

Helen I. Holmlund, PhD
Assistant Professor of Biology
Pepperdine University, Natural Science Division
24255 Pacific Coast Highway, Malibu, CA 90263

helen.holmlund@pepperdine.edu
helenholmlund.com

Plant physiological ecologist committed to undergraduate education and scholarship, with a special emphasis on undergraduate research in biology. My published works highlight the diversity of strategies that ferns use to thrive with limited fresh water.

EDUCATION

- 2020 **University of California, Santa Cruz:** PhD in Plant Physiological Ecology
 Advisor: Dr. Jarmila Pittermann
 Thesis: Ferns living on the edge: Ecophysiology of ferns under severe water deficit
- 2015 **Oklahoma Christian University:** Bachelor of Science in Biology, Honors Fellow

PROFESSIONAL APPOINTMENTS

- 2020 – **Pepperdine University.** Assistant Professor of Biology.
- 2018 – 2019 **Australian National University.** Visiting PhD student, Research School of Biology
 Advisor: Prof. Marilyn Ball
 Project: How does salinity affect the water relations of the mangrove fern?
- 2016 – 2020 **University of California, Santa Cruz.** National Science Foundation Graduate Research Fellow
 Advisor: Dr. Jarmila Pittermann
 Thesis: Ferns living on the edge: Ecophysiology of ferns under severe water deficit

PUBLICATIONS

**undergraduate student*

PEER-REVIEWED

- 2020 **Holmlund HI**, SD Davis, FW Ewers, NM Aguirre, G Sapes, A Sala, J Pittermann. Positive root pressure is critical for whole-plant desiccation recovery in two species of terrestrial resurrection ferns. *Journal of Experimental Botany* 71(3): 1139-1150.
- 2019 **Holmlund HI**, RB Pratt, AL Jacobsen, SD Davis, J Pittermann. High-resolution computed tomography reveals dynamics of desiccation and rehydration in fern petioles of a desiccation-tolerant fern. *New Phytologist* 224(1): 97-105. *Featured on the cover.*
- 2018 *Aguirre NM, *GN Palmeri, *ME Ochoa, **HI Holmlund**, *SR Reese, *ER Pierce, *KE Sauer, SD Davis, RL Honeycutt, CL Blomquist, GC Adams. First report of stem canker and subsequent plant death caused by *Botryosphaeria dothidea* on *Malosma laurina* in southern California. *Plant Disease* 102(7).
- 2016 ***Holmlund HI**, *VM Lekson, *BM Gillespie, *NA Nakamatsu, *AM Burns, *KE Sauer, J Pittermann, SD Davis. Seasonal changes in tissue water relations for eight species of ferns during historic drought in California. *American Journal of Botany* 103(9): 1607-1617.

BOOK REVIEWS

- 2017 Pearse D, **H Holmlund**, J Herman, S Grove, J Winnikoff, K Tanner, S Sianta, N Macias, A Vershinina. Book review of *Invasion Genetics: The Baker and Stebbins Legacy*. *The Quarterly Review of Biology* 92: 334.

GRANTS AND FELLOWSHIPS

2020	NSF Postdoctoral Research Fellowship in Biology – <i>declined in favor of faculty position</i>	\$138,000
2019	UCSC EEB Departmental Summer Research Grant	\$1,500
2019	Botanical Society of America Pteridological Section Student Travel Award	\$150
2018	NSF Graduate Research Opportunities Worldwide: Australia	\$5,000
2018	UCSC Graduate Student Association Travel Award	\$400
2018	UCSC EEB Departmental Summer Research Grant	\$858
2017	Southern California Research Learning Center, grant to Stephen D. Davis “Comparative Foliar Water Uptake between Ferns on Santa Cruz Island and the Santa Monica Mountains: A Common Garden Experiment.” I am a co-author.	\$9,197
2017	Langenheim Fellowship	\$1,500
2017	UCSC EEB Departmental Summer Research Grant	\$1,500
2017	UCSC Graduate Student Association Travel Award	\$500
2016	NSF Graduate Research Fellowship	\$138,000
2016	National Defense Science & Engineering Graduate Fellowship – <i>declined to accept NSF GRF</i>	\$146,400
2016	University of California, Santa Cruz: Chancellor’s Fellowship	\$24,000
2015	ESA Physiological Ecology Section: Student Travel Award	\$500
2015	Southern California Research Learning Center, grant to Stephen D. Davis “Foliar Water Uptake by Ferns in Island versus Mainland Ecosystems.” I am a co-author.	\$4,500

