http://www.vegfunction.net/wg/68/68_Prometheus.htm). Organizer, with Lou Santiago and Will Cornwell. Australian National University, October 2009.
- “The crown concert: division of labour among tree canopy modules”. Research team member, with Principal Investigator Luis Balaguer. Spanish Ministerio de Ciencia e Innovacion, 2009-2011. 129,000 euros.
- “The evolution of leaf form in *Viburnum* (Adoxaceae)”. Collaborative Principal Investigator, with Erika Edwards and Michael Donoghue. National Science Foundation 2008-2011. \$750,597.
- “Tolerance of temperature extremes under drought: linking physiological processes with morphological constraints on leaf function”. Partner Investigator, with Chief Investigators Marilyn Ball, Adrienne Nicotra, and Gary Bryant, and other Partner Investigator Missy Holbrook. Australian Research Council 2007-2010. AUS\$553,015.
- “CAREER: The coordination of leaf hydraulics, structure and gas exchange”. Principal Investigator. National Science Foundation 2006-2011. \$887,989.
- “Drought responses of C₄ plants: resolving the effects of physiological pathway from phylogenetic history”. Project partner (with Principal Investigator Colin Osborne, co-Principal Investigator Ian Woodward, and two other project partners). Natural Environment Research Council 2006-2009. GB£475,000.
- “Synergistic effects of light and water on physiological diversification in the Hawaiian lobeliads”. Project Collaborator (with Principal Investigator Rebecca Montgomery, and Project Collaborator Tom Givnish). National Science Foundation 2006-2009. \$230,000.
- “National Ecological Observatory Network (NEON), Pacific Domain”. Co-leader, with Rebecca Ostertag, Susan Cordell and Christian Giardina, of successful “Request For Information” documents co-authored by over 80 participants from across University of Hawaii campuses, and other research and land management agencies, leading to the designation of Core, Observation and Experimental components for the NEON in Hawaii. 2007.
- “Hawaii Permanent Forest Plots Network (HIPNET) – A permanent forest plot network for research, education and conservation”. Principal Investigator with other PIs Becky Ostertag, Susan Cordell and Christian Giardina. 2007-2009. Hawaii EPSCoR.
- “University of Hawaii EPSCoR II: Research Infrastructure”. Focus Area Leader for Ecology (with Principal Investigator Jim Gaines, co-Principal Investigators Ken Kaneshiro and Don Price, and five other Focus Area Leaders). National Science Foundation 2006-2009. \$9,000,000.

- “Bridging ecology and genetics for a key adaptive radiation: phylogeny, and evolutionary and conservation physiology of the Hawaiian *Chamaesyce*”. Principal Investigator (with other Principal Investigator Cliff Morden). Hawaii NSF EPSCoR Research Enhancement Activities Program 2006-2007. \$24,429.
- “Development of microsatellite (SSR) markers for ecological and evolutionary studies of the model tree species, *Metrosideros polymorpha*.” Collaborator (with Principal Investigator Heather Sahli and six other collaborators). Hawaii NSF EPSCoR Research Enhancement Activities Program 2006-2007. \$24,960.
- “Key instrumentation for inter-disciplinary botanical training” Principal Investigator. University of Hawai‘i Educational Improvement Grant 2004. \$2700.
- Principal Investigator. University of Hawai‘i Travel Grants 2004-2005. \$3300.
- Arnold Arboretum of Harvard University Putnam Research Fellowship 2002-2003.
- Smithsonian Tropical Research Institute Short-Term Fellowship 2003.
- Frank Smart Studentship, Plant Sciences Department, Cambridge University, 2000
- Cambridge Commonwealth Trust Bursary, Cambridge University, 1999-2000
- National Science and Engineering Research Council of Canada Postgraduate Scholarship 1998-2000.
- Junta de Andalucia (Spanish government) Research Grant 2000.
- University of British Columbia Graduate Fellowship, University of British Columbia 1997 (awarded but declined)
- University of Glasgow Postgraduate Scholarship, University of Glasgow 1997 (awarded but declined)
- Dean’s Honour List, McGill University, 1992, 1993, 1994, 1995
- McConnell Award, Emily Crawford Scholarships, Charles Snyder Scholarships, McGill University 1993, 1994, 1995.
- National Science and Engineering Research Council of Canada Undergraduate Fellowships 1993, 1994

Experience in Mentorship, Teaching and Curriculum Development

- Graduate student mentorship: *UCLA* (2007-) Chair of committee for one Ph.D student in the Ecology and Evolutionary Biology Department. Supervisor of three visiting graduate students. Member of guidance committees for three PhD students in EEB Department. *University of Hawai‘i* (2003-) Chair of committee for one MS student, graduated in 2008. Mentor of three

current PhD students in the Botany Department. Member of MS and Ph.D permanent committees for ten students in the Botany, Natural Resources and Environmental Management, and Tropical Plant and Soil Sciences (Agriculture) departments. Member or Chair of interim MS and Ph.D committees for numerous students in the Botany Department. *Harvard University* (2003) supervisor of visiting PhD student.

