

**CURRICULUM VITAE****William W. Adams III**

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**Education**

<b>Australian National University</b> , Canberra	1984-87	PhD	Plant Environmental Biology
<b>University of Kansas</b> , Lawrence	1981-84	MA	Botany
<b>University of Kansas</b> , Lawrence	1979-83	BA	Atmospheric Sciences
<b>University of Kansas</b> , Lawrence	1977-81	BA	Biology

**Academic Positions**

2003-present	Professor, University of Colorado
1996-2003	Associate Professor, University of Colorado
May-Aug 1994	Visiting Fellow, Australian National University
1988-1996	Assistant Professor, University of Colorado
1988-89	Humboldt Fellow, Universität Würzburg
1987-88	NATO Postdoctoral Fellow, Universität Würzburg
1984-87	PhD Scholar, Australian National University
1981-84	Teaching Assistant, University of Kansas

**Academic Honors**

- Highly Cited*: 13,796 citations and h-index=56 in the Web of Science (All Databases) on 09/10/2020 using **AUTHOR**: <Adams WW> and **ADDRESS**: <Univ Colorado or University of Colorado or Univ Kansas or Univ Nevada or Australian Natl Univ or Univ Wurzburg or Lehrstuhl Bot 2> yielding 144 publications
- Chancellor's Award for *Excellence in STEM Education* 2013-2014, University of Colorado
- Boulder Faculty Assembly *Excellence in Teaching* Award, 16 April 2004, University of Colorado
- Two papers among the top five that were honored for being the most highly cited during the previous ten years in the Australian Journal of Plant Physiology (January 2003 issue of Functional Plant Biology).
- One paper among the top twenty that were honored for being the most highly cited during the 30 years that the Australian Journal of Plant Physiology and Functional Plant Biology had been published (March 2003 issue of Functional Plant Biology).
- Certificate of Recognition for *Exceptional Teaching*, Mortar Board, Nov. 2000, University of Colorado
- Visiting Fellow*, Australian National University (Fellowship of A\$18,000), May-August 1994
- Junior Faculty Development Award, Summer 1990, University of Colorado at Boulder
- Fellowship from the Alexander von Humboldt Foundation, August 1988 to May 1989
- NATO Postdoctoral Fellowship, August 1987 to July 1988
- Young Botanist Award from organizers to attend XIV International Botanical Congress, July 1987
- PhD Scholarship, January 1986-June 1987, Australian National University
- Honors Fellowship, The Graduate School, August 1981-May 1984, University of Kansas (KU)
- Summer Fellowship, The Graduate School, June-July 1982, KU
- Election to Phi Beta Kappa and the National Honor Society of Phi Kappa Phi, May 1981, KU
- Graduation with Highest Distinction, and with Honors in Biology, May 1981, KU
- Waddington Family-Taylor Scholarship, 1981, KU
- Anschutz Scholarship, 1980, KU
- Quena Allen Scholarship, 1979-80, KU

**Publications**

- 166) Demmig-Adams B, López-Pozo M, Stewart JJ, Adams WW III (2020) Zeaxanthin and lutein: photoprotectors, anti-inflammatories, and brain food. *Molecules* **25**: 3607 <doi: 10.3390/molecules25163607>
- 165) Stewart JJ, Demmig-Adams B, Adams WW III (2020) Zeaxanthin and lutein in humans. E Scholarly Community Encyclopedia <<https://encyclopedia.pub/2270>>
- 164) Langensiepen M, Jansen MAK, Wingler A, Demmig-Adams B, Adams WW III, Dodd IC, Fotopaulus V, Snowdon R, Fenollosa E, de Tullio MC, Buck-Sorlin G, Munné-Bosch S (2020) Linking integrative plant physiology with agronomy to sustain future plant production. *Environmental and Experimental Botany* **178**: 104125 <doi: 10.1016/j.envexpbot.2020.104125>
- 163) Stewart JJ, Adams WW III, Escobar CM, López-Pozo M, Demmig-Adams B (2020) Growth and essential carotenoid micronutrients in *Lemna gibba* as a function of growth light intensity. *Frontiers in Plant Science*, **11**: 480 <doi: 10.3389/fpls.2020.00480>
- 162) Demmig-Adams B, Stewart JJ, Adams WW III (2019) Less photoprotection is good in some genetic and environmental contexts. *The Biochemical Journal* **476**: 2017-2029 <doi: 10.1042/BCJ20190328>
- 161) Stewart JJ, Muller O, Cohu CM, Demmig-Adams B, Adams WW III (2019) Quantification of foliar phloem infrastructure with microscopy. In: Liesche J (ed) Phloem. Methods and Protocols. Methods in Molecular Biology, Vol 2014, pp 55-72. Humana Press, New York, NY <doi: 10.1007/978-1-4939-9562-2\_5>
- 160) Oh S, Adams WW III, Demmig-Adams B, Koh S-C (2019) A proteomic approach to seasonal adjustment in the enzyme complement of Korean fir (*Abies koreana* Wilson) needles. *Horticulture, Environment, and Biotechnology* **60**: 135-146 <doi: 10.1007/s13580-018-0094-z>
- 159) Adams WW III (2018) Preface: The importance of leaves to life and humanity. In Adams WW III, Terashima I (eds) The Leaf: A Platform for Performing Photosynthesis. Advances in Photosynthesis and Respiration, Volume 44. Springer, Cham, pp. xxvii-xxxiv
- 158) Adams WW III (2018) A fascination with leaves. In Adams WW III, Terashima I (eds) The Leaf: A Platform for Performing Photosynthesis. Advances in Photosynthesis and Respiration, Volume 44. Springer, Cham, pp. xxxv-xxxix
- 157) Adams WW III (2018) The Life of a Leaf. In Adams WW III, Terashima I (eds) The Leaf: A Platform for Performing Photosynthesis. Advances in Photosynthesis and Respiration, Volume 44. Springer, Cham, pp. xvii-xlix
- 156) Adams WW III, Stewart JJ, Polutchko SK, Demmig-Adams B (2018) Leaf vasculature and the upper limit of photosynthesis. In Adams WW III, Terashima I (eds) The Leaf: A Platform for Performing Photosynthesis. Advances in Photosynthesis and Respiration, Volume 44. Springer, Cham, pp. 27-54 <doi: 10.1007/978-3-319-93594-2\_2>
- 155) Adams WW III, Stewart JJ, Demmig-Adams B (2018) Photosynthetic modulation in response to plant activity and environment. In Adams WW III, Terashima I (eds) The Leaf: A Platform for Performing Photosynthesis. Advances in Photosynthesis and Respiration, Volume 44. Springer, Cham, pp. 493-563 <doi: 10.1007/978-3-319-93594-2\_18>
- 154) Adams WW III, Terashima I (2018) The Leaf: A Platform for Performing Photosynthesis. Advances in Photosynthesis and Respiration, Volume 44. Springer, Cham <doi: 10.1007/978-3-319-93594-2>
- 153) Stewart JJ, Baker CR, Sharpes CS, Wong-Michalak ST, Polutchko SK, Adams WW III, Demmig-Adams B (2018) Effects of foliar redox status on leaf vascular organization suggest avenues for co-optimization of photosynthesis and heat tolerance. *International Journal of Molecular Science* **19**: 2507 <doi: 10.3390/ijms19092507>
- 152) Demmig-Adams B, Adams WW III (2018) An integrative approach to photoprotection and photoinhibition. *Environmental and Experimental Botany* **154**: 1-3
- 151) Stewart JJ, Polutchko SK, Demmig-Adams B, Adams WW III (2018) *Arabidopsis thaliana* Ei-5: Altered minor vein architecture compensates for low vein density and supports maintenance of photosynthetic capacity. *Frontiers in Plant Science* **9**: 693 <doi: 10.3389/fpls.2018.00693>
- 150) Polutchko SK, Stewart JJ, Demmig-Adams B, Adams WW III (2018) Evaluating the link between photosynthetic capacity and leaf vascular organization with principal component analysis. *Photosynthetica* **56**: 392-403 <doi: 10.1007/s11099-017-0764-6>
- 149) Stewart JJ, Adams WW III, Cohu CM, Demmig-Adams B (2018) Tocopherols modulate leaf vein arrangement and composition without impacting photosynthesis. *Photosynthetica* **56**: 382-391 <doi: 10.1007/s11099-017-0757-5>

- 148) Demmig-Adams B, Stewart JJ, Baker CR, Adams WW III (2018) Optimization of photosynthetic productivity in contrasting environments by regulons controlling plant form and function. *International Journal of Molecular Science* **19**: 872 <doi: 10.3390/ijms1903872>
- 147) Stewart JJ, Polutchko SK, Adams WW III, Demmig-Adams B (2017) Acclimation of Swedish and Italian ecotypes of *Arabidopsis thaliana* to light intensity. *Photosynthesis Research* **134**: 215-229 <doi: 10.1007/s11120-017-0436-1>
- 146) Demmig-Adams B, Stewart JJ, Adams WW III (2017) Environmental regulation of intrinsic photosynthetic capacity: An integrated view. *Current Opinion in Plant Biology* **37**: 34-41 <doi: 10.1016/j.pbi.2017.03.008>
- 145) Stewart JJ, Polutchko SK, Adams WW III, Cohu CM, Wenzl CA, Demmig-Adams B (2017) Light, temperature, and tocopherol status influence foliar vascular anatomy and leaf function in *Arabidopsis thaliana*. *Physiologia Plantarum* **160**: 98-110 <doi: 10.1111/pp1.12543>
- 144) Demmig-Adams B, Adams WW III (2017) Photoinhibition. In Thomas B, Murray BG, Murphy DJ (eds) Encyclopedia of Applied Plant Sciences, Second Edition, Vol. 1. Academic Press, Waltham, MA, pp. 78-85
- 143) Demmig-Adams B, Burch TA, Savage E, Stewart JJ, Adams WW III (2017) Algal glycerol accumulation and release as a sink for photosynthetic electron transport. *Algal Research* **21**: 161-168 <doi: 10.1016/j.algal.2016.11.017>
- 142) Adams WW III, Stewart JJ, Cohu CM, Muller O, Demmig-Adams B (2016) Habitat temperature and precipitation of *Arabidopsis thaliana* ecotypes determine the response of foliar vasculature, photosynthesis, and transpiration to growth temperature. *Frontiers in Plant Science* **7**: 1026 <doi: 10.3389/fpls.2016.01026>
- 141) Stewart JJ, Demmig-Adams B, Cohu CM, Wenzl CA, Muller O, Adams WW III (2016) Growth temperature impact on leaf form and function in *Arabidopsis thaliana* ecotypes from northern and southern Europe. *Plant, Cell and Environment* **39**: 1549-1558 <doi: 10.1111/pce.12720>
- 140) Demmig-Adams B, Muller O, Stewart JJ, Cohu CM, Adams WW III (2015) Chloroplast thylakoid structure in evergreen leaves employing strong thermal energy dissipation. *Journal of Photochemistry and Photobiology B: Biology* **152**: 357-366 <doi: 10.1016/j.jphotobiol.2015.03.014>
- 139) Stewart JJ, Adams WW III, Cohu CM, Polutchko SK, Lombardi EM, Demmig-Adams B (2015) Differences in light-harvesting, acclimation to growth light environment, and leaf structural development between Swedish and Italian ecotypes of *Arabidopsis thaliana*. *Planta* **242**: 1277-1290 <doi: 10.1007/s00425-015-2368-3>
- 138) Burch TA, Adams WW III, Degrenne BLS, Englert CH, Mines BR, Nash PC, Boone EC, Demmig-Adams B (2015) Environmental manipulation of growth and energy carrier release from freshwater and marine *Chlamydomonas* species. *Journal of Applied Phycology* **27**: 1127-1136 <doi: 10.1007/s10811-014-0433-0>
- 137) Adams WW III, Demmig-Adams B (2014) Lessons from nature: A personal perspective. In Demmig-Adams B, Garab G, Adams WW III, Govindjee (eds) Non-Photochemical Quenching and Energy Dissipation in Plants, Algae and Cyanobacteria, Advances in Photosynthesis and Respiration, Volume 40. Springer, Dordrecht, pp. 45-72 <doi: 10.1007/978-94-017-9032-1\_2>
- 136) Adams WW III, Muller O, Cohu CM, Demmig-Adams B (2014) Photosystem II efficiency and non-photochemical quenching in the context of source-sink balance. In Demmig-Adams B, Garab G, Adams WW III, Govindjee (eds) Non-Photochemical Quenching and Energy Dissipation in Plants, Algae and Cyanobacteria. Advances in Photosynthesis and Respiration, Volume 40. Springer, Dordrecht, pp. 503-529 <doi: 10.1007/978-94-017-9032-1\_23>
- 135) Demmig-Adams B, Koh SC, Cohu CM, Muller O, Stewart JJ, Adams WW III (2014) Non-photochemical quenching in contrasting plant species and environments. In Demmig-Adams B, Garab G, Adams WW III, Govindjee (eds) Non-Photochemical Quenching and Energy Dissipation in Plants, Algae and Cyanobacteria. Advances in Photosynthesis and Respiration, Volume 40. Springer, Dordrecht, pp. 531-552 <doi: 10.1007/978-94-017-9032-1\_24>
- 134) Demmig-Adams B, Stewart JJ, Adams WW III (2014) Chloroplast photoprotection and the trade-off between abiotic and biotic defense. In Demmig-Adams B, Garab G, Adams WW III, Govindjee (eds) Non-Photochemical Quenching and Energy Dissipation in Plants, Algae and Cyanobacteria. Advances in Photosynthesis and Respiration, Volume 40. Springer, Dordrecht, pp. 631-643 <doi: 10.1007/978-94-017-9032-1\_28>
- 133) Logan BA, Demmig-Adams B, Adams WW III, Bilger W (2014) Context, quantification, and measurement guide for non-photochemical quenching of chlorophyll fluorescence. In Demmig-Adams B, Garab G, Adams WW III, Govindjee (eds) Non-Photochemical Quenching and Energy Dissipation in Plants, Algae and Cyanobacteria. Advances in Photosynthesis and Respiration, Volume 40. Springer, Dordrecht, pp. 187-201 <doi: 10.1007/978-94-017-9032-1\_7>

