Adam B. Roddy

CONTACT

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CURRENT APPOINTMENT

2019 Associate Research Scientist, **Forestry & Environmental Studies, Yale University**

EDUCATION

2017-2019 YIBS Postdoctoral Associate, **Yale University**
2015-2017 Donnelley Postdoctoral Fellow, **Yale University**
Advisor: Craig Brodersen, School of Forestry & Environmental Studies, Yale University

2015 Ph.D. Integrative Biology, **The University of California, Berkeley**
Committee: Todd Dawson, David Ackerly, Paul Fine, Dennis Baldocchi

2006 B.A. Biology *with High Honors*, **Swarthmore College**, Minor: Religion

FELLOWSHIPS & AWARDS

2015 Yale Institute for Biospheric Studies, Donnelley Environmental Fellow
2010 U.S. National Science Foundation, Graduate Research Fellowship
2010 U.S. Department of Energy, Office of Science Graduate Fellowship
2009 Amer. Institute of Biological Sciences, Emerging Public Policy Leadership Award
2008 University of California, Berkeley, William V. Power Graduate Award
2006 Swarthmore College, Leo M. Leva Prize in Biology
2006 Swarthmore College, D.W. Brenner Memorial Scholarship 2003-2006
2005 U.S. Department of Energy, Global Change Educ. Prog. 2003-2005

PROFESSIONAL EXPERIENCE

Decentlab GmbH, Consultant in Sensor Development (2013 – 2015)
University of Pennsylvania, Research Assistant to PS Schmidt (2007 – 2008)
Smithsonian Tropical Research Institute, Research Assistant to TA Kursar & PD Coley (2006 – 2007)

LARGE GRANTS

2019 U.S. National Science Foundation: Research Assistantships for High School Students (RAHSS) supplemental award to NSF ROL:FELS:EAGER 1838327 to co-PI Roddy (Yale). **$31,039**

2018 U.S. National Science Foundation: Rules of Life (RoL): Forecasting and Emergence in Living Systems (FELS): **"EAGER: Simple scaling rules that define how genome size constrains metabolism: a test among photosynthetic pathways."** (NSF 1838327) PI Simonin KA (SFSU), co-PIs Roddy AB (Yale), Brodersen CR (Yale), Roy SW and Rohlfs R (SFSU). **$300,000**; Yale subaward: $142,395

2016 Yale Institute for Biospheric Studies (YIBS) Collaborative Grant:**"Program in the Evolution of Floral Form and Function (EF3)."** Co-PIs CR Brodersen (Forestry & Environmental Studies) and M Venkadesan (Engineering & Applied Science); AB Roddy was lead writer and project director. **$286,414**

SMALL GRANTS

2016 Jewett Prize, Arnold Arboretum, Harvard University. **$6650**
2015 UC MEXUS-CONACYT Collaborative Grant (Collaborator). **$25,000**
2014 Wiley Research Grant, Department of Integrative Biology, UC Berkeley. **$1700**
2013 Summer Research Grant, Department of Integrative Biology, UC Berkeley. **$3000**
2012 Summer Research Grant, Department of Integrative Biology, UC Berkeley. **$3000**
2012 Short-term Research Grant, German Academic Exchange Service (DAAD). **€ 5075**
2012 Lawrence R. Heckard Endowment Fund of the Jepson Herbarium. **$862**

2011 Umbson Fellowship, Department of Integrative Biology, UC Berkeley. **$3000**
2011 Lawrence R. Heckard Endowment Fund of the Jepson Herbarium. **$1102**
2010 Short-term Fellowship, Smithsonian Tropical Research Institute. **$2675**
2010 Lewis & Clark Fund, American Philosophical Society. **$3500**
2010 Umbson Research Grant, Department of Integrative Biology, UC Berkeley. **$3000**
2009 Mildred E. Mathias Research Grants, UC Natural Reserve System. **$2400**
2005 William J. Cooper Foundation. Lecture series. **$8500**
2005 William J. Cooper Foundation Serendipity Fund. Lecture/event series. **$750**

Travel Grants

2013 Open Access Ambassador Travel Scholarship, Berlin 11 OA Satellite Conference. **€300**
2013 Conference Travel Grant, UC Berkeley Graduate Division. **$1000**
2012 Student Travel Grant, Society for Experimental Biology. £**175**
2012 Graduate Division Travel Award, UC Berkeley. **$500**