- Postdoctoral researcher mentorship: Mentor of three postdoctoral fellows who have completed their training at UCLA (2007-8), and at University of Hawai'i (2006-2009).
- Undergraduate teaching: *UCLA* (2008-) Lecturer and developed curriculum for undergraduate advanced 'Plant Physiology' course. *University of Hawai'i* (2003-7); lectured and developed curriculum for undergraduate courses: 'Plant Physiology', 'Plant Physiology Laboratory', 'Plant Ecophysiology and Environmental Measurements', 'Hawaiian Ecosystems', 'Natural Resources Issues and Ethics', 'Strategies in Hawaiian Resource Use', and 'Hawaiian Resource-Use Strategies Internship'; and graduate courses, 'Foundations of Current Botany', and 'Botanical Seminars', and 'Environmental Physiology'. Member of the new "Hui Konohiki Program" at University of Hawai'i, an initiative to bring together Hawaiian knowledge and practices and contemporary scientific tools and methods to provide interdisciplinary training for land and resource management and environmental careers. *University of Cambridge* (1995-2000) Supervisor and demonstrator of Plant Sciences courses, including Biology of Organisms, Dynamics and Physiology of World Vegetation, Plant Sciences, Ecology, Cell Biology Laboratory, Plant Sciences Laboratory, and Statistics Laboratory.
- Undergraduate mentorship (worked with 33 undergraduate assistants from 2001 onward): *UCLA* (2007-) Mentor of nine undergraduate research assistants; *University of Hawai'i* (2003-) Developed the "Integrated Mentorship in Hawaiian Research, Education and Outreach" program, and mentored or co-mentored ten indigenous undergraduate science students in ongoing research in this program and in the NSF-funded Kumu Ola, and Undergraduate Mentorship in Environmental Biology programs; mentored six other undergraduate research assistants. *Harvard University* (2001-2003) Mentor of two undergraduate research assistants and an undergraduate thesis student in Department of Organismic and Evolutionary Biology; mentor of five undergraduate students in Harvard Forest Research Experience for Undergraduates program.

Editorial and Professional Positions

- Associate Editor for *Functional Ecology* (2006-)
- Advisor to Editorial Board for *New Phytologist* (2006-)
- Associate Editor for *American Journal of Botany* (2009-)
- Editorial Review Board for *Tree Physiology* (2005, 2007)
- Referee of 139 manuscripts, for 38 journals and book publishers: *Acta Oecologica*; *American Journal of Botany* (7); *American Naturalist*; *Annals of Botany* (4); *Australian Journal of Botany* (3); *BioScience*; *Biotropica* (3); *Bulletin of Mathematical Biology* (2); *Canadian Journal of Forest Research* (2); *Ecography*; *Ecological Monographs* (2); *Ecology* (3); *Evolution*; *Functional Ecology* (7); *Functional Plant Biology* (3); *Global Change Biology*, *International Journal of Plant Sciences* (2); *Journal of Arid Environments*; *Journal of Ecology* (5); *Journal of Experimental Botany*; *Journal of the Torrey Botanical Society* (3); *New Phytologist* (26); *New Zealand Journal of Ecology*; *Oecologia* (9); *Physiologia Plantarum* (2); *Planta*; *Plant, Cell and*

Environment (9); *Plant and Soil*; *Plant Ecology* (2); *Plant Physiology* (10); *Plant Physiology and Biochemistry*; *Proceedings of the National Academy of Sciences USA*; *Proceedings of the Royal Society B: Biological Sciences* (2); *Science*; *Tree Physiology* (8); *Trees—Structure and Function* (7); for the edited volume, Holbrook, NM & Zwieniecki, MA (2005) *Vascular Transport in Plants* (3); and of a book manuscript for New York Botanical Garden Press.