AWARDS AND HONORS

2019	Botanical Society of America – Physiology and Ecophysiology Sections Best Student Oral Presentation in the Physiology or Ecophysiology Sections
2017	UCSC Graduate Research Symposium Best Presentation in Division of Physical and Biological Sciences
2015	ESA Dwight Billings Award for Physiological Ecology Awarded to best student oral presentation in physiological ecology section
2015	Oklahoma Christian University Department of Biology: Dean’s Award
2015	First Place: Oklahoma Christian University Student Colloquium Awarded to the best student research paper in university-wide contest
2015	Fulbright Finalist, U.S. Student Program to Australia
2014	Oklahoma Academy of Science 103 rd Annual Technical Meeting, Botany Section Oral Presentation Section Winner
2014	Paul Buck Award – awarded to best student oral presentation in OAS Botany Section
2014	Oklahoma Christian University Dept of Biology: Outstanding Junior of the Year Award
2013	Oklahoma Christian University Dept of Biology: Outstanding Sophomore of the Year Award
2012	Oklahoma Christian University Dept of Biology: Outstanding Freshman of the Year Award
2011	National Merit Finalist

INVITED PRESENTATIONS

**targets non-academic audience*

2018*	"Niche segregation in water utilization as a mechanism of fern survival in chaparral shrub understories during extreme drought." Oral Presentation, California Native Plant Society Conservation Conference. Los Angeles, CA: February 2018.
2015*	“Ferns exhibit differential water utilization traits in the Santa Monica Mountains.” Oral Presentation, Santa Monica Mountains Science Day (NPS), Thousand Oaks, CA: October 2015.
2015	"Ferns living on the edge: Differential traits for survival during California's historic drought." Oral Presentation, Ecological Society of America 100th Annual Meeting, Baltimore, MD: August 2015.

- 2014 “Dehydration tolerance of California ferns in relation to stem hydraulics and mechanical strength.” Poster Presentation, Council on Undergraduate Research’s REU Symposium, Arlington, VA: October 2014.

CONTRIBUTED PRESENTATIONS

**targets non-academic audience*

CONFERENCE ORAL PRESENTATIONS

- 2019 “High-resolution computed tomography reveals dynamics of desiccation and rehydration in a desiccation-tolerant fern.” Oral Presentation, Botanical Society of America 113th Annual Meeting, Tucson, AZ: July 2019.
- 2018 “Positive root pressure drives desiccation recovery in two desiccation-tolerant California chaparral ferns.” Oral Presentation, Ecological Society of America 103rd Annual Meeting, New Orleans, LA: August 2018.
- 2018 “Positive root pressure drives desiccation recovery in two desiccation-tolerant California chaparral ferns.” Oral Presentation, Gordon Research Seminar: Multiscale Plant Vascular Biology, Mount Snow, VT: June 2018.
- 2015 “Contrasting water utilization patterns in ferns during California’s historic drought.” Oral Presentation, Southern California Conference on Undergraduate Research, Claremont, CA: November 2015.
- 2014 “Dehydration tolerance of California ferns in relation to stem hydraulics and mechanical strength.” Oral Presentation, Oklahoma Academy of Science 103rd Annual Technical Meeting, Broken Arrow, OK: November 2014.
- 2013 “Variation of mechanical strength of ferns in the Santa Monica and Santa Cruz Mountains.” Oral Presentation, Oklahoma Academy of Science 102nd Annual Technical Meeting, Lawton, OK: November 2013.

CONFERENCE POSTER PRESENTATIONS

- 2018 “Positive root pressure drives desiccation recovery in two desiccation-tolerant California chaparral ferns.” Poster Presentation, Gordon Research Seminar: Multiscale Plant Vascular Biology, Mount Snow, VT: June 2018.
- 2017 “Resistance to xylem cavitation in evergreen ferns correlates with seasonal dehydration levels, not mechanical strength.” Poster Presentation, Ecological Society of America 102nd Annual Meeting, Portland, OR: August 2017.
- 2016 “Foliar water uptake in ferns on Santa Cruz Islands versus the Santa Monica Mountains.” Poster Presentation, 9th California Islands Symposium, Ventura, CA: October 2016.
- 2016 “Differential response of eight fern species to severe drought in California.” Poster Presentation, Botanical Society of America 110th Annual Meeting, Savannah, GA: August 2016.
- 2014 “Relationship between dehydration tolerance of California ferns and the mechanical strength of their stipes.” Poster Presentation, Ecological Society of America 99th Annual Meeting, Sacramento, CA: August 2014.

