

CHRISTOPHER P. KRIEG, Ph.D.

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**How does physiological function drive patterns of spatial biodiversity?
 What are the evo-eco mechanisms that generate physiological diversity?**

I. EDUCATION

- 2019 Ph.D., Botany, **University of Florida**, Gainesville FL; Chair: Dr. Emily Sessa
Committee: Pam Soltis, Rob Guralnick, Karen Koch, Kate McCulloh
 2014 B.A., Biology, **Colgate University**, Hamilton NY; Chair: Dr. J. 'Eddie' Watkins Jr.

II. PROFESSIONAL APPOINTMENTS

- 2023– Scientist II, **University of Wisconsin**, Madison, WI
 2020–2022 NSF Postdoctoral Research Fellow, **University of Wisconsin**, Madison, WI
 2015–2019 NSF Graduate Research Fellow, **University of Florida**, Gainesville, FL
 2015 Research Technician, **University of California**, Davis, CA
 2014 Research Technician, **Florida International University**, Miami, FL
 2014 Summer Research Fellow, **Colgate University**, Hamilton, NY

III. PUBLICATIONS (*corresp., †equal cont., mentees: ^Hhigh school, ^Uundergraduate, ^Ggraduate)**PEER-REVIEWED PAPERS**

13. **Krieg C***, L. Nikravesh N^G, Smith D, Adams M, Berger J, Dacosta E, von Wettberg E. (2024) Greater ecophysiological stress tolerance in the core environment than in extreme environments of wild chickpea (*Cicer reticulatum*). [Scientific Reports](#). 14:5744.
12. Karimi N*, **Krieg C**, Spalink D, Eifler E, Hernandez A, Landis J, Rodríguez Contreras A, Lemmon E, Lemmon A, Specht C, Givnish T*. (2024) Chromosomal evolution, environmental heterogeneity, and migration drive spatial patterns of species richness in *Calochortus* (Liliaceae). [Proceedings of the National Academy of Sciences](#), 121:10.
11. Smith D*, Adams M, Salvi A, **Krieg C**, Ané C, McCulloh K, Givnish T. (2023) Ecophysiological adaptations shape distributions of closely related trees along a climatic moisture gradient. [Nature Communications](#), 14:7173.
10. **Krieg C***, Gosetti S^U, Watkins J, Griffith P, McCulloh K. (2023) Reproductive phases coincide with changes in photosynthetic physiology in an endangered cycad species. [Conservation Physiology](#), 11:1.
9. **Krieg C***, Seeger K^U, Company C, Watkins J, McClearn D, McCulloh K, Sessa E. (2023) Functional traits and trait co-ordination change over the life of a leaf in a tropical fern species. [American Journal of Botany](#), 110:4.
8. McCulloh K*, Augustine S[†], Goke A[†], Jordan R[†], **Krieg C[†]**, O'Keefe K[†], Smith D[†]. (2022) At least it's a dry cold: the global distribution of freeze-thaw and drought stress and the hydraulic traits that impart tolerance in conifers. [Tree Physiology](#), tpac102.
7. **Krieg C*[†]** & Chambers S*[†]. (2022) The ecology and physiology of fern gametophytes: a methodological synthesis. [Applications in Plant Sciences](#), 10:2.