- Referee for the National Science Foundation, Directorate for Biological Sciences (8 proposals): Ecological & Evolutionary Physiology 2004, Environmental and Structural Systems 2005, Ecological Biology 2006, Physiological and Structural Systems 2007, Ecosystem Studies 2008, *Research Experiences for Students*, Office of International Science and Engineering 2008, Physiological and Structural Systems 2008, Ecosystem Studies 2009, Physiological and Structural Systems 2008
- Referee for Netherlands Organization for Scientific Research (NWO, the Dutch NSF) for VIDI (Innovative Research) proposal, 2005.
- Referee for Sigma Delta Epsilon / Graduate Women in Science Eloise-Gerry Fellowship, 2006.
- Referee for University of Wisconsin Milwaukee Research Growth Initiative Panel, 2007
- Referee for Mildred Mathias Grant, University of California, 2008.
- External examiner for PhD Program, Victoria University of Wellington, NZ (2004) and for MSc Program, University of KwaZulu-Natal, South Africa (2007)

Professional Societies

American Society of Plant Biologists, Association of Tropical Biology and Conservation, Botanical Society of America, British Ecological Society, Ecological Society of America

Publications (alphabetical order by year; *undergraduate co-author)

42. Cavaleri MA, Sack L. in review. Comparative water use of native and invasive plants at multiple scales: a global meta-analysis.
41. Markesteijn L, Poorter L, Paz H, Sack L, Paz H, Bongers L. in review. Hydraulic niche partitioning among saplings of tropical dry forest species: coordination of species moisture and light requirements.
40. McKown AD, Cochard H, Sack L. in review. Decoding leaf hydraulics with a spatially explicit model: principles of venation architecture and implications for its evolution.
39. Waite M, Sack L. in press. How does moss photosynthesis relate to leaf and canopy structure? Trait relationships for ten Hawaiian species of contrasting light habitats.
38. Coomes DA, Sack L. 2009. Response to "Comment on Coomes *et al.* 2008, 'Scaling of xylem vessels and veins within the leaves of oak species' by CA Price and BJ Enquist". *Biology Letters* 3, 381-382.
37. Dunbar-Co S, Sporck MJ, Sack L. 2009. Leaf trait diversification and design in seven rare taxa of the Hawaiian *Plantago* radiation. *International Journal of Plant Sciences* 170, 61-75.
38. Kagawa AK, Sack L, Duarte K, James S. 2009. Hawaiian native forest conserves water relative to timber plantation: species and stand traits influence water use. *Ecological Applications*, in press.
35. Arcand N, Kagawa AK, Sack L, Giambelluca TW. 2008. Scaling of frond form in Hawaiian tree fern *Cibotium glaucum*: compliance with global trends, and application for field estimation. *Biotropica* 40, 686-691.
34. Coomes DA, Heathcote S*, Godfrey ER*, Shepherd JJ*, Sack L. 2008. Scaling of xylem vessels and veins within the leaves of oak species. *Biology Letters* 4, 302-306.
33. Hoof J, Sack L, Webb DT, Nilsen ET. 2008. Contrasting structure and function of pubescent and glabrous varieties of Hawaiian *Metrosideros polymorpha* at high elevation. *Biotropica* 40, 113-118.
32. Pratt RB, Jacobsen AL, North GB, Sack L, Schenk HJ. 2008. Plant hydraulics: new discoveries in the pipeline. Meeting Report. *New Phytologist* 179, 590-593.
31. Quero JL, Villar R, Marañón T, Zamora R, Vega D, Sack L. 2008. Relating leaf photosynthetic rate to whole plant growth: drought and shade effects on seedlings of four *Quercus* species. *Functional Plant Biology* 35, 725-737.
30. Sack L, Dietrich EM*, Streeter CM*, Sánchez-Gómez D, Holbrook NM. 2008. Leaf palmate venation and vascular redundancy confer tolerance of hydraulic disruption. *Proceedings of the National Academy of Sciences USA* 105, 1567-1572.