INSTITUTIONAL TALKS

- 2018 “Positive root pressure drives desiccation recovery in two resurrection ferns.” Seminar Presentation, Pepperdine University Natural Science Seminar Series, Malibu, CA: October 2018.
- 2017 “Ferns living on the edge of survival.” Seminar Presentation, Pepperdine University Natural Science Seminar Series, Malibu, CA: October 2017.
- 2017 “Ferns living on the edge: Differential traits for survival during California's historic drought.” Oral Presentation, UCSC Graduate Research Symposium, Santa Cruz, CA: May 2017.
- 2015 “Fern survival during unprecedented drought in California.” Seminar Presentation, Pepperdine University Natural Science Seminar Series, Malibu, CA: October 2015.

PUBLIC TALKS

- 2019* “Return of the dead: How resurrection plants come back to life.” Oral Presentation, Science on Tap (monthly event hosted by UCSC Women In Science and Engineering). Santa Cruz, CA: November 2019.
- 2018* Davis SD, HI Holmlund. “Ferns living on the edge of survival in the Santa Monica Mountains.” Joint Oral Presentation, Public Meeting of the Channel Islands Chapter of the California Native Plant Society. Ventura, CA: August 2018.
- 2018* "Water use strategies in ferns." Oral Presentation, UCSC Grad Slam. (This is a 3-minute thesis competition. I was selected as one of 12 finalists for the UCSC competition.) Santa Cruz, CA: February 2018.

TEACHING AND MENTORING

RESEARCH MENTORSHIP

**research presented at national conferences, †research published*

- 2018 *Sam Fiallo – photosynthetic recovery of resurrection ferns
- 2018 Luis Ballasteros – photosynthesis in seven species of island versus mainland ferns
- 2018 *Brandon Grinovich – seasonal change in photosynthetic response of drought-tolerant ferns
- 2017 Guinevere Mesh – recovery of chaparral shrubs following a fungal infection
- 2017 *Cristian Garcia – limits of dehydration tolerance in fungus *Botryosphaeria dothidea*
- 2016 *†Natalie Aguirre – mechanism of mortality of chaparral shrubs infected by fungus
- 2016 *Marissa Ochoa – greenhouse study to confirm mechanism of fungus-induced shrub mortality
- 2016 *Katie Sauer – photosynthesis and xylem anatomical traits in eight fern species
- 2015 *Gabriella Palmeri – mechanism of mortality of chaparral shrubs infected by fungus
- 2015 Shaquetta Reese – photosynthesis of chaparral shrubs suffering fungal infection
- 2014 *Victoria Lekson – foliar water uptake in eight fern species
- 2014 *Amanda Burns – chaparral shrub seedling early germination and mortality following canopy dieback

TEACHING EMPLOYMENT

- 2019 – 2020 Teaching Assistant, University of California, Santa Cruz
Plant Physiology (fall 2019)
Development and Physiology, active learning section (winter 2020)
- 2013 – 2015 Tutor for the Athletic Department, Oklahoma Christian University
General Biology, General Chemistry, Organic Chemistry, Biochemistry, Physics, and Algebra
- 2012 – 2015 Teaching Assistant, Department of Chemistry and Physics, Oklahoma Christian University
General Chemistry I and II, Organic Chemistry I and II