Peer-Reviewed Publications

Google Scholar Profile: https://tinyurl.com/scholar-abroddy
ORCID: 0000-0002-4423-8729
†*equal contribution* **undergraduate student* ˆ*high school student*

22. **Roddy AB**, Théroux-Rancourt G, Abbo T*, Benedetti Jˆ, Brodersen CR, Castro M, Castro S, Gilbride Aˆ, Jensen B*, Jiang G-F, Perkins JA, Perkins SD, Loureiro J, Syed Zˆ, Thompson RA*, Kuebbing SE, Simonin KA. *In press.* The scaling of genome size and cell size limits maximum rates of photosynthesis with implications for ecological strategies. ***International Journal of Plant Sciences***

21. **Roddy AB**. *In press.* Energy balance implications of floral traits involved in pollinator attraction and water balance. ***International Journal of Plant Sciences***. [pre-print doi: 10.1101/539668]

20. North GB, Brinton EK, Browne MG, Gillman MG, Kho T, Wang E, **Roddy AB**, Brodersen CR. 2019. Hydraulic conductance, resistance, and resilience: how leaves of a tropical epiphyte respond to drought. ***American Journal of Botany*** 106:943-957. [doi: 10.1002/ajb2.1323]

19. **Roddy AB**. 2019. Testing the benefits of early vessel evolution. ***Journal of Experimental Botany*** 70:3024-3027. [doi: 10.1093/jxb/erz187]

18. **Roddy AB**, Jiang G-F, Cao K-F, Simonin KA, Brodersen CR. 2019. Hydraulic traits are more diverse in flowers than in leaves. ***New Phytologist*** 223:193-203. [pre-print doi: 10.1101/461244] [doi: 10.1111/nph.15749]

    Commentary: Olson ME and Pittermann J. 2019. Cheap and attractive: water relations and floral adaptation. *New Phytologist* 223:8-10. [doi: 10.1111/nph.15839]

17. **Roddy AB**, van Blerk JJ, Midgley JJ, West AG. 2019. Ramification has little impact on shoot hydraulic efficiency in the sexually dimorphic genus *Leucadendron* (Proteaceae). ***PeerJ*** 7:e6835. [doi: 10.7717/peerj.6835] [pre-print doi: 10.1101/209460]

16. Brodersen CR, **Roddy AB**, Wason JW, McElrone AJ. 2019. Functional status of xylem through time. ***Annual Review of Plant Biology*** 70:407-433. [doi: 10.1146/annurev-arplant-050718-100455]

15. **Roddy AB**, Simonin KA, McCulloh KA, Brodersen CR, Dawson TE. 2018. Water relations of *Calycanthus* flowers: hydraulic conductance, capacitance, and embolism resistance. ***Plant, Cell & Environment*** 41:2250-2262. [doi: 10.1111/pce.13205] [pre-print doi: 10.1101/182915]

Commentary: Gleason SM. 2018. A blooming interest in the hydraulic traits of flowers. *Plant, Cell & Environment* 41:2247-2249. [doi: 10.1111/pce.13345]

14. Earles JM, Théroux-Rancourt G, **Roddy AB**, Gilbert ME, McElrone AJ, Brodersen CR. 2018. Beyond porosity: 3D leaf intercellular airspace traits that impact mesophyll conductance. ***Plant Physiology*** 178:148-162. [doi: 10.1104/pp.18.00550]

13. Simonin KA† and **Roddy AB†**. 2018. Genome downsizing, physiological novelty, and the global dominance of flowering plants. ***PLoS Biology*** 16(1):e2003706. [doi: 10.1371/journal.pbio.2003706] [pre-print doi: 10.1101/174615]

Press coverage: BBC; Quanta Magazine; Huffington Post (France); GenomeWeb; ScienceDaily; Science X; TechTimes; The American Gardener; The Breakfast Show (minute 40) on the Voice of Islam (UK) radio network

12. Kramer DB, Stevens K, Williams NE, Sistla SA, **Roddy AB**, Urquhart GR. 2017. Coastal livelihood transitions under globalization with implications for trans-ecosystem interactions. ***PLoS One*** 12(10):e0186683.