29. Scoffoni C, Pou A, Aasamaa K, Sack L. 2008. The rapid light response of leaf hydraulic conductance: new evidence from two experimental methods. *Plant, Cell & Environment* 31, 1803-1812.
28. Cavender-Bares J, Sack L, Savage J. 2007. Atmospheric and soil drought reduce nocturnal conductance in live oaks. *Tree Physiology* 27, 611-620.
27. Choat B, Sack L, Holbrook NM. 2007. Diversity of hydraulic traits in nine *Cordia* species growing in tropical rainforests with contrasting precipitation. *New Phytologist* 175, 686-698.
26. Cornwell WK, Bhaskar R, Sack L, Cordell S, Lurch C. 2007. Adjustment of structure and function of Hawaiian *Metrosideros polymorpha* at high versus low precipitation. *Functional Ecology* 21, 1063-1071.
25. Martin RE, Asner GP, Sack L. 2007. Genetic variation in leaf pigment, optical and photosynthetic function among diverse phenotypes of *Metrosideros polymorpha* grown in a common garden. *Oecologia* 151, 387-400.
24. Royer DL, Sack L, Wilf P, Lusk C, Jordan GJ, Niinemets Ü, Wright IJ, Westoby M, Cariglino B, Coley PD, Cutter AD, Johnson KR, Labandeira CC, Moles AT, Palmer MB, Valladares F. 2007. Fossil leaf economics quantified: calibration, Eocene case study, and implications. *Paleobiology* 33, 574-589.
23. Niinemets Ü, Sack L. 2006. Structural determinants of leaf photosynthetic potentials and light harvesting capacity. *Progress in Botany*, Vol 67. Springer Verlag, Berlin, 385-419.
22. Sack L, Frole K*. 2006. Leaf structural diversity is related to hydraulic capacity in tropical rainforest trees. *Ecology* 87, 483-491.
21. Sack L, Holbrook NM. 2006. Leaf hydraulics. *Annual Review of Plant Biology* 57, 361-381.
20. Sack L, Melcher PJ, Liu WH*, Middleton E* Pardee T*. 2006. How strong is intra-canopy leaf plasticity in temperate deciduous trees? *American Journal of Botany* 93, 829-839.
19. Nakahashi C*, Frole K*, Sack L. 2005. Bacterial leaf nodule symbiosis in *Ardisia*: does it contribute to seedling growth capacity? *Plant Biology* 7, 495-500.
18. Orians CM, Smith SDP*, Sack L. 2005. How are leaves plumbed inside a branch? Differences in leaf-to-leaf hydraulic sectoriality among six temperate tree species. *Journal of Experimental Botany* 56, 2267-2273.
17. Sack L, Tyree MT. 2005. Leaf hydraulics and its implications in plant structure and function. In *Vascular Transport in Plants*. eds N.M. Holbrook and M.A. Zwieniecki. Elsevier/Academic Press, Oxford, 93-114.
16. Sack L, Tyree MT, Holbrook NM. 2005. Leaf hydraulic architecture correlates with regeneration irradiance in tropical rainforest trees. *New Phytologist* 167, 403-413.

15. Tyree MT, Nardini A, Salleo S, Sack L, El Omari B. 2005. The dependence of leaf hydraulic conductance on irradiance during HPFM measurements: any role for stomatal response? *Journal of Experimental Botany* 56, 737-744.
14. Angeles G, Bond B, Boyer JS, Brodribb T, Brooks JR, Burns MJ, Cavender-Bares J, Clearwater M, Cochard H, Comstock J, Davis SD, Domec J-C, Donovan L, Ewers F, Gartner B, Hacke U, Hinckley T, Holbrook NM, Jones HG, Kavanagh K, Law B, López-Portillo J, Lovisolo C, Martin T, Martínez-Vilalta J, Mayr S, Meinzer FC, Melcher P, Mencuccini M, Mulkey S, Nardini A, Neufeld HS, Passioura J, Pockman WT, Pratt RB, Rambal S, Richter H, Sack L, Salleo S, Schubert A, Schulte P, Sparks JP, Sperry J, Teskey R, Tyree M. 2004. Letter: The cohesion-tension theory. *New Phytologist* 163, 451-452.
13. Sack L. 2004. Responses of temperate woody seedlings to shade and drought: do trade-offs limit potential niche differentiation? *Oikos*, 107: 107-127.
12. Sack L, Streeter CM*, and Holbrook NM. 2004. Hydraulic analysis of water flow through leaves of sugar maple and red oak. *Plant Physiology* 134, 1824-1833.
11. Sack L, Cowan PD*, Jaikumar NJ*, Holbrook NM. 2003. The 'hydrology' of leaves: coordination of structure and function in temperate woody species. *Plant, Cell and Environment* 26, 1343-1356.
10. Sack L, Cowan PD*, Holbrook NM. 2003. The major veins of mesomorphic leaves revisited: testing for conductive overload in *Acer saccharum* (Aceraceae) and *Quercus rubra* (Fagaceae). *American Journal of Botany* 90: 32-39.
9. Sack L, Dechmann D. 2003. Design of paradise. Review of 'A Magic Web' by E.G. Leigh and C. Ziegler. *Nature* 424, 132.
8. Sack L, Grubb PJ. 2003. Crossovers in seedling relative growth rates between low and high irradiance: analyses and ecological potential. *Functional Ecology* 17, 281-287.
7. Sack L, Grubb PJ, Marañón T. 2003. The functional morphology of juvenile plants tolerant of strong summer drought in shaded forest understories in southern Spain. *Plant Ecology* 168, 139-163.
6. Sack L, Grubb PJ. 2002. The combined impacts of deep shade and drought on the growth and biomass allocation of shade tolerant woody seedlings. *Oecologia* 131: 175-185.
5. Sack L, Marañón T, Grubb PJ. 2002. Global allocation rules for patterns of biomass partitioning. *Science* 296: 1923a.
4. Sack L, Melcher PJ, Zwieniecki MA, Holbrook NM. 2002. The hydraulic conductance of the angiosperm leaf lamina: a comparison of three measurement methods. *Journal of Experimental Botany* 53: 2177-2184.