6. Marques E^G, **Krieg C**, Decosta E, Bueno E, Sessa E, Penmetsa RV, von Wettberg EJB*. (2020) The impact of domestication on above-and below-ground trait responses to nitrogen fertilization in wild and cultivated genotypes of chickpea (*Cicer sp.*). *Frontiers in Genetics*, 11:576338.
5. Greenlon A, Chang P, Damtew ZM, Muleta A, Carrasquilla-Garcia N, Kim D, Nguyen HP, Suryawanshi V, **Krieg C**, Yadav SK, Patel JS, Mukherjee A, Udupa S, Benjelloun I, Thami-Alami I, Yasin M, Patil B, Singh S, Sarma BK, von Wettberg EJB, Kahramano A, Bukun B, Assefa F, Tesfaye K, Fikre A, Cook DR*. (2019) Global-level population genomics reveals differential effects of geography and phylogeny on horizontal gene transfer in soil bacteria. *Proceedings of the National Academy of Sciences*, 116:30.
4. **Krieg C***, Watkins JE, Jr., McCulloh K. (2019) A new protocol for psychometric pressure-volume curves of fern gametophytes. *Applications in Plant Sciences*, 7:5.
3. **Krieg C***, Valls R^U, Vatland S, Gordinier J, Porter S, von Wettberg EJB. (2019) Nitrogen fixation: fixing the gap between concept and evidence-based learning with legume biology. *American Biology Teacher*, 81:4.
2. von Wettberg EJB*, Chang P, Bařdemir F, Carrasquilla-Garcia N, Korbu LB, Moenga SM, Gashaw Bedada, Greenlon A, Moriuchi KS, Singh V, Cordeiro MA, Noujdina NV, Dinegde KN, Abbas Shah Sani SG, Getahun T, Vance L, Bergmann L, Lindsay D, Mamo BE, Warschefsky EJ, Dacosta-Calheiros E, Marques E, Yilmaz MA, Cakmak A, Rose J, Migneault A, **Krieg C**, Saylak S, Temel H, Friesen ML, Siler E, Akhmetov Z, Ozcelik H, Kholova J, Can C, Gaur P, Yildirim M, Sharma H, Vadez V, Tesfaye K, Fikre A, Tar'an B, Aydogan A, Bukun B, Penmetsa RV, Berger J, Kahraman A, Nuzhdin SV, Cook DR*. (2018) Ecology and genomics of an important crop wild relative as a prelude to agricultural innovation. *Nature Communications*, 9:649.
1. **Krieg C***, Watkins JE, Jr., Chambers S, Husby C. (2017) Sex-specific differences in functional traits and resource acquisition in five cycad species. *AoB Plants*, 9:2.

BOOK CHAPTERS

1. **Krieg C**, Mulualem K, von Wettberg EJB*. (2017) Germplasm characterization and trait discovery. In "*The Pigeonpea Genome*". p65-79, Springer, Cham.

SCIENCE COMMUNICATION and OTHER PUBLICATIONS

8. Zepeda, N^H, **Krieg C***. (2024) On the need to integrate ecophysiology into cycad conservation planning. *Cycads. In Press*.
7. Seeger, K^U, **Krieg C***. (2023) Research stations as catalysts for spontaneous collaboration. *eCanopy*, March:2023.
6. Gosetti S^U, **Krieg C***, McCulloh K. (2022) Emerging insights into the ecophysiology of dioecy in cycads: a call for research. *Cycads*, 5:1.
5. Zeller Z^U, **Krieg C***. (2019) Spoiled soils and the role of ferns in phytoremediation. *Fiddlehead Forum*, 45:5.
4. Pinson J*, **Krieg C***. (2017) Fern foray. *Fiddlehead Forum*, 44.
3. Mulualem K, van der Maesen LJG, **Krieg C**, von Wettberg EJB*. (2016) Historical and phylogenetic perspectives of pigeonpea. *Legume Perspectives*, 11.
2. **Krieg C***, Saunders S^U. (2016) Ferns in space. *The Palmetto*, 33.
1. **Krieg C**, Jimenez S^U, Vargas D^U, Penmetsa RV, von Wettberg EJB*. (2015) Green chickpeas: bringing Florida a new vegetable from the semi-arid tropics. *The Tropical Garden*, p36-37.