11. **Roddy AB**, Brodersen CR, Dawson TE. 2016. Hydraulic conductance and the maintenance of water balance in flowers. ***Plant, Cell & Environment*** 39:2123-2132. [doi: 10.1111/pce.12761] [pre-print doi: 10.1101/030122]

10. Sistla SA, **Roddy AB**, Williams NE, Kramer DB, Stevens KJS, Allison SD. 2016. Agroforestry practices promote biodiversity and ecosystem services in Atlantic Nicaragua. ***PLoS One*** 11(9):e0162529. [doi: 10.1371/journal.pone.0162529]

9. Brodersen CR and **Roddy AB**. 2016. New frontiers in the three-dimensional visualization of plant structure and function. ***American Journal of Botany*** 103:184-188.

8. Crutsinger GM, Rodriguez-Cabal MA, **Roddy AB**, Peay KG, Bastow JL, Kidder AG, Dawson TE, Fine PVA, Rudgers JA. 2014. Genetic variation within a dominant shrub structures green and brown community assemblages. ***Ecology*** 95:387-398.

7. Simonin KA†, **Roddy AB†**, Link P, Apodaca R, Tu KP, Hu J, Dawson TE, Barbour MM. 2013. Isotopic composition of transpiration and rates of change in leaf water isotopologue storage in response to environmental variables. ***Plant, Cell & Environment*** 36:2190-2206.

6. **Roddy AB**, Guilliams CM, Lilittham T*, Farmer J*, Wormser V*, Pham T*, Fine PVA, Feild TS, Dawson TE. 2013. Uncorrelated evolution of leaf and petal venation patterns across the angiosperm phylogeny. ***Journal of Experimental Botany*** 64:4081-4088.

5. **Roddy AB** & Dawson TE. 2013. Novel patterns of hysteresis in the response of leaf-level sap flow to vapor pressure deficit. ***Acta Horticulturae*** 991:261-267.

4. Brenes-Arguedas T, **Roddy AB**, Kursar TA. 2013. Plant traits in relation to the performance and distribution of woody species in wet and dry tropical forests. ***Functional Ecology*** 27:392-402.

3. **Roddy AB** & Dawson TE. 2012. Determining the water dynamics of flowering using miniature sap flow sensors. ***Acta Horticulturae*** 951:47-54.

2. Brenes-Arguedas T, **Roddy AB**, Coley PD, Kursar TA. 2011. Do differences in understory light contribute to species distributions along a tropical rainfall gradient? ***Oecologia***

166:443-456.

1. West TO, Marland G, Singh N, Bhaduri BL, **Roddy AB**. 2009. The human carbon budget: an estimate of the spatial distribution of metabolic carbon consumption and release in the United States. ***Biogeochemistry*** 94:29-41.

Manuscripts in Progress

In Revision

In revision. **Roddy AB**†, Teixido A†, Cornellissen T†, Oliveira RS†, Silveira FAO†. Towards the flower economics spectrum.

In Review

In review. Jiang G-F, Brodribb TJ, **Roddy AB**, Lei J-Y, Si H-T, Cao K-F. Co-occurring mangrove species have divergent stomatal and hydraulic strategies associated with their salt management strategies. *Functional Ecology*

In review. Kattge J, Bönisch, Diaz S, Lavorel S, et al. Twelve years of TRY – towards a third generation of plant trait data assimilation and sharing. *Global Change Biology*

In Preparation

In prep. Théroux-Rancourt G†, **Roddy AB†**, Earles JM, Simonin KA, Gilbert ME, Zwieniecki MA, Boyce CK, McElrone AJ, Brodersen CR. Genome size evolution coordinates leaf anatomy that optimizes photosynthesis.

In prep. **Roddy AB†**, Jiang G-F†, Brodersen CR, Cao K-F. Weak evidence for vulnerability segmentation of leaves and flowers in three subtropical woody species.

In prep. **Roddy AB** and Brodersen CR. Water potential gradients and rehydration reveal the prevalence of xylem-hydration of flowers. [pre-print doi: 10.1101/255042]

In prep. Williams NE, Sistla SA, **Roddy AB**, Steven KJS, Kramer DB. Resource users as land-sea links in coastal and marine socio-ecological systems.