- 132) Demmig-Adams B, Garab G, Adams WW III, Govindjee (eds) (2014) Non-Photochemical Quenching and Thermal Energy Dissipation in Plants, Algae and Cyanobacteria. *Advances in Photosynthesis and Respiration*, Volume 40. Springer, Dordrecht <doi: 10.1007/978-94-017-9032-1>
- 131) Demmig-Adams B, Stewart JJ, Burch TA, Adams WW III (2014) Insights from placing photosynthetic light harvesting into context. *Journal of Physical Chemistry Letters* **5**: 2880-2889 <doi: 10.1021/jz5010768>
- 130) Demmig-Adams B, Stewart JJ, Adams WW III (2014) Multiple feedbacks between chloroplast and whole plant in the context of plant adaptation and acclimation to the environment. *Philosophical Transactions of the Royal Society B* **369**: 20130244 <doi: org/10.1098.rstb.2013.0244>
- 129) Adams WW III, Cohu CM, Amiard V, Demmig-Adams B (2014) Associations between phloem-cell wall ingrowths in minor veins and maximal photosynthesis rate. *Frontiers in Plant Science* **5**: 24 <doi: 10.3389/fpls.2014.00024>
- 128) Cohu CM, Muller O, Adams WW III, Demmig-Adams B (2014) Leaf anatomical and photosynthetic acclimation to cool temperature and high light in two winter versus two summer annuals. *Physiologia Plantarum* **152**: 164-173 <doi: 10.1111/ppl.121154>
- 127) Muller O, Cohu CM, Stewart JJ, Protheroe JA, Demmig-Adams B, Adams WW III (2014) Association between photosynthesis and contrasting features of minor veins in leaves of summer annuals loading phloem via symplastic versus apoplastic routes. *Physiologia Plantarum* **152**: 174-183 <doi: 10.1111/ppl.12155>
- 126) Muller O, Stewart JJ, Cohu CM, Polutchko SK, Demmig-Adams B, Adams WW III (2014) Leaf architectural, vascular, and photosynthetic acclimation to temperature in two biennials. *Physiologia Plantarum* **152**: 763-772 <doi: 10.1111/ppl.12226>
- 125) Cohu CM, Lombardi E, Adams WW III, Demmig-Adams B (2014) Increased nutritional quality of plants for long-duration spaceflight missions through choice of plant variety and manipulation of growth conditions. *Acta Astronautica* **94**: 799-806 <doi: 10.1016/j.actaastro.2013.10.009>
- 124) Adams WW III, Muller O, Cohu CM, Demmig-Adams B (2013) May photoinhibition be a consequence, rather than a cause, of limited plant productivity? *Photosynthesis Research* **117**: 31-44 <doi: 10.1007/s11120-013-9849-7>
- 123) Adams WW III, Cohu CM, Muller O, Demmig-Adams B (2013) Foliar phloem infrastructure in support of photosynthesis. *Frontiers in Plant Science* **4**: 194 <doi: 10.3389/fpls.2013.00194>
- 122) Cohu CM, Muller O, Demmig-Adams B, Adams WW III (2013) Minor loading vein acclimation for three *Arabidopsis thaliana* ecotypes in response to growth under different temperature and light regimes. *Frontiers in Plant Science* **4**: 240 <doi: 10.3389/fpls.2013.00240>
- 121) Cohu CM, Muller O, Stewart JJ, Demmig-Adams B, Adams WW III (2013) Association between minor loading vein architecture and light- and CO<sub>2</sub>-saturated photosynthetic oxygen evolution among *Arabidopsis thaliana* ecotypes from different latitudes. *Frontiers in Plant Science* **4**: 264 <doi: 10.3389/fpls.2013.00264>
- 120) Oh S, Adams WW III, Demmig-Adams B, Koh SC (2013) Seasonal photoprotective responses in needles of Korean fir (*Abies koreana*) over an altitudinal gradient on Mount Halla, Jeju Island, Korea. *Arctic, Antarctic, and Alpine Research* **45**: 238-248 <doi: 10.1657/1938-4246-45.2.238>
- 119) Demmig-Adams B, Amiard V, Cohu CM, Muller O, van Zadelhoff G, Veldink GA, Adams WW III (2013) Emerging trade-offs – impact of photoprotectants (PsbS, xanthophylls, and vitamin E) on oxylipins as regulators of development and defense. *New Phytologist* **197**: 720-729 <doi: 10.1111/nph.12100>
- 118) Demmig-Adams B, Cohu CM, Muller O, Adams WW III (2012) Modulation of photosynthetic energy conversion efficiency in nature: from seconds to seasons. *Photosynthesis Research* **113**: 75-88 <doi: 10.1007/s11120-012-9761-6>
- 117) Dumlao MR, Darehshouri A, Cohu CM, Muller O, Mathias J, Adams WW III, Demmig-Adams B (2012) Low temperature acclimation of photosynthetic capacity and leaf morphology in the context of phloem loading type. *Photosynthesis Research* **113**: 181-189 <doi: 10.1007/s11120-012-9762-5>
- 116) Adams WW III, Demmig-Adams B (2012) Photoprotection (Plants). In McGraw-Hill Encyclopedia of Science & Technology, 11<sup>th</sup> Edition, Vol. 13. McGraw-Hill, New York, pp. 490-493 available at <<http://www.accessscience.com/content/photoprotection-plants/900153>>
- 115) Demmig-Adams B, Rixham CS, Adams WW III (2012) Carotenoids. In McGraw-Hill Encyclopedia of Science & Technology, 11<sup>th</sup> Edition, Vol. 3. McGraw-Hill, New York, pp. 549-555 available at <<http://www.accessscience.com/content/carotenoids/110600>>
- 114) Demmig-Adams B, Cohu CM, Adams WW III (2012) Dealing with the Hazards of Harnessing Sunlight. *Nature Education Knowledge* **4**(1):18 available at <<http://www.nature.com/scitable/knowledge/library/dealing-with-the-hazards-of-harnessing-sunlight-83031977>>

- 113) Aranjuelo I, Ebbets AL, Evans RD, Tissue DT, Nogués S, van Gestel N, Ebbert V, Adams WW III, Nowak RS, Smith SD (2011) Maintenance of C sinks sustains enhanced C assimilation during long-term exposure to elevated [CO<sub>2</sub>] in Mojave desert shrubs. *Oecologia* **167**: 339-354 <doi: 10.1007/s00442-011-1996-y>
- 112) Cessna S, Adams WW III, Demmig-Adams B (2010) Exploring photosynthesis and plant stress using inexpensive chlorophyll fluorometers. *Journal of Natural Resources and Life Sciences Education* **39**: 22-30 <doi: 10.4195/jnrlse.2009.0024u>
- 111) Demmig-Adams B, Adams WW III (2010) Overview of diet-gene interaction and the example of xanthophylls. In MT Giardi, G Rea, B Berra (eds) Bio-Farms for Nutraceuticals: Functional Food and Safety Control by Biosensors. Landes BioScience/Springer, Texas, *Advances in Experimental Medicine and Biology* **698**: 17-26 <doi: 10.1007/978-1-4419-7347-4\_2>
- 110) Berthier A, Desclos M, Amiard V, Morvan-Bertrand A, Demmig-Adams B, Adams WW III, Turgeon R, Prud'homme M-P, Noiraud-Romy N (2009) Activation of sucrose transport in defoliated *Lolium perenne* L.: an example of apoplastic phloem loading plasticity. *Plant and Cell Physiology* **50**: 1319-1344 <doi: 10.1093/pcp/pcp081>
- 109) Koh SC, Demmig-Adams B, Adams WW III (2009) Novel patterns of seasonal photosynthetic acclimation, including interspecific differences, in conifers over an altitudinal gradient. *Arctic, Antarctic, and Alpine Research* **41**: 317-322 <doi: 10.1657/1938.4246-41.3.317>
- 108) Seelig H-D, Hoehn A, Stodieck LS, Klaus DM, Adams WW III, Emery WJ (2009) Plant water parameters and the remote sensing *R*<sub>1300</sub>/*R*<sub>1450</sub> leaf water index: controlled condition dynamics during the development of water deficit stress. *Irrigation Science* **27**: 357-365 <doi: 10.1007/s00271-009-0152-5>
- 107) Demmig-Adams B, Adams WW III, Mattoo AK (eds) (2008) Photoprotection, Photoinhibition, Gene Regulation, and Environment. *Advances in Photosynthesis and Respiration*, Volume 21. Springer, Dordrecht. Paperback edition. <doi: 10.1007/1-4020-3579-9>
- 106) Demmig-Adams B, Dumlao MR, Herzenach MK, Adams WW III (2008) Acclimation. In Jørgensen SE, Fath BD (eds) *Encyclopedia of Ecology*. Elsevier B.V., Oxford, pp. 15-23
- 105) Seelig H-D, Adams WW III, Hoehn A, Stodieck LS, Klaus DM, Emery WJ (2008) Extraneous variables and their influence on reflectance-based measurements of leaf water content. *Irrigation Science* **26**: 407-414 <doi: 10.1007/s00271-008-0105-4>
- 104) Seelig H-D, Hoehn A, Stodieck LS, Klaus DM, Adams WW III, Emery WJ (2008) The assessment of leaf water content using leaf reflectance ratios in the visible, near-, and short-wave-infrared. *International Journal of Remote Sensing* **29**: 3701-3713 <doi: 10.1080/01431160701772500>
- 103) Seelig H-D, Hoehn A, Stodieck LS, Klaus DM, Adams WW III, Emery WJ (2008) Relations of remote sensing leaf water indices to leaf water thickness in cowpea, bean, and sugarbeet plants. *Remote Sensing of the Environment* **112**: 445-455 <doi: 10.1016/j.rse.2007.05002>
- 102) Adams WW III, Watson AM, Mueh KE, Amiard V, Turgeon R, Ebbert V, Logan BA, Combs AF, Demmig-Adams B (2007) Photosynthetic acclimation in the context of structural constraints to carbon export from leaves. *Photosynthesis Research* **94**: 455-466 <doi: 10.1007/s11120-006-9123-3>
- 101) Logan BA, Adams WW III, Demmig-Adams B (2007) Avoiding common pitfalls of chlorophyll fluorescence analysis under field conditions. *Functional Plant Biology* **34**: 853-859 <doi: 10.1071/FP07113>
- 100) Amiard V, Demmig-Adams B, Mueh KE, Turgeon R, Combs AF, Adams WW III (2007) Role of light and jasmonic acid signaling in regulating foliar phloem cell wall ingrowth development. *New Phytologist* **173**: 722-731 <doi: 10.1111/j.1469-8137.2006.01954.x>
- 99) Demmig-Adams B, Adams WW III (2006) Photoprotection in an ecological context: the remarkable complexity of thermal energy dissipation. *New Phytologist* **172**: 11-21 <doi: 10.1111/j.1469-8137.2006.01835.x>
- 98) Zarter CR, Adams WW III, Ebbert V, Cuthbertson D, Adamska I, Demmig-Adams B (2006) Winter down-regulation of intrinsic photosynthetic capacity coupled with up-regulation of Elip-like proteins and persistent energy dissipation in a subalpine forest. *New Phytologist* **172**: 272-282 <doi: 10.1111/j.1469-8137.2006.01815.x>
- 97) Zarter CR, Demmig-Adams B, Ebbert V, Adamska I, Adams WW III (2006) Photosynthetic capacity and light harvesting efficiency during the winter-to-spring transition in subalpine conifers. *New Phytologist* **172**: 283-292 <doi: 10.1111/j.1469-8137.2006.01816.x>
- 96) Adams WW III, Zarter CR, Mueh KE, Amiard V, Demmig-Adams B (2006) Energy dissipation and photoinhibition: a continuum of photoprotection. In Demmig-Adams B, Adams WW III, Mattoo AK (eds) *Photoprotection, Photoinhibition, Gene Regulation, and Environment. Advances in Photosynthesis and Respiration*, Volume 21. Springer, Dordrecht, pp. 49-64 <doi: 10.1007/1-4020-3579-9\_5>