IV. MAJOR RESEARCH GRANTS

		\$ AMOUNT
2023–2026	National Science Foundation: IOS-2243970 PI Kate McCulloh, co-I(s) Christopher Krieg , Cécile Ané (UW-Madison), Adam Roddy (FIU)	1,327,753
2020–2022	National Science Foundation: DBI-1907033 PI Christopher Krieg , co-I(s) Kate McCulloh, Cécile Ané (UW-Madison), Adam West (U Cape Town)	207,000
2019–2023	National Geographic Society: NGS-51013R-18 PI Kate McCulloh, co-I(s) Christopher Krieg (UW-Madison), Adam West (U Cape Town), and Michele Pfab (South African Natl. Biodiv. Inst.)	50,087

V. GRADUATE RESEARCH GRANTS & AWARDS

		\$ AMOUNT
2018	<u>NSF Graduate Research Opportunities Worldwide</u>	5,000
2018	Graduate Student Research Award, Botanical Society of America	500
2018	Kelly Botanical Research Fellowship, Montgomery Botanical Center	3,000
2018	Student Travel Grant, Graduate Student Council, University of Florida	350
2018	Graduate Student Training Grant, Torrey Botanical Society	1,000
2018	Australia-Americas PhD Internship, Australia Academy of Sciences	3,500
2018	Carrie Lynn Yoder Scholarship, University of Florida	500
2016	<u>NSF Graduate Research Fellowship</u>	138,000
2016	Student Travel Award, Graduate Student Council, University of Florida	350
2016	Rosemary Graduate Research Grant, Society for the Study of Evolution	2,500
2016	Michael L. May Interdisciplinary Research Grant, University of Florida	1,000
2015	Grinter Graduate Research Fellowship, University of Florida	7,500
2015	Student Travel Award, American Fern Society	550
2015	Organization for Tropical Studies Scholarship	1,000
2014	Student Travel Grant, Picker Science Institute, Colgate University	1,000
2014	Research Fellowship, Picker Science Institute, Colgate University	3,500

VI. RESEARCH SEMINARS & PRESENTATIONS**RESEARCH SEMINARS**

2024	Eastern Kentucky University, Dept. of Biology, Richmond, KY USA
2024	University of Central Florida, Dept. of Biology, Orlando, FL USA
2023	University of Georgia, Dept. of Plant Biology, Athens, GA USA
2023	University of Minnesota-Duluth, Dept. of Biology, MN USA
2023	Texas Gulf Coast Fern Society, virtual meeting
2022	Kenyon College, Dept. of Biology, Gambier, OH USA
2018	Montgomery Botanical Center, Miami, FL USA
2015	Audubon Society, Corkscrew Swamp Sanctuary, Immokalee, FL USA

CONFERENCE TALKS (only lead author talks listed; # invited speaker, * correspondence)

2023	Krieg C*# . From tropics to temperate: Global convergence in fern gametophyte ecophysiological functioning. <u>Botany Annual Meeting</u> . Boise, ID USA
2023	Krieg C* . Multi-scale drivers of polyploid ecology. <u>Botany Annual Meeting</u> . Boise, ID USA



- 2023 **Krieg C***. Innovations and their application in conservation biology: a case study in cycads. Botany Annual Meeting. Boise, ID USA
- 2022 **Krieg C***. Smith A, Watts J, Sessa E. Reconciling patterns niche trait and niche evolution in allopolyploid plants. Botany Annual Meeting. Anchorage, AK USA
- 2020 **Krieg C***. From Genes to Distributions: physiological ecology as an integrator of polyploid biology. Botany Annual Meeting. virtual meeting
- 2019 **Krieg C*#**, McCulloh K, Sessa E, R Guralnick. Transgressive physiological traits explain broad-scale niche novelty in an allopolyploid fern complex. Botany Annual Meeting. Tucson, AZ USA
- 2018 **Krieg C***, McCulloh K, Sessa E. Polyploidy, traits, and the niche: insights into coexistence mechanisms. Botany Annual Meeting. Rochester, MN USA
- 2018 **Krieg C***. The role of serpentine soils in the evolution of a polyploid fern complex. Northeast Natural History Conference. Burlington, VT USA
- 2016 **Krieg C***. Evolution & natural selection on ecophysiological traits in polyploid ferns. Whitney Laboratory for Marine Bioscience. St. Augustine, FL USA