3. Zwieniecki MA, Melcher PJ, Boyce CK, Sack L, Holbrook NM. 2002. The hydraulic architecture of the leaf venation in *Laurus nobilis* L. *Plant, Cell and Environment*: 25: 1445-1450.
2. Sack L, Grubb PJ. 2001. Why do species of woody seedlings change rank in relative growth rate between low and high irradiance? *Functional Ecology* 15: 145-154.
1. Sack L, Zeyl C, Bell G, Sharbel T, Reboud X, Bernhardt T, Koelewyn H. 1994. Isolation of four new strains of *Chlamydomonas reinhardtii* (Chlorophyta) from soil samples. *Journal of Phycology* 30, 770-773.

Recommendations / Commentaries

Evan DeLucia. 2008. On Sack et al. (2008) PNAS article. *Faculty of 1000 Biology*.

Peter Reich. 2008. On Choat et al. (2007) *New Phytologist* article. *Faculty of 1000 Biology*.

Guy Riddihough. 2007. Editor's Choice, on Royer et al. (2007) *Paleobiology* article. *Science* 318: 1219.

Coverage by Popular Press

“\$888,000 Grant to Botany Professor”. *Honolulu Advertiser*, 28 August 2006, p. B2.

“What is Leaf Hydraulics?” Interview on *ThinkTech Hawaii*, Hawaii Public Radio, June 2006.

“UH Teacher to Study Leaf Hydraulics.” *Pacific Business News*, May 2006.

Crites J. “Water in Peril.” *Malamalama*, May 2005.

Presentations at professional meetings (alphabetical order by year)

51. Cavaleri MA, Sack L, Cordell S, Michaud JD, Ostertag R. 2009. Hawaiian ecohydrology: Water use of native and invasive trees in a lowland tropical rainforest. Contributed paper. Ecological Society of America Meeting, Albuquerque, NM.
50. Creese C, Sack L. 2009. From frond to fern flora: An analysis of the Hawaiian pteridophyte trait database. Contributed paper. Ecological Society of America Meeting, Albuquerque, NM.
49. Inman-Narahari F, Nelson-Kaula, Ostertag R, Cordell S, Giardina C, Sack L. 2009. Regeneration patterns in a native dominated Hawaiian montane wet forest. Contributed paper. Ecological Society of America Meeting, Albuquerque, NM.

48. Inman-Narahari F, Ostertag R, Giardina C, Cordell S, Sack L. 2009. The Hawaii Permanent Plot Network: Research Infrastructure for Studying the Effects of Climate Change and Forest Dynamics. Contributed Poster, Hawaii Conservation Conference, Honolulu, HI.
47. Nakahashi CD, Sack L. 2009. The determinants and significance of stomatal responses to vapor pressure deficit in native Hawaiian wet and dry forest species. Contributed poster. American Society of Plant Biologists Meeting, Honolulu, HI.
46. Nakahashi CD, Sack L. 2009. The determinants and significance of stomatal responses to vapor pressure deficit in native Hawaiian wet and dry forest species. Contributed poster. Ecological Society of America Meeting, Albuquerque, NM.
45. Nelson-Kaula KK, Inman-Narahari F, Ostertag O, Giardina G, Cordell S, Sack L. 2009. Digital data collection methods for tree and seedling census data in forest dynamics plots. Contributed poster. Ecological Society of America Meeting, Albuquerque, NM.
44. Orona GM, Ramirez AR, Sack L, Kaneakua IN, Scoffoni C, McKown A, Davis SD. 2009. Water transport properties in leaves of the chaparral shrub, *Heteromeles arbutifolia*, in a post-fire environment. Contributed poster. Ecological Society of America Meeting, Albuquerque, NM.
43. Sack L, Havran JC, Nakahashi CD, McKown A, Ballard HE, Jr. 2009. Structural versus functional leaf trait coordination in the adaptive radiation of Hawaiian violets. Contributed poster. Ecological Society of America Meeting, Albuquerque, NM.
42. Sack L, Havran JC, Nakahashi CD, McKown A, Ballard HE, Jr. 2009. Structural versus functional leaf trait coordination in the adaptive radiation of Hawaiian violets. Contributed poster. American Society of Plant Biologists Meeting, Honolulu, HI.
41. Sack L. 2009. The function and scaling of the leaf venation architecture. Contributed presentation. Leaf Summit Meeting. Smithsonian Institution, Washington, DC.
40. Sporck MJ, Sack L. 2009. The adaptive radiation of leaf venation in Hawaiian *Chamaesyce* (including disjunct veins). Contributed poster. American Society of Plant Biologists Meeting, Honolulu, HI.
39. Sporck MJ, Sack L. 2009. Extraordinary diversification of leaf surface characters in the adaptive radiation of Hawaiian *Chamaesyce*. Contributed poster. Association of Tropical Biology and Conservation Meeting, Marburg, Germany.
38. Waite M, Sack L. 2009. Stoichiometry of mosses across an elevation and temperature gradient on Mauna Loa, Hawaii: Testing predictions from global theory. Contributed poster. American Society of Plant Biologists Meeting, Honolulu, HI.
37. Waite M, Sack L. 2009. Stoichiometry of mosses across an elevation and temperature gradient on Mauna Loa, Hawaii: Testing predictions from global theory. Contributed poster. Ecological Society of America Meeting, Albuquerque, NM.