- 95) Demmig-Adams B, Ebbert V, Zarter CR, Adams WW III (2006) Characteristics and species-dependent employment of flexible versus sustained thermal dissipation and photoinhibition. *In* Demmig-Adams B, Adams WW III, Mattoo AK (eds) Photoprotection, Photoinhibition, Gene Regulation, and Environment. *Advances in Photosynthesis and Respiration*, Volume 21. Springer, Dordrecht, pp. 39-48 <doi: 10.1007/1-4020-3579-9\_4>
- 94) Demmig-Adams B, Adams WW III, Mattoo AK (eds) (2006) Photoprotection, Photoinhibition, Gene Regulation, and Environment. *Advances in Photosynthesis and Respiration*, Volume 21. Springer, Dordrecht. Hardcover edition. <doi: 10.1007/1-4020-3579-9>
- 93) Demmig-Adams B, Ebbert V, Mellman DL, Mueh KE, Schaffer L, Funk C, Zarter CR, Adamska I, Jansson S, Adams WW III (2006) Modulation of PsbS and flexible versus sustained energy dissipation by light environment in different species. *Physiologia Plantarum* **127**: 670-680 <doi: 10.1111/j.1399-3054.2006.00698.x>
- 92) Zarter CR, Adams WW III, Ebbert V, Adamska I, Jansson S, Demmig-Adams B (2006) Winter acclimation of PsbS and related proteins in the evergreen *Arctostaphylos uva-ursi* as influenced by altitude and light environment. *Plant, Cell and Environment* **29**: 869-878 <doi: 10.1111/j.1365-3040.2005.01466.x>
- 91) Amiard V, Mueh KE, Demmig-Adams B, Ebbert V, Turgeon R, Adams WW III (2005) Anatomical and photosynthetic acclimation to the light environment in species with differing mechanisms of phloem loading. *Proceedings of the National Academy of Sciences USA* **102**: 12968-12973 <doi: 10.1073/pnas.0503784102>
- 90) Adams WW III, Amiard VSE, Mueh KE, Turgeon R, Demmig-Adams B (2005) Phloem loading type and photosynthetic acclimation to light. *In* van der Est A, Bruce D (eds) *Photosynthesis: Fundamental Aspects to Global Perspectives*. Allen Press, Lawrence, pp. 814-816
- 89) Demmig-Adams B, Ebbert V, Adams WW III (2005) Photoinhibition in evergreens: Involvement of sustained thermal dissipation and PSII protein phosphorylation. *In* van der Est A, Bruce D (eds) *Photosynthesis: Fundamental Aspects to Global Perspectives*. Allen Press, Lawrence, pp. 634-636
- 88) Adams WW III (2005) Photoprotection in plants. *In* McGraw-Hill Yearbook of Science & Technology 2005. McGraw-Hill, New York, pp. 265-268
- 87) Ebbert V, Adams WW III, Mattoo AK, Sokolenko A, Demmig-Adams B (2005) Upregulation of a photosystem II core protein phosphatase inhibitor and sustained D1 phosphorylation in zeaxanthin-retaining, photoinhibited needles of overwintering Douglas fir. *Plant, Cell and Environment* **28**: 232-240 <doi: 10.1111/j.1365-3040.2004.01267.x>
- 86) Adams WW III, Zarter CR, Ebbert V, Demmig-Adams B (2004) Photoprotective strategies of overwintering evergreens. *BioScience* **54**: 41-49 <doi: 10.1641/0006-3568(2004)054[0041:PSOOE]2.0.CO;2>
- 85) Adams WW III, Demmig-Adams B (2004) Chlorophyll fluorescence as a tool to monitor plant response to the environment. *In* Papageorgiou GC, Govindjee (eds) *Chlorophyll a Fluorescence: A Signature of Photosynthesis*. *Advances in Photosynthesis and Respiration*, Volume 19. Springer, Dordrecht, pp. 583-604 <doi: 10.1007/978-1-4020-3218-9\_22>
- 84) Barker DH, Marszalek J, Zimpfer JF, Adams WW III (2004) Changes in photosynthetic pigment composition and absorbed energy allocation during salt stress and CAM induction in *Mesembryanthemum crystallinum*. *Functional Plant Biology* **31**: 781-787 <doi: 10.1071/FP04019>
- 83) Bachmann KM, Ebbert V, Adams WW III, Verhoeven AS, Logan BA, Demmig-Adams B (2004) Effects of lincomycin on PSII efficiency, non-photochemical quenching, D1 protein and xanthophyll cycle during photoinhibition and recovery. *Functional Plant Biology* **31**: 803-813 <doi: 10.1071/FP04022>
- 82) Demmig-Adams B, Ebbert V, Adams WW III (2004) Photosynthesis and stress. *In* Goodman RM (ed) *Encyclopedia of Plant & Crop Science*, Marcel Dekker, New York, pp. 901-905 <doi: 10.1081/E-EPCS120019320>
- 81) Demmig-Adams B, Adams WW III (2003) Photoinhibition. *In* Thomas B, Murphy D, Murray B (eds) *Encyclopedia of Applied Plant Science*. Academic Press, London, pp. 707-714
- 80) Demmig-Adams B, Adams WW III (2003) Photoprotection against excess light via zeaxanthin-dependent energy dissipation. *In* Larcher W, *Physiological Plant Ecology. Ecophysiology and Stress Physiology of Functional Groups*. 4th edition. Springer, Berlin, pp. 359-361 & 501-502
- 79) Adams WW III, Demmig-Adams B, Rosenstiel TN, Brightwell AK, Ebbert V (2002) Photosynthesis and photoprotection in overwintering plants. *Plant Biology* **4**: 545-557 <doi: 10.1055/s-2002-35434>
- 78) Demmig-Adams B, Adams WW III (2002) Antioxidants in photosynthesis and human nutrition. *Science* **298**: 2149-2153 <doi: 10.1126/science.1078002>
- 77) Barker DH, Adams WW III, Demmig-Adams B, Logan BA, Verhoeven AS, Smith SD (2002) Nocturnally retained zeaxanthin does not remain engaged in a state primed for energy dissipation during the summer in two

- Yucca* species growing in the Mojave Desert. *Plant, Cell and Environment* **25**: 95-103 <doi: 10.1046/j.0016-8025.2001.00803.x>
- 76) Adams WW III, Demmig-Adams B, Rosenstiel TN, Ebbert V (2001) Dependence of photosynthesis and energy dissipation activity upon growth form and light environment during the winter. *Photosynthesis Research* **67**: 51-62 <doi: 10.1023/A:1010688528773>
  - 75) Ebbert V, Demmig-Adams B, Adams WW III, Mueh KE, Staehelin LA (2001) Correlation between persistent forms of zeaxanthin-dependent energy dissipation and thylakoid protein phosphorylation. *Photosynthesis Research* **67**: 63-78 <doi: 10.1023/A:1010640612843>
  - 74) Adams WW III, Demmig-Adams B, Rosenstiel TN, Ebbert V, Brightwell AK, Barker DH, Zarter CR (2001) Photosynthesis, xanthophylls, and D1 phosphorylation under winter stress. *In*: PS2001, Vol. 3, Number 1. Proceedings of the 12th International Congress on Photosynthesis. CSIRO Publishing: Melbourne, Australia, 2001. <doi: 10.1071/SA0403060> <http://www.publish.csiro.au/sa/pdf/SA0403060>
  - 73) Demmig-Adams B, Adams WW III (2001) Starklichtstreß: Photoprotektion durch Umwandlung der Xanthophylle. *In* Larcher W, Ökophysiologie der Pflanzen. 6th edition. Eugen Ulmer, Stuttgart, pp 293-295
  - 72) Demmig-Adams B, Adams WW III (2000) Harvesting sunlight safely. *Nature* **403**: 371-374 <doi: 10.1038/35000315>
  - 71) Adams WW III, Demmig-Adams B, Logan BA, Barker DH, Osmond CB (1999) Rapid changes in xanthophyll cycle-dependent energy dissipation and photosystem II efficiency in two vines, *Stephania japonica* and *Smilax australis*, growing in the understorey of an open *Eucalyptus* forest. *Plant, Cell and Environment* **22**: 125-136 <doi: 10.1046/j.1365-3040.1999.00369.x>
  - 70) Verhoeven AS, Adams WW III, Demmig-Adams B (1999) The xanthophyll cycle and acclimation of *Pinus ponderosa* and *Malva neglecta* to winter stress. *Oecologia* **118**: 277-287 <doi: 10.1007/s004420050728>
  - 69) Verhoeven AS, Adams WW III, Demmig-Adams B, Croce R, Bassi R (1999) Xanthophyll cycle pigment localization and dynamics during exposure to low temperatures and light stress in *Vinca major*. *Plant Physiology* **120**: 727-737 <doi: 10.1104/pp.120.3.727>
  - 68) Logan BA, Demmig-Adams B, Rosenstiel TN, Adams WW III (1999) Effect of nitrogen limitation on foliar antioxidants in relationship to other metabolic characteristics. *Planta* **209**: 213-220 <doi: 10.1007/s004250050625>
  - 67) Demmig-Adams B, Adams WW III, Ebbert V, Logan BA (1999) Ecophysiology of the xanthophyll cycle. *In* Frank HA, Young AJ, Britton G, Cogdell RJ (eds) The Photochemistry of Carotenoids. Advances in Photosynthesis, Vol. 8. Kluwer Academic Publishers, Dordrecht, pp. 245-269 <doi: 10.1007/0-306-48209-6\_14>
  - 66) Logan, BA, Demmig-Adams B, Adams WW III (1999) Acclimation of photosynthesis to the environment. *In* Singhal GS, Renger G, Sopory SK, Irrgang K-D, Govindjee (eds) Concepts in Photobiology. Photosynthesis and Photomorphogenesis. Narosa Publishing House, New Dehli, pp. 477-512
  - 65) Adams WW III, Barker DH (1998) Seasonal changes in xanthophyll cycle-dependent energy dissipation in *Yucca glauca* Nuttall. *Plant, Cell and Environment* **21**: 501-512 <doi: 10.1046/j.1365-3040.1998.00283.x>
  - 64) Verhoeven AS, Adams WW III, Demmig-Adams B (1998) Two forms of sustained xanthophyll cycle-dependent energy dissipation in overwintering *Euonymus kiautschovicus*. *Plant, Cell and Environment* **21**: 893-903 <doi: 10.1046/j.1365-3040.1998.00338.x>
  - 63) Grace SC, Logan BA, Adams WW III (1998) Seasonal differences in foliar content of chlorogenic acid, a phenylpropanoid antioxidant, in *Mahonia repens*. *Plant, Cell and Environment* **21**: 513-521 <doi: 10.1046/j.1365-3040.1998.00282.x>
  - 62) Logan BA, Grace SC, Adams WW III, Demmig-Adams B (1998) Seasonal differences in xanthophyll cycle characteristics and antioxidants in *Mahonia repens* growing in different light environments. *Oecologia* **116**: 9-17 <doi: 10.1007/PL00013823>
  - 61) Logan BA, Demmig-Adams B, Adams WW III, Grace SC (1998) Antioxidants and xanthophyll cycle-dependent energy dissipation in *Cucurbita pepo* L. and *Vinca major* L. acclimated to four growth PPFs in the field. *Journal of Experimental Botany* **49**: 1869-1879 <doi: 10.1093/jxb/49.328.1869>
  - 60) Logan BA, Demmig-Adams B, Adams WW III (1998) Antioxidants and xanthophyll cycle-dependent energy dissipation in *Cucurbita pepo* L. and *Vinca major* L. upon a sudden increase in growth PPF in the field. *Journal of Experimental Botany* **49**: 1881-1888 <doi: 10.1093/jxb/49.328.1881>
  - 59) Demmig-Adams B, Moeller DL, Logan BA, Adams WW III (1998) Positive correlation between levels of retained zeaxanthin plus antheraxanthin and degree of photoinhibition in shade leaves of *Schefflera arboricola* (Hayata) Merrill. *Planta* **205**: 367-374 <doi: 10.1007/s004250050332>

- 58) Barker DH, Logan BA, Adams WW III, Demmig-Adams B (1998) Photochemistry and xanthophyll cycle-dependent energy dissipation in differently oriented cladodes of *Opuntia stricta* during the winter. *Australian Journal of Plant Physiology* **25**: 95-104 <doi: 10.1071/PP97106>
- 57) Barker DH, Adams WW III (1997) The xanthophyll cycle and energy dissipation in differently oriented faces of the cactus *Opuntia macrorhiza*. *Oecologia* **109**: 353-361 <doi: 10.1007/s004420050093>
- 56) Logan BA, Barker DH, Adams WW III, Demmig-Adams B (1997) The response of xanthophyll cycle-dependent energy dissipation in *Alocasia brisbanensis* to sunflecks in a subtropical rainforest. *Australian Journal of Plant Physiology* **24**: 27-33 <doi: 10.1071/PP96059>
- 55) Verhoeven AS, Demmig-Adams B, Adams WW III (1997) Enhanced employment of the xanthophyll cycle and thermal energy dissipation in spinach exposed to high light and nitrogen stress. *Plant Physiology* **113**: 817-824 <doi: 10.1104/pp.113.3.817>
- 54) Demmig-Adams B, Adams WW III, Grace SC (1997) Physiology of light tolerance in plants. *Horticultural Reviews* **18**: 215-246
- 53) Demmig-Adams B, Adams WW III (1996) The role of xanthophyll cycle carotenoids in the protection of photosynthesis. *Trends in Plant Science* **1**: 21-26 <doi: 10.1016/S1360-1385(96)80019-7>
- 52) Demmig-Adams B, Gilmore AM, Adams WW III (1996) In vivo functions of carotenoids in higher plants. *The FASEB Journal* **10**: 403-412 available at <http://www.fasebj.org/content/10/4/403.full.pdf+html>
- 51) Demmig-Adams B, Adams WW III (1996) Xanthophyll cycle and light stress in nature: uniform response to excess direct sunlight among higher plant species. *Planta* **198**: 460-470 <doi: 10.1007/BF00620064>
- 50) Verhoeven AS, Adams WW III, Demmig-Adams B (1996) Close relationship between the state of the xanthophyll cycle pigments and photosystem II efficiency during recovery from winter stress. *Physiologia Plantarum* **96**: 567-576 <doi: 10.1111/j.1399-3054.1996.tb00228.x>
- 49) Logan BA, Barker DH, Demmig-Adams B, Adams WW III (1996) Acclimation of leaf carotenoid composition and ascorbate levels to gradients in the light environment within an Australian rainforest. *Plant, Cell and Environment* **19**: 1083-1090 <doi: 10.1111/j.1365-3040.1996.tb00215.x>
- 48) Demmig-Adams B, Adams WW III, Barker DH, Logan BA, Bowling DR, Verhoeven AS (1996) Using chlorophyll fluorescence to assess the fraction of absorbed light to thermal dissipation of excess excitation. *Physiologia Plantarum* **98**: 253-264 <doi: 10.1034/j.1399-3054.1996.980206.x>
- 47) Demmig-Adams B, Adams WW III (1996) Chlorophyll and carotenoid composition in leaves of *Euonymus kiautschovicus* acclimated to different degrees of light stress in the field. *Australian Journal of Plant Physiology* **23**: 649-659 <doi: 10.1071/PP9960649>
- 46) Adams WW III, Demmig-Adams B, Barker DH, Kiley S (1996) Carotenoids and photosystem II characteristics of upper and lower halves of leaves acclimated to high light. *Australian Journal of Plant Physiology* **23**: 669-677 <doi: 10.1071/PP9960669>
- 45) Adams WW III, Demmig-Adams B (1996) Energy dissipation and the xanthophyll cycle in CAM plants. In Winter K, Smith JAC (eds) *Crassulacean Acid Metabolism. Biochemistry, Ecophysiology, and Evolution. Ecological Studies* vol. 114. Springer, Berlin, pp. 97-114 <doi: 10.1007/978-3-642-79060-7\_8>
- 44) Adams WW III, Demmig-Adams B, Verhoeven AS, Barker DH (1995) 'Photoinhibition' during winter stress: Involvement of sustained xanthophyll cycle-dependent energy dissipation. *Australian Journal of Plant Physiology* **22**: 261-276 <doi: 10.1071/PP9950261>
- 43) Adams WW III, Demmig-Adams B (1995) The xanthophyll cycle and sustained thermal energy dissipation activity in *Vinca minor* and *Euonymus kiautschovicus* in winter. *Plant, Cell and Environment* **18**: 117-127 <doi: 10.1111/j.1365-3040.1995.tb00345.x>
- 42) Adams WW III, Hoehn A, Demmig-Adams B (1995) Chilling temperatures and the xanthophyll cycle. A comparison of warm-grown and overwintering spinach. *Australian Journal of Plant Physiology* **22**: 75-85 <doi: 10.1071/PP9950075>
- 41) Demmig-Adams B, Adams WW III, Logan BA, Verhoeven AS (1995) Xanthophyll cycle-dependent energy dissipation and flexible PSII efficiency in plants acclimated to light stress. *Australian Journal of Plant Physiology* **22**: 249-260 <doi: 10.1071/PP9950249>
- 40) Adams WW III, Demmig-Adams B (1994) Carotenoid composition and down regulation of photosystem II in three conifer species during the winter. *Physiologia Plantarum* **92**: 451-458 <doi: 10.1034/j.1399-3054.1994.920313.x>
- 39) Demmig-Adams B, Adams WW III (1994) Capacity for energy dissipation in the pigment bed in leaves with different xanthophyll cycle pools. *Australian Journal of Plant Physiology* **21**: 575-588 <doi: 10.1071/PP9940575>