Teaching Experience

Tutor/Instructor

Yale University, PHYS 991: Integrated Workshop (2018, 2019: guest instructor for module on plant biomechanics)

Yale University, Pathways to Science: Plant Form & Evolution (2019: high school summer course)

San Quentin State Prison, Members of Modern American Society: coordinated course and lectured about financial planning (2010-11)

San Quentin State Prison, Prison University Project: tutor and coordinator for a self-paced introductory college math course, developed and implemented a system for tracking student progress (2009-2010)

ACHIEVEability, Mathematics tutor for single mothers working on their Associate's degree (2010-11)

Teaching Assistant

UC Berkeley, IB 400: Stable Isotope Methods and Mass Spectrometry (2014)

UC Berkeley, ESPM 220: Stable Isotope Ecology (2014)

UC Berkeley, Biology 1B: General Biology (2008-2010, 3x)

UC Berkeley, IB 153: Population & Community Ecology (2009)

Guest Lectures

Yale University Plant Ecophysiology (2017)

Yale University Trees: Environmental Biology (2015, 2016, 2018)

Hampshire College Global Change Ecology freshman tutorial (2017)

UC Berkeley Environmental Leadership Pathway (2010, 2011)
Santa Clara University California Plant Diversity (2010)
UC Berkeley Panel on applying to graduate school (2010)
Bindlestiff Books Panel on "Science vs. Intelligent Design" (2006)

Students Advised

High School

Zuhah Syed (High School in the Community) 2019
*Austin Gilbride (Amity High School) 2018, 2019
*Joseph Benedetti (Amity High School) 2018, 2019
*State winners (Connecticut) of the 2018 Google Science Fair

Undergraduate

Chainey Boroski (Yale College, thesis) 2017-; currently preparing her thesis for publication
Terapan Lilittham (UC Berkeley) 2011-2013
*Jessica Farmer (UC Berkeley) 2011-2013
*2nd place winner of 2012 California Native Plant Society student poster competition
Vanessa Wormser (UC Berkeley) 2012-2013
Fatemeh Adlparvar (UC Berkeley) 2011-2012
Ray Donheiser (Laney College) 2011
Trang Pham (Berkeley City College) 2010

Workshops & Working Groups

2017 Oak Spring Garden Foundation (Upperville, VA), "Evolution of Flower Form and Function." 22-24 September. Organizer.

2014-7 Synthesis Centre for Biodiversity Sciences (sDiv, Leipzig, Germany) and National Socio-Environmental Synthesis Center (SESYNC, Annapolis, MD), "Playing dominoes with tipping points? Exploring linkages between anthropogenically-driven shifts in marine and terrestrial biodiversity and ESS in a rapidly globalizing coastal region within a biodiversity hotspot."

2017 Arnold Arboretum (Harvard University, Boston, MA), "The developmental basis of evolutionary innovation." 3-5 March.

Invited Talks

2019 Department of Botany, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil
2018 Department of Ecology and Evolutionary Biology, University of California, Los Angeles, CA, USA
2018 Department of Biology, California State University, Dominguez Hills, Carson, CA, USA
2017 Department of Molecular, Cellular, and Developmental Biology, Yale University, New Haven, CT
2016 Arnold Arboretum, Harvard University, Cambridge, MA
2016 Yale Institute for Biospheric Studies, New Haven, CT
2016 Department of Integrative Biology, University of California, Berkeley
2014 Jepson Herbarium, University of California, Berkeley
2012 Center for Tropical Paleoecology and Archaeology, STRI
2012 Department of Biology, Sonoma State University
2011 Barro Colorado Island, Smithsonian Tropical Research Institute
2006 Barro Colorado Island, Smithsonian Tropical Research Institute

Conference Presentations

2019 Lambert MR, **Roddy AB**, Gosser C, Mettler C, Robinson W, Carlson B. Reptile sex ratios in museum collections are associated with climate change and phylogeny. Joint Meeting of Ichthyologists and Herpetologists 2019, Snowbird, Utah, USA, 24-28 July. (oral)

2018 **Roddy AB** Physiological and biomechanical constraints in floral evolution. Evolution 2018: II Joint Congress on Evolutionary Biology, Montpellier, France, 19-22 August. (oral)