GUEST INSTRUCTOR

- 2019 UC Santa Cruz (Santa Cruz, CA): Guest lecturer in Dr. Pittermann’s plant physiology class
Lectures: Aquatic Plants; Soil, Nutrients, & Mycorrhizae
- 2017 Pepperdine University (Malibu, CA): Guest lab instructor in Dr. Davis’ ecophysiology class
Topic: Analyzing A-Ci curves using the “plantecophys” R package
- 2017 UC Santa Cruz (Santa Cruz, CA): Guest panelist in Dr. Dunkin’s development/physiology class
Topic: The role of failure in science; also gave feedback on student posters
- 2016 Pepperdine University (Malibu, CA): Guest lab instructor in Prof. Holden’s physics class
Topic: Physical principles behind measuring and calculating stem hydraulic conductivity
- 2015 Pepperdine University (Malibu, CA): Guest instructor in Dr. Davis’ plant ecophysiology class
Topic: C₄ and CAM photosynthesis
- 2014 Sanger High School (Sanger, TX): Guest speaker in Mr. Hahn’s biology class
Topic: Scientific research, study skills in college

OTHER PREPARATION

- 2019 Attended the National Science Teaching Association Conference in Seattle, WA on Dec. 12-14, 2019
- 2019 Completed a class on pedagogy offered by UCSC's EEB department: "Teaching to Reduce Equity Gaps in Higher Education"

PUBLIC SERVICE AND OUTREACH

SERVICE TO PROFESSION

- 2019 PLANTS mentor at annual Botany meeting (NSF-funded program to aid first-time attendees)
- 2017 – present Ad-hoc reviewer for *New Phytologist*, *American Journal of Botany*, *Annals of Botany*, *American Fern Journal*, *Environmental and Experimental Botany*

SERVICE TO DEPARTMENT

- 2019 Mentor for three EEB graduate students (first-year mentoring program)
- 2017 March for Science, Santa Cruz: Co-organized UCSC EEB marching group, designed posters

SERVICE TO COMMUNITY

- 2019 Hosted two field trips and two biology classes for homeschool families
- 2019 Interviewed for Santa Cruz Naturalist (local radio show); talked about native ferns on air
- 2019 Taught Girl Scouts in Santa Cruz about plants for their "Power of Flowers" badge
- 2018 Interviewed for an article in the UCSC Arboretum fall newsletter by Jen Quick-Cleveland: "The Importance of a Demonstration: Climate Change & the Future Gardens"
- 2017 Judge, Santa Cruz County Science Fair
- Volunteered as judge for elementary/middle school science projects, discussed science careers
- 2015, 2017 Volunteered for Pepperdine University's annual "Step Forward Day"
- 2015 – 2016 Volunteered for the University Church's "SOS" project: meals for the homeless in Malibu
- 2013 – 2014 Social Service Co-Director, Lambda Chi Zeta (social service club)
- Organized and participated in various community service activities, including trash cleanup, Habitat for Humanity, and visiting nursing homes
- 2012 – 2013 Fundacion Manos Juntas (free medical clinic): Volunteer in triage and pharmacy

SPECIALIZED TRAINING

- 2019 Introduction to Light Microscopy (Microscopy Australia): Canberra, ACT, Australia
Trained in theory and practice of light microscopy
- 2018 LI-COR LEEF Training: Lincoln, NE, USA
Trained in the use of LI6800 and LI6400 gas exchange systems, developed laboratory lesson
- 2017 Plant Hydraulics Workshop: McCall, ID, USA
NSF-funded methods workshop in plant-water relations
- 2017 Tropical Ferns and Lycophytes: Costa Rica (Organization for Tropical Studies)
Field course on fern taxonomy and physiology in three sites in Costa Rica

EMPLOYMENT

- 2015 – 2016 Administrative Clerk, Pepperdine University Natural Science Division
I co-organized the 5-year departmental review and assisted students, faculty, and other administrative staff.
- 2012 – 2015 Teaching Assistant, Chemistry Department at Oklahoma Christian University
I prepared chemical solutions for lab sessions, graded lab reports, and assisted students.
- 2013 – 2015 Academic Tutor, Athletic Department at Oklahoma Christian University
I tutored student athletes in the subjects of biology, chemistry, physics, and math.
- 2006 – 2011 Veterinary Technician Assistant, Half Moon Bay Veterinary Hospital

SOCIETY MEMBERSHIPS

2014 – Ecological Society of America
2016 – Botanical Society of America
2016 – American Fern Society
2017 – California Native Plant Society
2019 – American Society of Plant Biology
2019 – National Science Teaching Association

LANGUAGES

English – native speaker

Spanish – proficient in conversation and reading academic literature with a dictionary

R – proficient in basic analysis and graphing