- 38) Falbel TG, Staehelin LA, Adams WW III (1994) Analysis of xanthophyll cycle carotenoids and chlorophyll fluorescence in light intensity-dependent chlorophyll-deficient mutants of wheat and barley. *Photosynthesis Research* **42**: 191-202 <doi: 10.1007/BF00018262>
- 37) Demmig-Adams B, Adams WW III (1994) Light stress and photoprotection related to the xanthophyll cycle. In Foyer C, Mullineaux P (eds) Causes of Photooxidative Stress and Amelioration of Defense Systems in Plants. CRC Press, Boca Raton, pp 105-126
- 36) Adams WW III, Demmig-Adams B, Lange OL (1993) Carotenoid composition and metabolism in green and blue-green algal lichens in the field. *Oecologia* **94**: 576-584 <doi: 10.1007/BF00566975>
- 35) Demmig-Adams B, Adams WW III (1993) The xanthophyll cycle, protein turnover, and the high-light tolerance of sun-acclimated leaves. *Plant Physiology* **103**: 1413-1420 <doi: 10.1104/pp.103.4.1413>
- 34) Adams WW III, Demmig-Adams B (1993) Energy dissipation and photoprotection in leaves of higher plants. In Yamamoto HY, Smith CM (eds) Photosynthetic Responses to the Environment. Current Topics in Plant Physiology: An American Society of Plant Physiologists Series, Rockville, Maryland, pp 27-36
- 33) Demmig-Adams B, Adams WW III (1993) The Xanthophyll Cycle. In Young A, Britton G (eds) Carotenoids in Photosynthesis. Chapman and Hall, London, pp 206-251
- 32) Demmig-Adams B, Adams WW III (1993) The Xanthophyll Cycle. In Alscher RG, Hess JL (eds) Antioxidants in Higher Plants. CRC Press, Boca Raton, pp 91-110
- 31) Adams WW III, Demmig-Adams B (1992) Operation of the xanthophyll cycle in higher plants in response to diurnal changes in incident sunlight. *Planta* **186**: 390-398 <doi: 10.1007/BF00195320>
- 30) Adams WW III, Volk M, Hoehn A, Demmig-Adams B (1992) Leaf orientation and the response of the xanthophyll cycle to incident light. *Oecologia* **90**: 404-410 <doi: 10.1007/BF00317698>
- 29) Demmig-Adams B, Adams WW III (1992) Carotenoid composition in sun and shade leaves of plants with different life forms. *Plant, Cell and Environment* **15**: 411-419 <doi: 10.1111/j.1365-3040.1992.tb00991.x>
- 28) Monson RK, Jaeger CH, Adams WW III, Driggers EM, Silver GM, Fall R (1992) Relationships among isoprene emission rate, photosynthesis, and isoprene synthase activity as influenced by temperature. *Plant Physiology* **98**: 1175-1180 <doi: 10.1104/pp.98.3.1175>
- 27) Demmig-Adams B, Adams WW III (1992) Photoprotection and other responses of plants to high light stress. *Annual Review of Plant Physiology and Plant Molecular Biology* **43**: 599-626 <doi: 10.1146/annurev.arplant.43.1.599>
- 26) Demmig-Adams B, Adams WW III (1991) Light, photosynthesis, and the xanthophyll cycle. In Pell EJ, Steffen KL (eds) Active Oxygen/Oxidative Stress and Plant Metabolism, Current Topics in Plant Physiology, Volume 6, American Society of Plant Physiologists, Rockville, Maryland, pp 171-179
- 25) Adams WW III, Demmig-Adams B, Winter K, Schreiber U (1990) The ratio of variable to maximum chlorophyll fluorescence from photosystem II, measured in leaves at ambient temperature and at 77K, as an indicator of the photon yield of photosynthesis. *Planta* **180**: 166-174 <doi: 10.1007/BF00193991>
- 24) Adams WW III, Winter K, Schreiber U, Schramel P (1990) Photosynthesis and chlorophyll fluorescence characteristics in relationship to changes in pigment and element composition of leaves of *Platanus occidentalis* L. during autumnal leaf senescence. *Plant Physiology* **92**: 1184-1190 <doi: 10.1104/pp.92.4.1184>
- 23) Demmig-Adams B, Adams WW III, Heber U, Neimanis S, Winter K, Krüger A, Czygan F-C, Bilger W, Björkman O (1990) Inhibition of zeaxanthin formation and of rapid changes in radiationless energy dissipation by dithiothreitol in spinach leaves and chloroplasts. *Plant Physiology* **92**: 293-301 <doi: 10.1104/pp.92.2.293>
- 22) Adams WW III, Demmig-Adams B, Winter K (1990) Relative contributions of zeaxanthin-related and zeaxanthin-unrelated types of "high-energy-state" quenching of chlorophyll fluorescence in spinach leaves exposed to various environmental conditions. *Plant Physiology* **92**: 302-309 <doi: 10.1104/pp.92.2.302>
- 21) Demmig-Adams B, Adams WW III (1990) The carotenoid zeaxanthin and "high-energy-state" quenching of chlorophyll fluorescence. *Photosynthesis Research* **25**: 187-197 <doi: 10.1007/BF00033160>
- 20) Demmig-Adams B, Máguas C, Adams III WW, Meyer A, Kilian E, Lange OL (1990) Effect of high light on the efficiency of photochemical energy conversion in a variety of lichen species with green and blue-green phycobionts. *Planta* **180**: 400-409 <doi: 10.1007/BF01160396>
- 19) Demmig-Adams B, Adams WW III, Czygan F-C, Schreiber U, Lange OL (1990) Differences in the capacity for radiationless energy dissipation in green and blue-green algal lichens associated with differences in carotenoid composition. *Planta* **180**: 582-589 <doi: 10.1007/BF02411457>
- 18) Demmig-Adams B, Adams WW III, Green TGA, Czygan F-C, Lange OL (1990) Differences in the susceptibility to light stress in two lichens forming a phycosymbiodeme, one partner possessing and one lacking the xanthophyll cycle. *Oecologia* **84**: 451-456 <doi: 10.1007/BF00328159>

- 17) Cleland RE, Demmig-Adams B, Adams WW III, Winter K (1990) Phosphorylation state of the light-harvesting chlorophyll-protein complex of photosystem II and fluorescence characteristics in *Monstera deliciosa* Liebm. and *Glycine max* (L.) Merrill in response to light. *Australian Journal of Plant Physiology* **17**: 589-599 <doi: 10.1071/PP9900589>
- 16) Adams WW III, Winter K, Lanzl A (1989) Light and the maintenance of photosynthetic competence in leaves of *Populus balsamifera* during short-term exposures to high concentrations of sulfur dioxide. *Planta* **177**: 91-97 <doi: 10.1007/BF00392158>
- 15) Adams WW III, Diaz M, Winter K (1989) Diurnal changes in photochemical efficiency, the reduction state of Q, radiationless energy dissipation, and nonphotochemical fluorescence quenching from cacti exposed to natural sunlight in northern Venezuela. *Oecologia* **80**: 553-561 <doi: 10.1007/BF00380081>
- 14) Demmig-Adams B, Adams WW III, Winter K, Meyer A, Schreiber U, Pereira JS, Krüger A, Czygan F-C, Lange OL (1989) Photochemical efficiency of photosystem II, photon yield of O<sub>2</sub> evolution, photosynthetic capacity, and carotenoid composition during the "midday depression" of net CO<sub>2</sub> uptake in *Arbutus unedo* growing in Portugal. *Planta* **177**: 377-387 <doi: 10.1007/BF00403596>
- 13) Osmond CB, Adams WW III, Smith SD (1989) Crassulacean acid metabolism. In Pearcy RW, Ehleringer JR, Mooney HA, Rundel P (eds) *Plant Physiological Ecology - Field Methods and Instrumentation*. Chapman and Hall, London, pp 255-280
- 12) Adams WW III (1988) Photosynthetic acclimation and photoinhibition of terrestrial and epiphytic CAM tissues growing in full sunlight and deep shade. *Australian Journal of Plant Physiology* **15**: 123-134 <doi: 10.1071/PP9880123>
- 11) Adams WW III, Terashima I, Brugnoli E, Demmig B (1988) Comparisons of photosynthesis and photoinhibition in the CAM vine *Hoya australis* and several C<sub>3</sub> vines growing on the coast of eastern Australia. *Plant, Cell and Environment* **11**: 173-181 <doi: 10.1111/j.1365-3040.1988.tb01134.x>
- 10) Adams WW III, Osmond CB (1988) Internal CO<sub>2</sub> supply during photosynthesis of sun and shade grown CAM plants in relation to photoinhibition. *Plant Physiology* **86**: 117-123 <doi: 10.1104/pp.86.1.117>
- 9) Evans JR, von Caemmerer S, Adams WW III (eds) (1988) *Ecology of Photosynthesis in Sun and Shade*. CSIRO Press, Melbourne. 358 pp
- 8) Adams WW III, Smith SD, Osmond CB (1987) Photoinhibition of the CAM succulent *Opuntia basilaris* growing in Death Valley: evidence from 77K fluorescence and quantum yield. *Oecologia* **71**: 221-228 <doi: 10.1007/BF00377287>
- 7) Adams WW III, Osmond CB, Sharkey TD (1987) Responses of two CAM species to different irradiances during growth and susceptibility to photoinhibition by high light. *Plant Physiology* **83**: 213-218 <doi: 10.1104/pp.83.1.213>
- 6) Martin CE, Adams WW III (1987) Crassulacean acid metabolism, CO<sub>2</sub>-recycling, and tissue desiccation in the Mexican epiphyte *Tillandsia schiedeana* Steud. (Bromeliaceae). *Photosynthesis Research* **11**: 237-244 <doi: 10.1007/BF00055063>
- 5) Adams WW III, Nishida K, Osmond CB (1986) Quantum yields of CAM plants measured by photosynthetic O<sub>2</sub> exchange. *Plant Physiology* **81**: 297-300 <doi: 10.1104/pp.81.1.297>
- 4) Adams WW III, Martin CE (1986) Morphological changes accompanying the transition from juvenile (atmospheric) to adult (tank) forms in the Mexican epiphyte *Tillandsia deppeana* (Bromeliaceae). *American Journal of Botany* **73**: 1207-1214 available at <<http://www.jstor.org/stable/2443800>>
- 3) Adams WW III, Martin CE (1986) Physiological consequences of changes in life form of the Mexican epiphyte *Tillandsia deppeana* (Bromeliaceae). *Oecologia* **70**: 298-304 <doi: 10.1007/BF00379255>
- 2) Adams WW III, Martin CE (1986) Heterophylly and its relevance to evolution within the Tillandsioideae. *Selbyana* **9**: 121-125
- 1) Haufler CH, Adams WW III (1982) Early gametophyte ontogeny of *Gleichenia bifida* (Willd.) Spreng: phylogenetic and ecological implications. *American Journal of Botany* **69**: 1560-1565 <doi: 10.2307/2442910>

#### **Publications in progress**

- Baker CR, Stewart JJ, Amstutz, CL, Johnson JD, Ching LG, Niyogi KK, Adams WW III, Demmig-Adams B (submitted) Role of CBF transcription factors during long-term acclimation to high light and low temperature in two ecotypes of a winter annual. *Plant, Cell and Environment*
- Glime GNE, Stewart JJ, Polutchko SK, Adams WW III, Demmig-Adams B (in revision) Descriptive exploration of foliar xylem traits in three wild sunflowers shows potential for climate resilience. *Plant Biology*

- Adams WW III, Stewart JJ, Demmig-Adams B (in prep) Phenotypic plasticity in leaf form and function reveals the acclimation potential of *Arabidopsis thaliana* ecotypes adapted to different levels of environmental variability. *Frontiers in Plant Science*
- Stewart JJ, Demmig-Adams B, Adams WW III (in prep) Pot size impacts growth and function of *Arabidopsis thaliana* over a wide range of growth light intensities. *Functional Plant Biology*
- Escobar CM, Adams WW III, Stewart JJ, Demmig-Adams B (in prep) Duckweed: a robust crop for bioregenerative life support. *Proceedings of the International Conference on Environmental Systems 2020*
- Polutchko SK, Stewart JJ, Demmig-Adams B, Adams WW III (in prep) Photosynthesis and foliar vascular adjustments to growth light intensity in summer annual species with symplastic and apoplastic phloem loading.
- Jenkins MW, Stewart JJ, Demmig-Adams B, Adams WW III (in prep) Assessing photosynthesis via oxygen and carbon dioxide exchange.
- Adams WW III, Demmig-Adams B (in prep) Foliar solar panels: feeding life's electrical grid. *Scientific American*