36. Yang Y, Morden CW, Sack L, Sporck MJ, Berry PE. 2009. Phylogeny and adaptive radiation of woody Hawaiian *Chamaesyce* from herbaceous and annual ancestors in subtropical North America (*Euphorbia*-Euphorbiaceae). Contributed paper. Botanical Society of America Meeting, Snowbird, Utah.
35. Cavaleri MA, Sack L. 2008. Impacts of plant invasions on ecosystem hydrology: a global meta-analysis. Contributed paper. Ecological Society of America Meeting, Milwaukee, WI.
34. Kagawa AK, Sack L, Duarte K, James SA. 2008. Does native forest conserve water? Species composition and stand structure influence water use for a Hawaiian wet forest. Contributed paper. Ecological Society of America Meeting, Milwaukee, WI.
33. McKown AD, Cochard H, Sack L. 2008. Decoding the leaf venation architecture: testing hydraulic design features with a spatially explicit model. Contributed paper. Botanical Society of America Meeting, Vancouver.
32. Nakahashi CD, Sack L. 2008. The determinants and significance of stomatal responses to dry air in Hawaiian wet and dry forest species. Contributed paper. Botanical Society of America Meeting, Vancouver.
31. Ostertag R, Giardina C, Cordell S, Sack L, Ellsworth L, Inman F. 2008. HIPNET: Hawaii's Permanent Plot Network for Research, Monitoring and Education. Contributed poster. Hawaii Conservation Conference, Honolulu.
30. Sack L. 2008. Design, dynamics and evolution of the leaf hydraulic system. Symposium, "Structure and Function of Plant Hydraulic Systems." Invited paper. California State University, Fullerton.
29. Sack L, Scoffoni C, Frole K, McKown AD, Havran CJ, Tran S. 2008. The scaling of leaf venation architecture: General laws, functional implications, and paleo-applications. Contributed paper. Ecological Society of America Meeting, Milwaukee, WI.
28. Sack L, Scoffoni C, Frole K, McKown AD, Havran CJ, Tran S. 2008. The scaling of leaf venation architecture: laws, functional implications and paleo-applications. Contributed paper. Botanical Society of America Meeting, Vancouver.
27. Sporck MJ, Sack L. 2008. Exceptional diversification of leaf surfaces in the Hawaiian *Chamaesyce*. Contributed paper. Botanical Society of America Meeting, Vancouver.
26. Sporck MJ, Sack L. 2008. Hyperstomaty in Hawaiian *Chamaesyce*, a remarkable case of adaptive radiation. Contributed paper. Ecological Society of America Meeting, Milwaukee, WI.
25. Waite M, Sack L. 2008. Do mosses measure up to vascular plants in functional traits? Interlinkages of photosynthetic light responses and structure and function. Contributed paper. Botanical Society of America Meeting, Vancouver.
24. Choat B, Sack L, Holbrook NM. 2007. Diversity of hydraulic traits in nine *Cordia* species