STUDENT CONTRIBUTED PRESENTATIONS (major inter/national meetings only)

- 2023 Smith Z^U, **Krieg C***, McCulloh K, Smith D, Berry L^G, Roddy A, Griffith P, Paiva D. Comparative physiology of two cycad species from different habitats. Botany Annual Meeting. Boise, ID USA. *Poster*.
- 2023 Zepeda N^H, **Krieg C***, McCulloh K, Zondi Z, Pfab M, West A. Environmental drivers of leaf hydraulic anatomy in wild cycads in South Africa. Botany Annual Meeting. Boise, ID USA. *Poster*.
- 2018 Zeller Z^U, **Krieg C***, McCulloh K, Sessa E. Environmental drivers of intra-specific trait variation in a broadly distributed fern species. Ecological Society of America Annual Meeting. *Poster*.

VII. TEACHING (Semester: F = Fall, S = Spring, ## = Year)

INSTRUCTOR OF RECORD (OR EQUIVALENT)

- S24 **University of Wisconsin**, Dept. of Botany, Co-instructed w/ M. Connolly
Integsci 660: Research Mentor Training ([Materials](#))

CURRICULUM DEVELOPMENT

- S17 **University of Florida**, Dept. of Biology, Co-developed w/ Dr. C. Davis
BSC 3911: Entering Research in Biology ([Materials](#))

GUEST LECTURER

- F22 **University of Wisconsin**, Department of Botany
BIO 152: Intro. Biology; Topic: plant cell water-relations (×1)
- S17 **University of Florida**, Department of Biology
BOT 3503: Phys. & Mol. Bio. of Plants; Topic: C3 vs C4 leaf physiology (×2)
- S16 PCB 3601C: Plant Ecology; Topic: leaf acclimation/adaptation (×1)
- S16 BOT 6935: Plant Phys.; Topic: leaf stress physiology (×3)

TEACHING ASSISTANT

- S17 **Organization for Tropical Studies (OTS)**, Costa Rica
Graduate level: Ferns & Lycophytes
- S16 **University of Florida**, Department of Biology
PCB 3601C: Plant Ecology
- F15 BSC 211L: Integrative Principles of Biology 2



TEACHING & PEDEGOGY TRAINING

	University of Wisconsin , DELTA program, CIRTL Network
S23	Mentoring other Mentors (invited workshop; 8 hrs)
F22	The Inclusive STEM Teaching Project (6 wks)
S21	Developing an Evidence-Based Teaching Plan (4 wks)
F20	Gender Equity in STEM (semester)
F20	Engaging Students through High-Impact Practices (4 wks)
	University of Florida , Department of Biology
F15	ZOO 6927: Biology Laboratory Instructional Methods (semester)

VIII. MENTORSHIP**SUMMARY**

24 undergraduate students and **2** high school students, **21** of whom are women and/or from underrepresented group(s), resulting in **15** student poster presentations (including **3** at major national conferences), as well as **6** general audience articles and **5** peer-reviewed publications with mentee co-authorship. See below for a list of select students under my supervision and see "[Publications](#)" and "[Mentee Contributed Posters](#)" for specific product details.

SELECT STUDENTS UNDER MY SUPERVISION

- 2022-present Nico Zepeda, current high school student
- Co-author of general audience article ×1 (in press)
 - Poster presentation, Botany Annual Meeting (2023)
- 2022-present Zach Smith, current undergraduate mentee
- Undergraduate Research Award, Botanical Society of America
 - Poster presentation, Botany Annual Meeting (2023)
 - Undergraduate Research Award, Univ. of Wisconsin, Dept. of Botany
- 2022-present Ameya Baxi, current undergraduate mentee
- Co-author of peer-reviewed manuscript ×1 (in revision)
- 2020–2021 Kate Seeger, former undergraduate mentee
- Co-author of peer-reviewed manuscript ×1
 - Co-author of general audience article ×1
- 2020–2021 Sophie Gosetti, former undergraduate mentee
- Co-author of peer-reviewed manuscript ×1
 - Co-author of general audience article ×1
 - Undergraduate Research Award, Univ. of Wisconsin, Dept. of Botany
- 2017–2019 Zachary Zellar, former undergraduate mentee
- Co-author of general audience article ×1
 - Poster presentation, Botany Annual Meeting (2018)
- 2015–2017 Sandy Saunders, former undergraduate mentee
- Co-author of general audience article ×1