### **Grants Awarded**

- Co-Optimization of Duckweed Biomass, Nutritional Quality, & Input-Use Efficiency (2019-2020) \$799,991 from the Translational Research Institute for Space Health – Biomedical Research Advances for Space Health 1801 (under a cooperative agreement with NASA). Co-PI with Barbara Demmig-Adams and Co-I Christine Escobar (Space Lab Technologies)
- IGERT: Interdisciplinary Quantitative Biology Program (2012-2017). \$3,000,000 from the National Science Foundation. Other Senior Personnel with PIs Thomas Cech, Kristi Anseth, Meredith Betterton, Robin Dowell, and Manuel Lladser
- Collaborative Research (Arabidopsis 2010): Ecological Genomics of Adaptation to the Environment (2010-2015). \$3,154,225 (\$587,908 to the University of Colorado) from the National Science Foundation. Co-PI with Barbara Demmig-Adams, Douglas Schemske and Michael Thomashow (MSU), and John McKay (CSU).
- Increasing Teaching Effectiveness in Ecology and Evolutionary Biology (2011-2015). \$480,000 from the Science Education Initiative at the University of Colorado. Co-PI with Andrew Martin, Nichole Barger, John Basey, Barbara Demmig-Adams, and Samuel Flaxman.
- Assessing the Impact of Early, Individualized Faculty and TA Interventions for At-Risk Students (2013-2014). \$10,000 from the STEM Chancellor's Award. Part of the National Science Foundation award to the University of Colorado entitled "13: Towards a Center for STEM Education". Co-PI with Barbara Demmig-Adams and Sarah Wise.
- EAGER: Assessing Functional Diversity of Algal Communities at the Single Cell Level with a Compact Multi-function Microfluidic Cytometer (2011-2013). \$205,000 from the National Science Foundation. Co-PI with Barbara Demmig-Adams, Ralph Jimenez, & William M. Lewis
- Photosynthesis and Phloem Anatomy (2009-2013). \$486,203 from the National Science Foundation. Co-PI with Barbara Demmig-Adams
- Novel Dissection of Temperature Tolerance in the Model Plant Arabidopsis (2010-2013). \$43,750 from the Office of the VCR Innovative Seed Grant Program at the University of Colorado. Co-PI with Barbara Demmig-Adams and Douglas Schemske (Michigan State University).
- Developing a Roadmap to the Diatoms with Greatest Oil Production (2011-2013). \$44,000 from the Office of the VCR Innovative Seed Program at the University of Colorado. Co-PI with J Pat Kocielek, Ralph Jimenez, Barbara Demmig-Adams, and William M. Lewis
- Extractive Photobioreactor (2011-2012). \$524,819 (\$188,048 to Demmig-Adams & Adams) from ConocoPhillips. Co-PI with John Pellegrino, Robert Davis, and Barbara Demmig-Adams
- Defining a Mechanistic Link Between Stand Thinning, Drought Stress, and Risk of Mortality from Pine Bark Beetles in Californian Yellow Pine (2007-2011). CU's portion \$157,020 from the United States Department of Agriculture. Co-PI with Barbara Demmig-Adams, PI for California portion Nancy Grulke (Forest Service, Riverside, CA), and Steve Seybold (Forest Service, Davis, CA)
- Optimization of Light Use Efficiency for Algal Production of Glycerol as a Precursor for Transport Fuels (2009-2010). \$219,193 from Conoco-Phillips. Co-PI with Barbara Demmig-Adams
- Identification of Novel Biomolecules for Improved Biological Production of Alternative Fuels from Solar Energy (2007-2009). \$40,000 from the Energy Initiative University of Colorado/NREL Seed Grant Program. Co-PI with Barbara Demmig-Adams, Matthew Posewitz (CSM), and Michael Seibert (NREL)
- Supplementary Research Opportunity Award to Collaborative Research: Photosynthetic Acclimation, Photoprotection, and Phloem Loading (2005-2007). \$24,952 from the National Science Foundation. PI with Barbara Demmig-Adams

- Collaborative Research: Photosynthetic Acclimation, Photoprotection, and Phloem Loading (2003-2007). \$454,007 (\$386,638 to the University of Colorado) from the National Science Foundation. PI with Barbara Demmig-Adams and Robert Turgeon (Cornell University)
- Seasonal Changes in the Productivity of Evergreen Forests: Toward an Understanding of what it Takes to be “Evergreen” and How Seasonal Changes are Orchestrated (2002-2005). \$260,000 from the Andrew W. Mellon Foundation. PI with Barbara Demmig-Adams
- Protein Phosphorylation and Xanthophyll Cycle Dynamics Dependent on Lifeform (2000-2003) \$150,000 from the United States Department of Agriculture. Co-PI with Barbara Demmig-Adams
- Photoprotection during Winter Stress (1999-2001) \$100,000 from the National Science Foundation. PI with Barbara Demmig-Adams
- Photoprotection during Winter Stress (1996-1998) \$200,486 from the National Science Foundation. PI with Barbara Demmig-Adams
- Interaction of Photoprotective Processes in Plants (1994-1997) \$185,000 from the United States Department of Agriculture. Co-PI with Barbara Demmig-Adams
- Biosphere/Atmosphere Interactions: Biochemical Causes to Global Implications (1994-1999) \$1,699,837 from the National Science Foundation. Co-PI with 20 other investigators
- Replacement and Modernization of Greenhouse Facilities (1994-1996) \$202,500 from the National Science Foundation. Co-PI with 4 other investigators
- Improvement of Laboratories in Plant Physiology and Plant Ecophysiology at the University of Colorado in Boulder (1993-1995) \$90,000 from the National Science Foundation and the University of Colorado. PI with Barbara Demmig-Adams and Russell Monson
- Carotenoids and Photoprotection in CAM plants (1992-1995) \$126,000 from the National Science Foundation. PI with Barbara Demmig-Adams
- Grant to support research during three months as a Visiting Fellow in Australia (1994) A\$18,000 from the Research School of Biological Sciences, Australian National University, Canberra, Australia.
- Remote Sensing of Actual Photosynthesis Rates of Vegetation under Changing Environmental Conditions (1991-1992) \$17,971 from the University of Colorado Global Change & Environmental Quality Program. Co-PI with Barbara Demmig-Adams
- Carotenoids and Photoprotection in Various Crop Species (1990-1992) \$100,000 from the United States Department of Agriculture. Co-PI with Barbara Demmig-Adams
- Purchase of Nine Controlled Environment Growth Chambers (1990-1991) \$113,015 from the National Science Foundation. Co-PI with 4 other investigators

### **Oral Presentations**

- “Space Veggies: Regenerative Life Support System, Food, and Inflammation-Fighting Micronutrients”, 8<sup>th</sup> Annual Technical Symposium, ATS-2019 AIAA Rocky Mountain Section Annual Symposium, University of Colorado, Boulder, CO, 19 November 2019. B Demmig-Adams, CM Escobar, JJ Stewart, G Glime, CM Zeller, ND Garcia, & WW Adams III
- “Leaf Phenotypic Plasticity Mirrors Environmental Variability among Ecotypes of *Arabidopsis thaliana* Adapted to Sites Differing in Temperature, Daylength, and Precipitation”, International Conference on Integrative Plant Physiology, Sitges, Spain, 27-29 October 2019. WW Adams III, JJ Stewart, & B Demmig-Adams
- “Integrative Plant Physiology for Climate-Resilient Crops”, International Conference on Integrative Plant Physiology, Sitges, Spain, 27-29 October 2019. B Demmig-Adams & WW Adams III
- “From Photoinhibition to Carbon Export Capacity Supporting High Photosynthetic Rates to Growing Like a Duckweed”, A Symposium Celebrating Barry Osmond – Reflections in a Flash, Research School of Biology, Australian National University, Canberra, Australia, 12-13 September 2019. WW Adams III & B Demmig-Adams
- “Adaptation and Acclimation of Foliar Vasculature, Photosynthesis, and Transpiration among Herbaceous Species”, Annual Meeting of the Ecological Society of America, Louisville, KY, 11-16 August 2019. WW Adams III, JJ Stewart, & B Demmig-Adams
- “Context-Dependent Interpretation of Fluorescence- and Pigment-Based Indicators of Plant Status”, Annual Meeting of the Ecological Society of America, Louisville, KY, 11-16 August 2019. B Demmig-Adams, JJ Stewart, & WW Adams III
- “Paradigm Shift for Climate-Resilient Crops: May Less Photoprotection be Beneficial in Some Environments?”, Gordon Research Conference on Photosynthesis: From the Biophysics of Natural and Artificial Photosynthesis to Bioenergy Conversion, Sunday River Conference Facilities, Newry, ME, 21-26 July 2019. WW Adams III,

- JJ Stewart, & B Demmig-Adams
- “Photosynthetic Upregulation Relies on Increased Capacity for Foliar Sugar Export”, Gordon Research Conference on Photosynthetic Plasticity: From the Environment to Synthetic Systems, Sunday River Conference Facilities, Newry, ME, 16-21 July 2017. [WW Adams III](#) & B Demmig-Adams
- “Acclimation of *Arabidopsis thaliana* Foliar Vasculature, Photosynthesis, and Transpiration Dependent on Environment”, 26<sup>th</sup> Western Photosynthesis Conference, Marconi Conference Center, CA, 5-8 January 2017. [WW Adams III](#), JJ Stewart, SK Polutchko, & B Demmig-Adams
- “Linking Foliar Vascular Metrics to Photosynthesis and Transpiration”, Keynote Speaker, Gordon Research Conference on Multiscale Plant Vascular Biology – Identifying Interdisciplinary Opportunities for a New Era of Plant Vascular Biology, Sunday River Conference Facilities, Newry, ME, 26 June – 1 July 2016. [WW Adams III](#) & B Demmig-Adams
- “Foliar Vasculature, Photosynthesis, and Transpiration in *Arabidopsis thaliana* Ecotypes from Uncoupled Temperature and Precipitation Clines”, Plant Super Group Seminar, Colorado State University, Fort Collins, CO, 1 April 2016. [WW Adams III](#) & B Demmig-Adams
- “Leaf Vasculature as Determined by Environment, Tocopherol Status, and Species”, Plant Super Group Seminar, Colorado State University, Fort Collins, CO, 1 April 2016. [B Demmig-Adams](#) & [WW Adams III](#)
- “Leaf Vasculature and Photosynthesis”, 25<sup>th</sup> Western Photosynthesis Conference, Devil’s Thumb Ranch Conference Center, Tabernash, CO, 3-6 January 2016. [WW Adams III](#), JJ Stewart, & B Demmig-Adams
- “Adjustments in Photosynthesis, Growth, and Leaf Vasculature in Response to Growth Environment and Tocopherol Status”, 25<sup>th</sup> Western Photosynthesis Conference, Devil’s Thumb Ranch Conference Center, Tabernash, CO, 3-6 January 2016. [B Demmig-Adams](#), JJ Stewart, & [WW Adams III](#)
- “Maximizing the Conversion of Photons to Electrons in Algae and Plants”, Energy Transport Materials and Systems: Designing for Adaptive Character and Emergent Properties, ICAM Energy Transport Workshop, Renewable and Sustainable Energy Institute, Boulder, CO, 14-16 December 2015. [B Demmig-Adams](#) & [WW Adams III](#)
- “Foliar Phloem Features Underlying Photosynthetic Capacity”, 24<sup>th</sup> Western Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 8-11 January 2015. [WW Adams III](#), JJ Stewart, & B Demmig-Adams
- “Pushing the Limits of Photosynthesis: Placing Photosynthetic Light Harvesting Into Context”, 24<sup>th</sup> Western Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 8-11 January 2015. [B Demmig-Adams](#), JJ Stewart, TA Burch, & [WW Adams III](#)
- “What Limits Photosynthesis?”, Biology, Energy, Technology Workshop, Canadian Institute for Advanced Research, Toronto, Canada, 24-26 January 2014. [B Demmig-Adams](#) & [WW Adams III](#)
- “Photosynthesis, Photoprotection, and the Environment”, Ecological Genomics of *Arabidopsis* meeting, Fort Collins, CO, 10-11 December 2011. [B Demmig-Adams](#) & [WW Adams III](#)
- “Photosynthetic Capacity and Anatomical Features of *Arabidopsis thaliana* Ecotypes from Italy and Sweden”, Ecological Genomics of *Arabidopsis* meeting, Fort Collins, CO, 10-11 December 2011. [C Cohu](#), O Muller, B Demmig-Adams, & [WW Adams III](#)
- “Phloem Loading, Leaf Architecture, and Photosynthetic Capacity”, Department of Plant Physiology, Umeå Plant Science Centre, Umeå Universitet, 17 November 2011. [WW Adams III](#) & B Demmig-Adams
- “Photosynthesis, Photoprotection, and the Environment”, Keynote address, Kriton-Hatzios Symposium on Abiotic Stress, Southern Section of the American Society of Plant Biologists’ Annual Meeting, Gulf Coast Research Laboratory University of Southern Mississippi, Ocean Springs, MS, 9-11 April 2011 (presentation on April 11). [B Demmig-Adams](#) & [WW Adams III](#)
- “Contrasting Features of Photoprotective Energy Dissipation in Plants with Different Growth Habits”, International Workshop on “Mechanisms of Non-photochemical Quenching”, EU Marie Curie Network “HARVEST”, Passau, Germany, 6-10 April 2011 (presentation on April 8). [B Demmig-Adams](#) & [WW Adams III](#)
- “Phloem Anatomy and Photosynthetic Capacity”, International Conference on Plant Vascular Biology 2010, Columbus, OH, 23-29 July 2010. [WW Adams III](#), V Amiard, R Turgeon, & B Demmig-Adams
- “Adjustment of Leaf Structure and Function to Cold Temperature”, International Conference on Plant Vascular Biology 2010, Columbus, OH, 23-29 July 2010. [B Demmig-Adams](#), M Dumlao, R Leyva, & [WW Adams III](#)
- “Regulation and Acclimation of Photoprotection: Dependence on Species and Environmental Conditions”, Department of Botany, Oklahoma State University, Stillwater, OK, 20 January 2009
- “Maximizing Solar Energy Conversion Efficiency in Photosynthesis”, Joint Air Force Office of Science Research and National Renewable Energy Laboratory Research Meeting: Work-in-Progress, Golden, CO, 8-9 January 2009. [B Demmig-Adams](#) & [WW Adams III](#)