2018 Roddy AB, O'Hern C, Venkadesan M, Brodersen CR. Coordinated evolution of hydraulic and biomechanical traits allows for cheaper flowers. 9th International Plant Biomechanics Conference, Montreal, Canada, 9-14 August. (poster/flashtalk)

2018 Roddy AB, Simonin KA, Théroux-Rancourt G, Earles JM, Brodersen CR. Genome size evolution coordinates leaf cell sizes, optimizes photosynthesis, and facilitated the global dominance of the flowering plants. Gordon Research Conference on Unifying Ecology Across Scales, Biddeford, Maine, 22-27 July. (poster)

2017 Roddy AB,Dawson TE, Brodersen CR. Hydraulic tradeoffs in the diversification of angiosperm flowers. 3rd Xylem International Meeting, Bordeaux, France, 27-29 September. (oral)

2017 Jensen B*, Abbo T*, **Roddy AB**, Simonin KA. Impacts of polyploidy in Vireya *Rhododendron* on physiology and biogeography. Ecological Society of America, Portland, USA, 6-11 August. (poster)

2017 North G, Brinton E, Browne M, Gillman M, Kho T, Wang E, **Roddy A**, Brodersen C. Leaf hydraulic conductance, resistance, and resilience for a tank bromeliad during drying and rewetting. Ecological Society of America, Portland, USA, 6-11 August. (poster)

2017 Roddy AB, Guilliams CM, Dawson TE, Brodersen CR. The macroevolution of floral hydraulic traits and strategies for maintaining turgor. XIX International Botanical Congress, Shenzhen, China, 23-29 July. (oral)

2017 Roddy AB and Brodersen CR. Hydraulic tradeoffs in the evolution and diversification of angiosperm flowers. Stomata: Evolution, Development, and Evolution, 12th Annual Plant Biology Symposium, Arnold Arboretum of Harvard University, 9 May 2017. (poster)

2016 Simonin KA and **Roddy AB**. Cell size, genome size, and the dominance of angiosperms. American Geophysical Union, San Francisco, USA, 12-16 December. (poster)

2016 Willing CE, **Roddy AB**, Glassman SI, Dawson TE. Do shifts in ectomycorrhizal fungal communities change the sources of N and S for Bishop pine trees? American Geophysical Union, San Francisco, USA, 12-16 December. (poster)

2016 Roddy AB. A physiological approach to the ecology and evolution of flowers. Botanical Society of America, Savannah, GA, USA, 30 July-3 August. (invited oral)

2016 Riley M, **Roddy AB**, Brodersen CR, Johnson DM. A comparison of vascular development and desiccation in stems of very young *Pseudotsuga menziesii* and *Pinus ponderosa*. Ecological Society of America Annual Meeting, Fort Lauderdale, USA, 7-12 August. (poster)

2016 Roddy AB, Dawson TE, Brodersen CR. Hydraulic tradeoffs in the evolution and diversification of angiosperm flowers. Gordon Research Conference on Multiscale Plant Vascular Biology, Newry, ME, USA, 26 June-1 July. (poster)

2015 Roddy AB, Guilliams CM, Brodersen CR, Dawson TE. The maintenance of water balance in flowers: physiological mechanisms and ecological implications. Ecological Society of America Annual Meeting, Baltimore, USA, 9-14 August. (oral)

2014 Roddy AB, Guilliams CM, Fine PVA, Dawson TE. Physiological novelty in the evolution of flowers. Ecological Society of America Annual Meeting, Sacramento, USA, 10-15 August. (oral)

2014 Gessler A, **Roddy A**, Volkmann T, Weiler M, Haberer K. Stable isotopes in leaf water and transpiration - tools to assess leaf physiology and water uptake. European Geosciences Union, Vienna, Austria, 27 April-2 May. (invited oral)

2013 Roddy AB, Koettig C*, Simonin KA, Kayler Z, Dawson TE, Gessler A, Grams TEE. Canopy position influences the deviation of plant-transpired water vapor from isotopic steady state. Ecological Society of Germany, Austria, and Switzerland (GfÖ), Potsdam, Germany, 9-13 September. (oral)

2013 Roddy AB, Skelton R, Johnson DM, West AG, Dawson TE. Sap flow hysteresis: linking environmental drivers and plant hydraulics. 9th International Workshop on Sap Flow, Ghent, Belgium, 4-7 June. (oral)