- growing in tropical rainforests with contrasting precipitation. Contributed paper. Ecological Society of America Meeting, San Jose.
23. Kagawa AK, Sack L, Duarte TK, James SA. 2007. Does Hawaiian native forest conserve water? Lower uptake rates at tree and stand scale by *Metrosideros polymorpha* relative to plantation species. Contributed paper. American Geophysical Union Meeting, San Francisco.
 22. Royer DL, Sack L, Wilf P, Lusk C, Jordan GJ, Niinemets U, Wright IJ, Westoby M, Cariglino B, Coley PD, Cutter AD, Johnson KR, Labandeira CC, Moles AT, Palmer MB, Valladares F. 2007. Fossil leaf economics quantified: calibration and Eocene case study. Contributed paper. Botanical Society of America and American Society of Plant Biology Joint Congress, Chicago.
 21. Sack L. 2007. Needs for research on rare Hawaiian plants. Contributed paper. Hawaii Ecosystem Project Symposium, Volcano, Hawaii.
 20. Sack L, Cordell S, Ostertag R, Giardina C, Cole C. 2007. How do Hawaiian native forests function over the long-term? The Hawaii Permanent Plot Network (HIPNET) for monitoring, research and education. Contributed poster. Hawaii Conservation Conference 2007—Conservation Strategies: Matching Science and Management.
 19. Royer DL, Sack L, Wilf P, Lusk C, Jordan GJ, Niinemets U, Wright IJ, Westoby M, Cariglino B, Coley PD, Cutter AD, Johnson KR, Labandeira CC, Moles AT, Palmer MB, Valladares F. 2006. Fossil leaf economics from scaling principles. Contributed paper. Geological Society of America Meeting, Philadelphia.
 18. Sack L. 2006. Ecohydrology: Exploring the relationship between water quantity and vegetation in Hawaiian forested ecosystems. Invited paper and panel discussion. Hawaii Association of Watershed Partnerships Symposium.
 17. Sack L. 2006. Petiole-lamina scaling. Invited paper. Working Groups on Stomata and Leaves, Australian Research Council Research Network for Vegetation Function, Macquarie University, Sydney, Australia.
 16. Sack L. 2006. The coordination of leaf hydraulics, structure and function. Contributed paper. Hawaii Ecosystem Project Symposium, Volcano, Hawaii.
 15. Sack L, Dietrich E, Sanchez D, Streeter C, Holbrook NM. 2005. Palmate versus pinnate leaf venation systems: Do they diverge in function? Contributed paper. Ecological Society of America Meeting, Montreal.
 14. Sack L, Dietrich E, Sanchez D, Streeter C, Holbrook NM. 2005. Palmate versus pinnate leaf venation systems: how do they differ in function? Invited paper. Symposium, "*Land plant architecture: multifunctional design and evolution.*" XVII International Botanical Congress, Vienna.

13. Cornwell W, Bhaskar R, Sack L, Cordell S. 2005. Hydraulic strategies of *Metrosideros polymorpha* at high and low precipitation. Contributed paper. Ecological Society of America Meeting, Montreal.
12. Sack L. 2005. Leaf hydraulics. Invited paper. Working Group on Leaves, Australian Research Council Research Network for Vegetation Function, Macquarie University, Sydney, Australia
11. Sack L, Ostertag B, Cordell S, Montgomery R, Price J. 2005. A comprehensive database of functional traits and distributions of Hawaiian native and alien plants: a tool for research and management. Contributed paper. Hawai'i Ecosystem Project Symposium, Volcano, Hawaii.
10. Sack L. 2004. Leaf laws and outlaws: scaling form and function from lamina to stomata. Invited paper. Symposium, "*Evolutionary Constraints on Life History and Physiological Traits in Tropical Plants.*" Association of Tropical Biology and Conservation, Miami.
9. Sack L. 2004. Leaf laws and outlaws: scaling form and function from lamina to stomata. Contributed paper. Hawai'i Ecosystem Project Symposium, Volcano, Hawaii
8. Orians CM, Smith S, Sack L. 2003. How are leaves plumbed on a branch? A new hydraulic method for measuring branch-level sectoriality. Contributed paper. Ecological Society of America Meeting, Savannah, Georgia.
7. Sack L. 2003. Plant responses to deep shade plus drought. Invited paper. Workshop, "*Plant Responses to Shade and Drought*". University of Madrid.
6. Sack L, Holbrook NM. 2003. The 'hydrology' of tropical tree leaves: can hydraulics explain the diversity of leaf structure and function? Contributed paper. Association of Tropical Biology and Conservation Meeting, Aberdeen, UK.
5. Sack L. 2002. Leaf hydraulics. Invited paper. Workshop, "*Integration of Long-Distance Transport Processes in Plants.*" Harvard Forest, Petersham, MA.
4. Sack L, Holbrook NM. 2002. Leaf 'hydrology': linking hydraulic conductance with structure and function in temperate woody species. Contributed paper. Ecological Society of America Meeting, Tucson, AZ.
3. Sack L, Holbrook NM. 2002. The 'hydrology' of temperate deciduous leaves: linkages between leaf hydraulic conductance and leaf form, structure and function. Invited paper. 13th Annual Harvard Forest Ecology Symposium, Harvard Forest, Petersham, MA.
2. Sack L. 2001. Temperate woody seedling responses to deep shade plus drought: testing for a tolerance trade-off. Contributed paper. Ecological Society of America Meeting, Madison, WI.
1. Sack L. 2000. How does shade plus drought affect seedling growth? Contributed poster. British Ecological Society/Ecological Society of America Meeting, Orlando, FL.