- “Implications for Forest Management under a Changing Climate: Linking Ozone and Drought Stress to Tree Mortality” Air Pollution Workshop, Raleigh, NC, 8 April 2008. NE Grulke, SJ Seybold, B Demmig-Adams, WW Adams III, DM Rizzo, & AD Graves
- “Forest Health and Disturbance: Defining a Mechanistic Link between Tree Drought Stress and Risk of Mortality from Pine Bark Beetles in Jeffrey Pine” USDA Forest Service Region 5, Regional Leadership Team Meeting, Sacramento, CA, 2 April 2008. NE Grulke, SJ Seybold, B Demmig-Adams, WW Adams III, DM Rizzo, & AD Graves
- “Photosynthetic Capacity and Minor Loading Veins”, 17<sup>th</sup> Western Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 3-6 January 2008. WW Adams III, R Turgeon, & B Demmig-Adams
- “Variations in Acclimation of Photosynthesis & Photoprotection in Overwintering Plants”, 17<sup>th</sup> Western Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 3-6 January 2008. B Demmig-Adams, MR Dumlao, & WW Adams III
- “An Integrative View of Photoprotection”, Japan-US Workshop (jointly sponsored by the Japan Ministry of Science & Education and the US National Science Foundation) on Phenotypic Plasticity in Response to Environmental Changes: Scaling from the Molecular to the Ecosystem Levels, Nikko Botanical Gardens, University of Tokyo, Japan, 23-26 October 2007. WW Adams III & B Demmig-Adams
- “Novel Genes in Photoprotection and Stress Adaptation?”. Collaborative Plant Biology in the Rocky Mountain / Midwest: Impacts and Future Prospects for Plant Genomics, University of Wyoming, 1-3 June 2006. B Demmig-Adams, V Ebbert, K Danna, WW Adams III
- “Novel Genes in Photoprotection and Stress Adaptation of Evergreen Species”. Keystone Conference on “Plant Responses to Abiotic Stress”, Copper Mountain, Colorado, 8-12 April 2006. B Demmig-Adams, V Ebbert, & WW Adams III
- “Seasonal Adjustments in Photosynthesis and Photoprotection”, Keynote Speaker for symposium entitled: Responses to Winter – from Ecosystem to Gene, XVII International Botanical Congress, Vienna, Austria, 17-23 July 2005. WW Adams III & B Demmig-Adams
- “Photoprotective Energy Dissipation and the Bigger Picture”, Keynote speaker for symposium entitled: Antioxidants, Gene Regulation, and Environment, XVII International Botanical Congress, Vienna, Austria, 18-23 July 2005. B Demmig-Adams, V Ebbert, KE Mueh, & WW Adams III
- “Responses of Plants to Excess Light”, Department of Biological Sciences, University of Nevada, Las Vegas, NV, 5 November 2004
- “Role of Phloem Loading Type in the Plasticity of Photosynthetic Acclimation to Light Environment”, 13<sup>th</sup> International Congress of Photosynthesis, Montréal, Canada, 29 August – 3 September 2004. WW Adams III, VSE Amiard, KEM Bachmann, R Turgeon, & B Demmig-Adams
- “Multiple Mechanisms of Zeaxanthin Function in Thermal Dissipation, Photoinhibition, and Signal Transduction”, 13<sup>th</sup> International Congress of Photosynthesis, Montréal, Canada, 29 August – 3 September 2004. B Demmig-Adams, V Ebbert, CR Zarter, KEM Bachmann, VSE Amiard, A Sokolenko, AK Mattoo, & WW Adams III
- “Role of Phloem Loading Type in the Plasticity of Photosynthetic Acclimation to Light Environment”, Plasmodesmata 2004, Fifth International Conference, Pacific Grove, CA, 17-21 August 2004. VSE Amiard, KEM Bachmann, R Turgeon, B Demmig-Adams, & WW Adams III
- “An Integrative View of Photoprotection”, Department of Plant Biology, Cornell University, Ithaca, NY, 24 October 2003
- “Photosynthesis and Photoprotection During Winter”, Annual Meeting of the American Society of Plant Biologists, Denver, CO, 3-7 August 2002. B Demmig-Adams & WW Adams III
- “Growth Form and Light Environment Determinants of Photosynthetic Acclimation to Winter Stress”, 12<sup>th</sup> International Congress on Photosynthesis. Brisbane, Australia, 18-23 August 2001. WW Adams III & B Demmig-Adams
- “Regulatory and Acclimatory Responses of Xanthophyll Cycle-Dependent Energy Dissipation”, USDA Vegetable Laboratory, Beltsville Agricultural Research Center, MD, 30 March 2001
- “Seasonal Adjustments in Photosynthesis and Energy Dissipation in Overwintering Plants”, Gordon Research Conference on Temperature Stress in Plants. Ventura, CA, 28 January to 1 February 2001. WW Adams III & B Demmig-Adams
- “Modulation of the Xanthophyll Cycle by the Environment” and “Zeaxanthin retention, sustained energy dissipation, and protein phosphorylation”, European Science Foundation (ESF) Workshop on “Non-Photochemical Quenching and the Xanthophyll Cycle – Mechanisms and Implications”, Weizmann Institute of Science, Rehovot, Israel, 12-15 October 1999. B Demmig-Adams & WW Adams III

- "How is Continuous Energy Dissipation Maintained under Stress? From the Whole Plant to the Chloroplast", Symposium on "Light and Photosynthesis: From the Molecule to the Globe" sponsored by the Carnegie Institution of Washington, Napa, CA, 28-30 August 1999. B Demmig-Adams & WW Adams III
- "Relationships among Zeaxanthin, Photoinhibition, and Carbohydrate Status in Shade Leaves Exposed to High Light", 7th Western Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 8-11 January 1998. B Demmig-Adams & WW Adams III
- "The Xanthophyll Cycle and Regulation of the Efficiency of Solar Energy Conversion", International Conference on 'Molecular to Global Photosynthesis'. Imperial College of Science, London, United Kingdom, 28-29 March 1996. B Demmig-Adams & WW Adams III
- "Involvement of the Xanthophyll Cycle in the Phenomenon of Photoinhibition", Fifth Western Photosynthesis Conference. Asilomar Conference Center, Pacific Grove, 9-12 January 1996. B Demmig-Adams & WW Adams III
- "Xanthophyll Cycle and Diurnal PSII Regulation", Special Mini-Symposium on "The Xanthophyll Cycle and Photoprotective Energy Dissipation". Annual Meeting of the American Society of Plant Physiology. Charlotte, NC, 2 August 1995. B Demmig-Adams & WW Adams III
- "Xanthophyll Cycle and Temporal Flexibility in Regulation of Thermal Energy Dissipation: Seconds to Seasons", Annual meeting of the American Society of Plant Physiology. Charlotte, NC, 1 August 1995. WW Adams III and B Demmig-Adams
- "The Xanthophyll Cycle in the Understory of Different Australian Forests", Department of Botany, University of California at Davis, 7 September 1994
- "Photoinhibition' During Winter Stress", Robertson Symposium on "Chlorophyll Fluorescence, Origin, Measurements, Interpretations, and Applications", Australian National University, Canberra, 27-29 May 1994. WW Adams III & B Demmig-Adams
- "Using Chlorophyll Fluorescence to Assess the Dynamics of Xanthophyll-Associated Energy Dissipation", Robertson Symposium on "Chlorophyll Fluorescence", Research School of Biological Sciences, Australian National University, Canberra, Australia, 27-29 May 1994. B Demmig-Adams & WW Adams III
- "Photoprotection and the Xanthophyll Cycle under Chilling Stress", 4th Western Regional Photosynthesis Conference. Asilomar Conference Center, Pacific Grove, CA, 4-7 January 1994. WW Adams III & B Demmig-Adams
- "Photoprotection and the Xanthophyll Cycle: Capacity for Energy Dissipation in Leaves with Different Xanthophyll Cycle Pool Sizes", 4th Western Regional Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 4-7 January 1994. B Demmig-Adams & WW Adams III
- "Down Regulation of PS II Efficiency: Ecophysiological Aspects", Gordon Research Conference on Photosynthetic CO<sub>2</sub> Fixation and Metabolism. Irsee, Germany, 10-15 October 1993. WW Adams III & B Demmig-Adams
- "High Light Stress and the Xanthophyll Cycle", XVth International Botanical Congress, Tokyo (Yokohama), Japan, 28 August – 3 September 1993. B Demmig-Adams & WW Adams III
- "Energy Dissipation and the Xanthophyll Cycle in CAM Plants", International Workshop on Crassulacean Acid Metabolism. Panama City, 21-26 March 1993
- "The Xanthophyll Cycle and Energy Dissipation in Plants", Department of Botany, University of Wyoming, Laramie, 5 March 1993
- "Photoprotection of the Photosynthetic Apparatus through the Carotenoid Zeaxanthin", Photosynthetic Responses to the Environment, Satellite meeting for the IX International Congress on Photosynthesis, Kona, Hawaii, 25-27 August 1992. B Demmig-Adams & WW Adams III
- "Zeaxanthin Function in Photosynthetic Organisms", Gordon Research Conference on Chemistry and Biology of Carotenoids, Oxnard, CA, 9-13 March 1992. B Demmig-Adams & WW Adams III
- "The Carotenoid Zeaxanthin and Photoprotection of the Photosynthetic Apparatus", Sixth Annual Penn State Symposium in Plant Physiology, 23-25 May 1991. B Demmig-Adams & WW Adams III
- "Zeaxanthin Formation and Photoprotective Energy Dissipation as Affected by Temperature", Gordon Research Conference on Temperature Stress in Plants. Oxnard, CA, 18 January 1991. WW Adams III & B Demmig-Adams
- "Photoinhibition and Photoprotective Responses: The Xanthophyll Cycle", Plant Physiology Seminar, Department of Botany, Duke University, Durham, 30 March 1990. Joint seminar) WW Adams III & B Demmig-Adams
- "Zeaxanthin Formation and Avoidance of PS II Damage from Combined High Light and Water Stress", Rockefeller Foundation meeting on 'The Potentials of Biotechnology for Improving Grain Yield of Rice under Water Limited Conditions', Bellagio Study and Conference Center, Bellagio, Italy, 18-22 September 1989. B Demmig-Adams & WW Adams III

- "Zeaxanthin-Associated Energy Dissipation in Leaves and Isolated Chloroplasts", International Workshop on 'The Use of Chlorophyll Fluorescence and other Non-Invasive Spectroscopic Techniques in Plant Stress Physiology', Wageningen, The Netherlands, 14-16 August 1989. B Demmig-Adams & WW Adams III
- "Light Stress, Photoprotective Energy Dissipation, and the Carotenoid Zeaxanthin", VIIIth International Congress on Photosynthesis, Stockholm, Sweden, 6-11 August 1989. B Demmig-Adams & WW Adams III
- "Heterophylly in the Epiphytic Genus *Tillandsia*: Ecophysiological and Evolutionary Implications", XIV International Botanical Congress. West Berlin, July 1987
- "Photosynthesis and Photoinhibition in CAM Plants found in Full Sunlight and Deep Shade", First Robertson Symposium on "Ecology of Photosynthesis in Sun and Shade", Australian National University, Canberra, February 1987
- "Fluorescence and Stress in CAM Plants", Joint US and Australian conference on "Structure, function and photoinhibition of Photosystem II and plant responses to stress". Honolulu, Hawaii, September 1985
- "Photosynthesis and Transpiration in Atmospheric and Tank Forms of the Epiphyte *Tillandsia deppeana* (Bromeliaceae)", Annual meeting of the American Society of Plant Physiology. Davis, California, August 1984. WW Adams III & CE Martin
- "New Aspects of Gametophyte Development in the Tropical Fern *Gleichenia bifida*", Botanical Society of America section of the annual AIBS meeting. Bloomington, Indiana, August 1981. WW Adams III & CH Haufler