2013 Farmer J*, Lilittham T*, Wormser V*, **Roddy AB**, Guilliams M, Dawson TE. Independent evolution of vein density in flowers and leaves: support for developmental and

physiological modularity of vegetative and reproductive functions. Northern California Botanists Symposium, Chico, CA, 14-15 January. (poster)

2012 Simonin KA, **Roddy AB**, Link P, Apodaca RL, Tu KP, Hiu J, Dawson TE, Barbour M. The stable isotope composition of transpired water and the rate of change in leaf water enrichment in response to variable environments. AGU Fall Meeting, San Francisco, Abstract B33A-0507. (poster)

2012 Simonin KA, Hu J, **Roddy A**, Barbour MM. A novel stable isotope technique for evaluating the hydraulic architecture of leaves. ComBio2012, Adelaide, Australia, 23-27 September. (poster)

2012 Adlparvar F*, Shuldman MI, **Roddy AB**, Dawson TE. Physiological responses of *Heteromeles arbutifolia* seedings, a California native perennial shrub, during artificial heatwaves. Ecological Society of America, Portland, Oregon, USA, 5-10 August. (poster)

2012 Roddy AB, Guilliams M, Lilittham T*, Farmer J*, Wormser V*, Pham T*, Dawson TE. The evolution of hydraulic traits in flowers and leaves across the angiosperm tree of life. Society of Experimental Biology, Salzburg, Austria, 29 June-2 July. (oral)

2012 Farmer J*, Lilittham T*, **Roddy AB**, Guilliams M, Dawson TE. Is floral water balance an important driver of angiosperm ecology and evolution? California Native Plant Society, San Diego, CA, 10-14 January. (poster; 2nd place in student competition)

2011 Shuldman MI, Simonin K, **Roddy A**, Dawson TE. Taking the heat: seasonal responses of *Heteromeles arbutifolia* to extreme heat events. MEDECOS XII, Los Angeles, CA, 6-9 September. (poster)

2011 Roddy AB & Dawson TE. Determining the water dynamics of flowering using miniature sap flow sensors. 8th International Workshop on Sap Flow, Volterra, Italy, 7-12 May. (oral)

2009 Kursar TA, Brenes T, **Roddy AB**, Coley PD. Do differences in understory light contribute to tree species turnover along a tropical rainfall gradient? Ecological Society of America. (oral)

2009 Roddy AB, Comita LS, Condit R, Kursar TA. Seedling hydraulic traits are linked to species distributions along a tropical rainfall gradient and to carbon gain. Ecological Society of America. (poster)

2007 West TO, Singh N, Marland G, Bhaduri BL, **Roddy AB**. The human carbon budget: the spatial distribution of carbon consumption and release in the U.S. *U.S. North American Carbon Program and Joint Canada-Mexico-USA Carbon Program Meeting.* Colorado Springs, CO. Abstract I-27. (oral)

2005 Sabesan A, West TO, **Roddy AB**, Marland G, Bhaduri BL. Lateral flow of carbon from U.S. agricultural lands: carbon uptake, consumption, and respiration. *Eos Trans. AGU, 86(52)*, Fall Meet. Suppl., Abstract B44B-03. (oral)

Outreach & Service

Graduate Women in Science National Fellowship Program Reviewer (2018)
Roddy AB. Taking Aim at Recidivism. *San Quentin News.* Vol. 2010. No.7.
Class Agent, Swarthmore College Record-breaking success in fundraising (2006-2018)
Smithsonian Tropical Research Institute, Naturalist and Tour Guide (2006-2007)
Scientists & Citizens, Lecture series organizer (2005-2006)
Earthlust, Swarthmore College, Liaison to renewable energy suppliers (2005-2006)
Ad Hoc Reviewer: *Ecology Letters*; *New Phytologist*; *Proceedings of the Royal Society of London-Series B*; *Journal of Experimental Botany*; *Plant, Cell & Environment*; *American Journal of Botany*; *Functional Plant Biology*; *Oecologia*; *Tree Physiology*; *PLoS ONE*; *Perspectives in Plant Ecology, Evolution and Systematics*; *Plant & Soil*; *AOB Plants*; *Forest Science*; *Peerage of Science*; *Trees: Structure and Function*; *Planta*; *Plant Science*