Invited Seminars

Xishuangbanna Tropical Garden, China, March 2009
 University of Nebraska, Lincoln, March 2009
 University of Illinois Urbana-Champaign, January 2009
 University of California, Irvine. April 2008.
 Pepperdine University. March 2008.
 University of Cambridge, UK. February 2008.
 Ohio University, Athens, Ohio. January 2008.
 University of California, Riverside. January 2008.
 University of California, Los Angeles. November 2006
 Botany Department, University of Hawaii. September 2006.
 Research School of Biological Sciences, Australian National University. May 2005.
 University of Hawai'i at Hilo. October 2004.
 University of California, Berkeley. March 2004.
 Water Resources Research Center, University of Hawai'i. December 2003
 Zoology Department, University of Hawai'i. October 2003
 Botany Department, University of Hawai'i., February 2003
 Organization of Tropical Studies Field Course Seminar, Panama. March 2003
 Smithsonian Tropical Research Institute Seminars, Panama. February 2003
 Harvard University Herbarium Seminar, Harvard University, Cambridge, MA. September 2002
 Universidad de Sevilla, Spain. March 2001

University Service

Service at UCLA

- Service to Ecology and Evolutionary Biology Department:
 - Chair of EcoLunch Committee (2008-9), Graduate Admissions and Support Committee (2007-8, 2008-9), DWQE Committee (2008-9), IGERT Committee (2008-9).
- Service to local scientific community:
 - Organizing committee for symposium, "*Structure and Function of Plant Hydraulic Systems.*" California State University, Fullerton, March 2008. (With Jochen Schenk, lead organizer, and Gretchen North).
- Service to University, Campus Level:
 - Representative from Ecology and Evolutionary Biology Department to the UCLA Legislative Assembly (2008-11).
 - Reviewer for Mildred Mathias Grants 2008, 2009.

Service at University of Hawaii

- Service to University, System Level:
 - Co-leader (with Rebecca Ostertag, Susan Cordell and Christian Giardina) of successful "Request For Information" documents, leading to the designation of Core, Observation

- and Experimental components for the National Ecological Observatory Network (NEON), Pacific Domain (2007).
- Member of the team that wrote the successful \$9,000,000 National Science Foundation grant for Research Infrastructure (“EPSCoR IMUA II”; 2006-2009), with Principal Investigator Jim Gaines, co-Principal Investigators Ken Kaneshiro and Don Price, and with five other Area Leaders, to promote productivity and develop research infrastructure at University of Hawaii. Leader of Ecology Area for University of Hawaii at Manoa for administering this grant, with five other Area Leaders and senior mentor Peter Vitousek (Stanford University). Led writing of proposal with over 80 participants from across University of Hawaii campuses, and State and Federal Agencies and other research and land management institutions. With a widely-inclusive and transparent strategic planning process, \$1,500,000 was allocated to research infrastructure projects including over 80 researchers within UH, outside UH in Hawaii, and outside Hawaii.
- Service to University, Campus Level:
 - Member of the UH Manoa Chancellor’s Council on Sustainability (October 2005-); University of Hawai‘i at Manoa Library Committee (2004-2006); University of Hawai‘i’s Task Force on the Lyon Arboretum (2004-2005).
 - Service to Botany Department:
 - Chair of Website Committee (2004-), Chair of Wilder Chair Committee (2004-2006), member of other Botany committees, including Graduate Curriculum Innovation Committee, Undergraduate Curriculum Integration Committee, Graduate Admissions Committee, Search Committee for Anatomy Position, Vehicle Committee, Chair’s Space Advisory Committee, Greenhouse and Courtyard Garden Committee, Search Procedures Committee.
 - Service to Hui Konohiki Program:
 - Member of the five-person team that developed the *Hui Konohiki Program*, including design of mission and the development, and ongoing teaching of four core courses. The *Hui Konohiki Program* at University of Hawai‘i combines faculty from Botany, Biology and Hawaiian Studies, an initiative to bring together Hawaiian knowledge and practices with contemporary scientific tools and methods to provide interdisciplinary training for land and resource management and environmental research careers.
 - Service to Ecology, Evolution and Conservation Biology Program (EECB):
 - Appointed to EECB in Fall 2003. Member of the EECB Program Development Committee (2004), Student Admissions Committee (2005, 2006)
 - Service to Lyon Arboretum:
 - Research affiliate at Lyon Arboretum from 2003 to 2006. Served as campus liaison officer to bridge the Lyon Arboretum with the Hui Konohiki Program, from Fall 2003 to Spring 2005.
 - Service to local community:
 - Advisor/supervisor to three local high school students for their senior science projects, including advising by email as well as supervising lab work and plant growth experiments; Faculty Sponsor of the Hawaii Botanical Society 2004-2006