### **Contributed/Poster Presentations**

- "Duckweed: A Robust Crop for Bioregenerative Life Support", International Conference on Environmental Systems 2020, Corinthia Hotel Lisbon, Portugal, 12-16 July 2020. CM Escobar, WW Adams III, JJ Stewart, B Demmig-Adams
- "Lighting Protocols to Co-Optimize Duckweed Yield, Nutritional Quality, and Energy-Use Efficiency for Crew Diet Supplementation", Human Research Program Investigators' Workshop, Galveston Island Convention Center, Galveston, TX, 27-30 January 2020. B Demmig-Adams, WW Adams III, JJ Stewart, & CM Escobar
- "Co-Optimization of Duckweed Biomass, Nutritional Quality, & Input-Use Efficiency", 35<sup>th</sup> Annual Meeting of the American Society for Gravitational and Space Research, Sheraton Denver Downtown, Denver, CO, 20-23 November 2019. B Demmig-Adams, WW Adams III, JJ Stewart, CM Escobar, & A Escobar
- "Duckweed: A Tiny Aquatic Plant with Enormous Potential for Space Life Support", 8<sup>th</sup> Annual Technical Symposium, ATS-2019 AIAA Rocky Mountain Section Annual Symposium, University of Colorado, Boulder, CO, 19 November 2019. CM Escobar, A Escobar, B Shaffer, G Power, B Demmig-Adams, WW Adams III, & JA Nability
- "Effects of Limiting Root Volume Vary Across Growth Conditions in *Arabidopsis thaliana*", 25<sup>th</sup> Western Photosynthesis Conference, Devil's Thumb Ranch Conference Center, Tabernash, CO, 3-6 January 2016. JJ Stewart, B Demmig-Adams, & WW Adams III
- "Impact of Salinity on Photosynthesis, Photosynthetic Efficiency, Cell Division, and Glycerol in Freshwater and Marine *Chlamydomonas*", 25<sup>th</sup> Western Photosynthesis Conference, Devil's Thumb Ranch Conference Center, Tabernash, CO, 3-6 January 2016. TA Burch, WW Adams III, & B Demmig-Adams
- "Temperature Acclimation in *Arabidopsis thaliana* Ecotypes from Three Geographic Origins", 24<sup>th</sup> Western Photosynthesis Conference, Asilomar Conference Center, Pacific Grove, CA, 8-11 January 2015. JJ Stewart, WW Adams III, & B Demmig-Adams
- "Algal Energy-Carrier Excretion Increases Photosynthesis", Colorado Center for Biorefining and Biofuels Semi-Annual Meeting, Colorado School of Mines, 24-25 April 2014. TA Burch, WW Adams III, JJ Stewart, & B Demmig-Adams
- "Milking of Microalgae for Biofuel Production", First Annual Energy Showcase symposium, University of Colorado, 1 April 2010. A Reese, C Rixham, B Degrenne, TA Burch, WW Adams III, & B Demmig-Adams
- "Seasonal Adjustments in Photosynthesis and Photoprotection in a Subalpine Forest", Annual meeting of the Guild of the Rocky Mountain Population Biologists, 17-18 September 2004. CR Zarter, V Ebbert, WW Adams III, & B Demmig-Adams
- "Does Photoinhibition Represent Downregulation of Photosystem II in Response to Limited Sink Strength?", Gordon Research Conference on CO<sub>2</sub> Fixation and Metabolism in Green Plants. Tilton, NH, 18-23 August 1996. WW Adams III & B Demmig-Adams
- "The Use of the Leaf Disc Electrode to Examine Photosynthetic Characteristics of Leaves", Annual meeting of the American Society of Plant Physiology, Charlotte, NC, 29 July to 2 August 1995. WW Adams III



- “Cold Temperature-Induced Photoinhibition and the Xanthophyll Cycle in Evergreen Leaves during Winter”, Annual meeting of the American Society of Plant Physiology, Charlotte, NC, 29 July to 2 August 1995. AS Verhoeven, WW Adams III, & B Demmig-Adams
- “Photoprotection in the CAM Plant *Opuntia macrorhiza*”, Annual meeting of the American Society of Plant Physiology, Charlotte, NC, 29 July to 2 August 1995. DH Barker & WW Adams III
- “Acclimation of Leaf Antioxidant Systems to Light Stress”, Annual meeting of the American Society of Plant Physiology, Charlotte, NC, 29 July to 2 August 1995. S Grace, BA Logan, A Keller, B Demmig-Adams, & WW Adams III
- “Xanthophyll Cycle and Diurnal PSII Regulation”, Annual meeting of the American Society of Plant Physiology, Charlotte, NC, 29 July to 2 August 1995. B Demmig-Adams & WW Adams III
- "High PFD Reduces SO<sub>2</sub>-induced Inhibition of Photosynthesis", Annual meeting of the American Society of Plant Physiology. Reno, Nevada, July 1988. WW Adams III, K Winter, & A Lanzl
- "Adaptability to Shade and Photoinhibition in Plants Possessing Crassulacean Acid Metabolism", Annual meeting of the Australian Society of Plant Physiology. Melbourne, Victoria, May 1986. WW Adams III & CB Osmond
- "Photosynthetic Responses to Tissue Desiccation in the CAM Epiphytes *Tillandsia usneoides* and *T. schiedeana*", Annual meeting of the Ecological Society of America. Syracuse, New York, August 1986. CE Martin, WW Adams III, & FM Smith
- "Quantum Yield and Fluorescence in CAM", Annual meeting of the American Society of Plant Physiology. Providence, Rhode Island, June 1985. WW Adams III & CB Osmond
- "Physiological Consequences of an Extreme Change in Leaf Morphology in a Mexican Epiphyte", Fourth Annual Prairie States Ecology Conclave. Big Lake, Missouri, April 1984
- "Water Stress in *Populus deltoides* along an Environmental Gradient", Regional meeting of the Association of American Geographers. Lawrence, Kansas, November 1984. GE Marotz & WW Adams III

### Symposia Organized/Chaired

- “Foliar Vasculature: Transport and Communication Hub”, Organizer, XIX International Botanical Congress, Shenzhen, China, 23-29 July 2017
- “Physiology and Regulation Processes”, Chair, Mechanisms of Nonphotochemical Quenching, Passau, Germany, 6-10 April 2011
- “Responses to Winter – from Ecosystem to Gene”, Organizer, Chair, & Keynote Speaker, XVII International Botanical Congress, Vienna, Austria, 18-23 July 2005
- “Temperature Stress”, Chair, Plant Biology 2002 (Annual meeting of the American Society of Plant Biologists), Denver, Colorado, 5 August 2002
- "The Xanthophyll Cycle and Photoprotective Energy Dissipation", Organizer and Chair. Annual meeting of the American Society of Plant Physiologists. Charlotte, North Carolina, 2 August 1995

### Patents

- “Phytometric Intelligence Sensors” by Hans-Dieter Seelig, Alexander Hoehn, Richard Stoner, II, and William W. Adams III. Provisional Filing on 25 May 2006; US Filing on 6 March 2007; Assignment in October 2009; Patent granted (#7,660,698) on 9 February 2010; License Agreement with Agrihouse, Inc. <<http://www.agrihouse.com/>> for worldwide rights in February 2010

### Teaching

#### **Classes at the University of Colorado, 1989-present.**

Classes from Fall 2006 onward on a 6-point scale, with 6 as the highest.

Classes from Fall 2017 onward completed online.

	<b>Mean Ratings</b>	
	<b>Instructor</b>	<b>Course</b>
Fall 2020, EBIO 1210-003, General Biology, students		Covid-19 Disruption
Fall 2020, EBIO 1210-004, General Biology, students		Covid-19 Disruption
Spring 2020, EBIO 4800/5800, Genetically Engineered Organisms, 20 students		Covid-19 Disruption
Fall 2019, EBIO 1210-003, General Biology, 368 students	4.9	4.0
Fall 2019, EBIO 1210-004, General Biology, 365 students	4.8	3.8
Spring 2019, FYSM 1000-001, Science under Siege, 19 students	5.17±0.76	4.39±1.11
Fall 2018, EBIO 1210-003, General Biology, 356 students	4.71±1.29	4.08±1.31
Fall 2018, EBIO 1210-004, General Biology, 241 students	4.94±1.25	4.13±1.24
Spring 2018, EBIO 4800/5800, Genetically Engineered Organisms, 32 students	5.47±0.88	4.74±1.52
Fall 2017, EBIO 1210-003, General Biology, 351 students	4.63±1.28	3.74±1.28

Fall 2017, EBIO 1210-004, General Biology, 209 students 4.65±1.27 3.89±1.3

Classes prior to Fall 2017, paper copies completed in class

**Ratings; Mean/Median**

	<b><u>Instructor</u></b>	<b><u>Course</u></b>
Fall 2016, EBIO 1210-001, General Biology, 365 students	5.6/6	5.2/5
Fall 2016, EBIO 1210-002, General Biology, 300 students	5.5/6	4.8/5
Fall 2016, EBIO 1210-003, General Biology, 389 students	5.6/6	5.0/6
Fall 2016, EBIO 1210-004, General Biology, 266 students	5.5/6	4.9/5
Fall 2015, EBIO 1210-003, General Biology, 389 students	5.7/6	5.1/5
Fall 2015, EBIO 1210-004, General Biology, 232 students	5.7/6	5.0/5
Spring 2015, EBIO 4800/5800, Genetically Engineered Organisms, 26 students	5.1/5	4.8/5
Fall 2014, EBIO 1210-003, General Biology, 384 students	5.7/6	5.0/5
Fall 2014, EBIO 1210-004, General Biology, 250 students	5.7/6	5.2/6
Spring 2014, EBIO 4800/5800, Genetically Engineered Organisms, 34 students	5.4/6	4.8/5
Fall 2013, EBIO 1210-003, General Biology, 377 students	5.6/6	4.9/5
Fall 2013, EBIO 1210-004, General Biology, 257 students	5.4/6	4.8/5
Spring 2013, EBIO 4800/5800, Genetically Engineered Organisms, 29 students	5.7/6	5.4/6
Fall 2012, EBIO 1210-003, General Biology, 363 students	5.6/6	4.9/5
Fall 2012, EBIO 1210-004, General Biology, 244 students	5.6/6	4.8/5
Spring 2012, EBIO 4800/5800, Genetically Engineered Organisms, 27 students	5.6/6	5.2/5
Fall 2011, EBIO 1210-003, General Biology	5.6/6	4.8/5
Fall 2011, EBIO 1210-004, General Biology	5.5/6	4.8/5
Spring 2011, EBIO 4800/5800, Genetically Engineered Organisms	5.8/6	5.7/6
Fall 2010, EBIO 1210-001, General Biology	5.4/6	4.7/5
Fall 2010, EBIO 1210-002, General Biology	5.4/6	4.7/5
Spring 2010, EBIO 4800/5800, Genetically Engineered Organisms	5.9/6	5.7/6
Fall 2009, EBIO 1210-002, General Biology	5.7/6	5.1/5
Fall 2009, EBIO 1210-003, General Biology	5.8/6	5.3/6
Spring 2009, EBIO 4800/5800, Genetically Engineered Plants	5.3/6	5.0/5
Fall 2008, EBIO 1210-002, General Biology	5.7/6	5.0/5
Fall 2008, EBIO 1210-003, General Biology	5.5/6	4.9/5
Spring 2008, EBIO 4800/5800, Genetically Engineered Plants	5.8/6	5.5/6
Fall 2007, EBIO 1210-002, General Biology	5.3/6	4.8/5
Fall 2007, EBIO 1210-003, General Biology	5.4/6	4.8/5
Spring 2007, EBIO 4800/5800, Genetically Engineered Plants	5.7/6	5.3/6
Fall 2006, EBIO 3530, Functional Plant Biology	5.5/6	5.2/5

Classes from 1989 through Spring 2006 on a 4-point scale, with 4 (A+) as the highest.

Spring 2006, EBIO 4800/5800, Genetically Engineered Plants	3.89 (A+)	3.78 (A)
Fall 2005, EBIO 3530, Functional Plant Biology	3.33 (B+)	3.17 (B)
Spring 2005, EBIO 4800/5800, Genetically Engineered Plants	3.94 (A+)	3.83 (A)
Spring 2004, EPOB 4800/5800, Genetically Engineered Plants	4.00 (A+)	3.89 (A+)
Fall 2003, EPOB 3530, Plant Physiology	3.80 (A)	3.68 (A)
Spring 2003, EPOB 4800/5800, Genetically Engineered Plants	4.00 (A+)	3.88 (A+)
Fall 2002, EPOB 3530, Plant Physiology	3.95 (A+)	3.82 (A)
Spring 2002, EPOB 4800/5800, Plant Ecophysiology	3.75 (A)	3.83 (A)
Fall 2001, EPOB 3530, Essentials of Plant Physiology	3.77 (A)	3.61 (A-)
Fall 2000, EPOB 4800/5800, Plant Ecophysiology	3.89 (A+)	3.89 (A+)
Fall 2000, EPOB 3530, Plant Physiology	3.79 (A)	3.63 (A)
Spring 2000, EPOB 4800, Plant Ecophysiology	4.00 (A+)	3.89 (A+)
Spring 2000, EPOB 6300, Environmental Signal Transduction	3.33 (B+)	3.33 (B+)
Fall 1999, EPOB 3530, Essentials of Plant Physiology	3.78 (A)	3.63 (A)
Fall 1998, EPOB 3530, Essentials of Plant Physiology	3.67 (A)	3.72 (A)
Fall 1998, EPOB 4800, Plant Ecophysiology	4.00 (A+)	3.78 (A)
Spring 1998, EPOB 4800, Plants, Light, and Stress	3.75 (A)	3.75 (A)
Spring 1998, EPOB 6200, Environmental Control of Gene Expression	3.75 (A)	3.60 (A-)

Fall 1996, EPOB 3530, Plant Physiology	3.69 (A)	3.46 (B+)
Fall 1996, EPOB 4800, Plant Ecophysiology	3.78 (A)	3.78 (A)
Spring 1996, EPOB 3530, Plant Physiology	3.20 (B)	3.27 (B+)
Fall 1995, EPOB 4800, Plant Ecophysiology	3.57 (A-)	3.50 (A-)
Fall 1995, EPOB 6200, Biology of Epiphytes	3.80 (A)	3.60 (A-)
Spring 1995, EPOB 3530, Plant Physiology	2.95 (B)	2.95 (B)
Spring 1995, EPOB 4800, Ecophysiology of Photosynthesis	3.83 (A)	4.00 (A+)
Fall 1994, EPOB 4800, Plant Ecophysiology	3.29 (B+)	3.29 (B+)
Spring 1994, EPOB 3530, Plant Physiology	3.27 (B+)	3.21 (B)
Spring 1994, EPOB 4800, Ecophysiology of Photosynthesis	3.50 (A-)	3.30 (B+)
Spring 1994, EPOB 5800, Ecophysiology of Photosynthesis	4.00 (A+)	4.00 (A+)
Fall 1993, EPOB 4800, Plant Ecophysiology	3.17 (B)	3.25 (B+)
Fall 1993, EPOB 4950, Plant Ecophysiology Laboratory	3.57 (A-)	3.71 (A)
Spring 1993, EPOB 3530, Plant Physiology	3.00 (B)	2.83 (B)
Spring 1993, EPOB 4580, Physiological Plant Adaptation II	4.00 (A+)	3.50 (A-)
Spring 1993, EPOB 5580, Physiological Plant Adaptation II	3.18 (B)	3.45 (B+)
Fall 1992, EPOB 4570, Physiological Plant Adaptation I	3.31 (B+)	3.38 (B+)
Spring 1992, EPOB 3530, Plant Physiology	3.33 (B+)	3.57 (A-)
Spring 1992, EPOB 6100, Plant Responses to Stress	3.44 (B+)	3.44 (B+)
Spring 1991, EPOB 3530, Plant Physiology	3.47 (B+)	3.35 (B+)
Spring 1990, EPOB 3530, Plant Physiology	2.83 (B)	2.78 (B)
Fall 1989, EPOB 4570, Advanced Plant Physiology	3.25 (B+)	3.56 (A-)