IX. SERVICE, OUTREACH & DEI**SERVICE TO PROFESSION**

Grant Proposal Review Panelist: NSF-DEB (full proposals)

Ad hoc Grant Proposal Reviewer: NSF-DEB (full proposals)

Ad hoc Journal Reviewer: Scientific Reports, New Phytologist, AoB Plants, Annals of Botany, Plant Physiology, American Journal of Botany, BioScience, American Fern Journal, Plants People Planet, Applications in Plant Sciences, Tree Physiology, and others



SERVICE TO LITERATURE

2023–2024 **Guest Editor**, Special Issue on Conservation Bio, Applications in Plant Sciences
 2022–*present* **Associate Editor**, Applications in Plant Sciences
 2020–2022 **Reviewing Editor**, Applications in Plant Sciences

SERVICE TO PROFESSIONAL SOCIETIES, ORGANIZATIONS and DEIJ

2023–*present* **Council Member**, Early Career Professional Development Committee,
 Botanical Society of America
 2023–*present* **Council Member**, Botany360 Ad-hoc Committee, Botanical Society of America
 2023–*present* **Program Director**, Physiology & Ecophysiology, Botanical Society of America
 2023–*present* **Code of Conduct Committee Member**, Pteridophyte Phylogeny Group (PPGII)
 2023 **Co-organizer**, Symposium on Conservation Biology, Botany Annual Meeting
 2020–2021 **Panel Member**, NSF GRFP workshop, Botanical Society of America
 2020 **Co-organizer**, Symposium on polyploid biodiversity, Botany Annual Meeting
 2019–*present* **Council Member**, IUCN / SSG Cycad Specialist Group

SERVICE TO UNIVERSITY and DEIJ

2021–*present* **DEI Climate Committee Member**, Botany Dept., UW-Madison
 2020 **BIPOC Inclusion Committee Member**, Botany Dept., UW-Madison
 2020 **Co-organizer**, Anti-bias workshop, WiSELI & Dept. of Botany, UW-Madison
 2017–2018 **Green Initiatives**, Biology Graduate Student Association, University of Florida
 2016–2017 **President**, Biology Graduate Student Association, University of Florida

OUTREACH

2024 **Co-organizer**, Methods in plant gas-exchange, Botany Annual Meeting, ID
 2023 **Instructor**, Methods in plant water-relations, Phys-Fest IV, Sevilleta Refuge, NM
 2022 **Co-organizer**, Methods in plant gas-exchange, Botany Annual Meeting, AK
 2021 **Instructor**, Methods in plant hydraulics, Phys-Fest III, CSU Mtn Campus, CO
 2018 **Survey co-leader**, ferns, Takayna BioBlitz, B. Brown Foundation, Tasmania, AU
 2018 **Co-organizer**, Fern foray, Botany Annual Meeting, MN
 2015 **Co-organizer**, science pedagogy, Pinecrest School, Ft. Lauderdale FL USA

X. PROFESSIONAL AFFILIATIONS

- IUCN / SSG Cycad Specialist Group (counsel member)
- Global Consortium for Conservation–Cycads (affiliate member)
- Montgomery Botanical Center (research fellow)
- Australia Academy of Science (research fellow alumnus)
- American Fern Society (member)
- Cycad Society (member)
- Botanical Society of America (member)
- Ecological Society of America (member)
- Society for Conservation Biology (member)