#### **Classes at the Universität Würzburg, Germany, 1988 (volunteer teaching contributions)**

Physiological Ecology of Plants  
 Photoinhibition of Photosynthesis in Higher Plants

#### **Classes at the University of Kansas, 1981-1984 (Laboratory Teaching Assistant)**

Biology of Organisms  
 Plant Physiology  
 Principles of Biology  
 Unusual Weather

#### **Guest Presentations**

“Safety and Sustainability of Genetically Engineered Foods”, Guest Speaker in ENVS 6305 Food System Solutions? Evaluation of Food System Debates. 3 October 2018  
 “Genetic Engineering and Sustainability”, Guest Speaker in ENVS 6305 Food System Solutions. 6 September 2017  
 “Genetic Engineering of Plants”, Guest Speaker in ENVS 5000 Policy, Science, and the Environment. 2 November 2016  
 “Biofuels – The Hype and the Hope”, Presentation to Colorado Center for Biorefining and Biofuels Research Experiences for Undergraduate students. 17 June 2009

#### **Extramural and Intramural Funding in Support of Teaching**

IGERT: Interdisciplinary Quantitative Biology Program (2012-2017). \$3,000,000 from the National Science Foundation. Other Senior Personnel with PIs Thomas Cech, Kristi Anseth, Meredith Betterton, Robin Dowell, and Manuel Lladser  
 Increasing Teaching Effectiveness in Ecology and Evolutionary Biology (2011-2015). \$480,000 from the Science Education Initiative at the University of Colorado. Co-PI with Andrew Martin, Nichole Barger, John Basey, Barbara Demmig-Adams, and Samuel Flaxman.  
 Assessing the Impact of Early, Individualized Faculty and TA Interventions for At-Risk Students (2013-2014). \$10,000 from the STEM Chancellor’s Award. Part of the National Science Foundation award to the University of Colorado entitled “13: Towards a Center for STEM Education”. Co-PI with Barbara Demmig-Adams and Sarah Wise.  
 Howard Hughes Medical Institute Equipment Proposal funded in 1997 for the purchase of one microcentrifuge, two circulating refrigerated water baths, four Hansatech leaf disc oxygen electrode systems, four sets of glass neutral density filters from Schott Glass Technologies, four thin layer chromatography developing chambers, four pH meters, and four glass combination pH electrodes for use in the class Essentials of Plant Physiology.

Improvement of Laboratories in Plant Physiology and Plant Ecophysiology at the University of Colorado in Boulder (1993-1995) \$90,000 from the National Science Foundation and the University of Colorado. PI with Barbara Demmig-Adams and Russell Monson

### Teaching Presentations at National Meetings

Invited to share my experiences in obtaining NSF funding in support of the improvement of teaching laboratories in a workshop on "Grant Opportunities in Teaching and Education", Annual meeting of the American Society of Plant Physiologists. Charlotte, NC, 31 July 1995

"The Use of the Leaf Disc Electrode to Examine Photosynthetic Characteristics of Leaves" Annual meeting of the American Society of Plant Physiologists. Charlotte, NC, 29 July to 2 August 1995

### Teaching Awards

-Chancellor's Award for *Excellence in STEM Education* 2013-2014, University of Colorado

-Boulder Faculty Assembly *Excellence in Teaching* Award, 16 April 2004, University of Colorado

-Certificate of Recognition for *Exceptional Teaching*, Mortar Board, 16 November 2000, University of Colorado

### Undergraduate Students advised in my laboratory (\*indicates co-author on one or more publications)

Maureen McNamara (2019-2020), Biological Science Initiative Scholar's Award

Cedric Zeller (2018-2020), Biological Science Initiative Scholar's Award

\*Gabrielle Glime (2017-2018), volunteer and Biological Science Initiative Scholar's Award

\*Stephanie K. Polutchko (2013-2015), volunteer, URAP Award, BURST Award, and UROP Award

\*Coleman Wenzl (2013-2015), volunteer and paid assistant

\*Emma C. Boone (2013), UROP Award

\*Parker C. Nash (2013), UROP Award

\*Brita R. Mines (2013), UROP Award

\*Elizabeth M. Lombardi (2012-2013), UROP Award and Honors. Pursuing PhD at Cornell University.

\*Johanna A. Protheroe (2012-2013), UROP Award, volunteer, and paid assistant

Emmo Scherbatskoy (2012-2013), paid assistant (post-BA)

Katherine Kronen (2011-2012), volunteer

Tyler Dowd (2011-2012), volunteer and paid assistant

Lynn My Dang (2010-2012), paid assistant

\*Calvin Englert (2010-2012), volunteer and paid assistant

Jonathan Kittel (2009-2010), volunteer and paid assistant

Tyson Burch (2009-2010), volunteer, then paid assistant

Charlie Cotton (Oxford University), intern during summer 2009

Deylen S. Aponte Rosario (University of Puerto Rico at Cayey); SMART intern (Summer 2008)

Noelia Ines Aponte Silva (University of Puerto Rico at Mayaguez); SMART intern (Summer 2008)

\*Andrew F. Combs (2005-2006), Supported on an NSF Research Opportunity Award

\*Daniel Cuthbertson (2004-2005), UROP Award. PhD at Washington State University. Applications Scientist – Metabolomics with Agilent Technologies.

Jeffrey Robinson (summer 2003-2005), paid Research Assistant

\*Angela Brightwell (2000-2001), UROP Award

\*Lisa Schaffer (2000-2001), UROP Award

Kevin (Casey) Cody (Spring 1997), Independent Research

Bryn Orwig (Fall 1996 and Spring 1997), paid Research Assistant. Teacher in Colorado.

\*Jeff Marszalek (Fall 1996 and Spring 1997), Independent Research. Deceased.

Timothy Minger (Summer 1995 to Spring 1996), UROP Award and paid Research Assistant.

Stephanie Waugh (Spring and Fall 1995), Independent Research

Christina Ives (Summer 1995), paid Research Assistant

\*Dan Moeller (Spring 1995 through Fall 1995), BART training grant. Curator, Hoyt Arboretum, Portland, Oregon.

Brian Albrecht (Spring 1995), Independent Research

Amy Keller (1994-1996), volunteer and paid Research Assistant

Jay Maguire (1994), volunteer Research Assistant

\*Susan Kiley (Spring 1993), Independent Research

Robert Kennedy (1993), volunteer Research Assistant

Kyle Klimoski (Spring 1992), volunteer Research Assistant

Mark Compton (1992), volunteer Research Assistant  
 Mark Ohan (1992), volunteer Research Assistant  
 Martin Schutz (1991), Independent Research  
 \*Matthias Volk (1989-1990), volunteer Research Assistant. Obtained PhD at Universität Basel.  
 Jean Dodge (1989-1990), volunteer Research Assistant and Undergraduate Research Opportunities Program

### **Undergraduate Honors Committees**

Jenna E. Gallegos, Molecular, Cellular, & Developmental Biology, Fall 2011; Science Communicator  
 Tyson A. Burch, Economics, Spring 2007  
 Sarah McPherson, EBIO, 2006-2007  
 Douglas Bevan, Chemistry & Biochemistry, 2006-2007  
 Elizabeth H. Frost, Molecular, Cellular, & Developmental Biology, Spring 2005  
 Erin A. White, Molecular, Cellular, & Developmental Biology, Spring 2004  
 Timothy Minger, Chemistry & Biochemistry, Spring 1999

### **Graduate Students**

Stephanie K. Polutchko, PhD, 2020-present  
 Patrick Morrison (Lead Advisor = Stephen Mojzsis of Geological Sciences), PhD candidate, then MAI, 2018-2020  
 Gabrielle Glime, BA/MA, 2018-2020  
 Jared J. Stewart, PhD in 2018; NSF Postdoctoral Fellow at the USDA-ARS in Fort Collins, CO  
 Stephanie K. Polutchko, MA in 2018; Teacher, Erie High School  
 Tyson A. Burch, PhD in 2016; Postdoctoral Research Associate, Arizona State University, 2016-2018; Postdoctoral Research Associate, Colorado School of Mines, 2019-present  
 Margaret Habib, 2015; obtained MA with Nancy Emery in 2018  
 Ricardo (Nick) Leyva, MA in 2009; Naval career  
 Matthew R. Dumlao, MA in 2009; PhD, University of California, Davis; Policy Consultant, California State Senate  
 MaryKay Herzenach, MA in 2009  
 Amy Watson (Trowbridge), 2005-2006; obtained PhD with Russell Monson in 2012  
 Kristine E. Mueh, PhD in 2005; President of the Boulder Valley Education Association  
 C. Ryan Zarter, PhD in 2005; Forestry Technician, US Forest Service, US Department of Agriculture  
 Todd N. Rosenstiel, 1996-1999; PhD with Russell Monson in 2004; Associate Professor at Portland State University  
 David H. Barker, PhD in 1999; Postdoctoral Fellow, Smithsonian Tropical Research Institute, Panama 1999-2000; Postdoctoral Fellow, Australian National University, 2001-2002; Postdoctoral Fellow, University of Nevada at Las Vegas, 2002 – 2005; Position with a company in Las Vegas, 2005-present  
 Mark Longo, MAII in 1998; PhD at Stanford University  
 Amy S. Verhoeven, PhD in 1998; Professor at University of St. Thomas, St. Paul, MN  
 Barry A. Logan, PhD in 1997; Professor at Bowdoin College, Brunswick, Maine

### **Member of Thesis or Dissertation committees (other than those listed above)**

Christine M. Escobar (Aerospace Engineering; 2019-present; PhD)  
 Luis Allende (EBIO; 2018-present; PhD)  
 Mariska Hamstra (EBIO; 2012-2013; MA)  
 Robert Baker (EBIO; 2007-2012; PhD)  
 Chi-Chih Wu (EBIO; 2006-2012; PhD)  
 Hanna Johansson Jänkänpää (Umeå Plant Science Centre, Sweden; 2011; PhD)  
 Carly Rixham (EBIO; 2009-2010; MA)  
 Eric Madrid (EBIO; 2006-2008; PhD)  
 Mark J. Bradburn (EBIO; 2004-2007; MA)  
 Timothy E. Tomaszewski (Environmental Studies, UCD; 2004-2006; PhD)  
 Michelle Wallar (Journalism; 2004-2005; MA)  
 Hans Seelig (Aerospace Engineering; 2003-2005; PhD); Hochschule für Technik und Wirtschaft Dresden  
 Timothy Minger (Chemistry & Biochemistry, 2005; PhD); Mesa Community College, Arizona and CU Boulder (summers)  
 Karie Cherwin (EBIO; 2002 – 2003; PhD Candidate)  
 David L. Mellman (EPOB; 2001-2003; MAI)  
 Christopher Meloche (EPOB; 1995-2001; PhD); Metropolitan State University, Denver

Graham Cummins (EPOB; 1997-1998; PhD Candidate)  
 Kevin Horst (EPOB; 1992-1999; PhD Candidate)  
 Kristine Mueh, (EPOB; 1996-1998; MAI)  
 Tanya Falbel (Molecular, Cellular, and Development Biology; 1991-1994; PhD); University of Wisconsin  
 Alexander Hoehn (Aerospace Engineering; 1989-1993; PhD); BioServe Space Technologies, CU-Boulder  
 Charles Jaeger (EPOB; 1989-1993; PhD)

**Graduate Students from other laboratories advised on joint projects** (\*indicates co-author on published papers)

\*Christine Escobar (Aerospace Engineering)  
 \*Hans Seelig (Aerospace Engineering)  
 \*Tanya Falbel (Molecular, Cellular, and Developmental Biology)  
 Christopher Cowan (Molecular, Cellular, and Developmental Biology)  
 \*David Bowling (Engineering)  
 Jennifer Grinspoon (Chemistry)  
 \*Alexander Hoehn (Aerospace Engineering)

**Postdoctoral Research Associates**

Dr. Marina López-Pozo, 2020  
 Dr. Jared J. Stewart, 2018-2019, NSF Postdoctoral Fellowship at the USDA in Fort Collins  
 Dr. Michael Jenkins, 2017-2018  
 Dr. Sarah Tepler Drobnitch, 2017, USDA in Fort Collins  
 Dr. Christopher CoHu, 2011-2014, Colorado Mesa University  
 Dr. Onno Muller, 2011-2013, Forschungszentrum Jülich  
 Dr. Anza Darehshouri, 2009-2011, University of Texas Southwestern Medical Center  
 Dr. Jennifer Mathias, 2010  
 Dr. Benoît Degrenne, 2009-2010, Chief Technology Officer at Algonesia Technologies  
 Dr. Krishnaveni Kesanapalli, 2008-2010  
 Dr. Volker Ebbert, 1996-2006, funded in part by a Feodor Lynen Fellowship from 1997-1999  
 Dr. Véronique Amiard, 2003-2005, Teacher in Chile  
 Dr. Stephen C. Grace, 1994-1996, NSF postdoctoral fellowship; University of Arkansas

**Faculty hosted on Sabbatical Leave in our Laboratory**

Professor William Henley, Oklahoma State University, 2009  
 Professor Steven Cessna, Eastern Mennonite University, 2007-2008  
 Professor Seok Chan Koh, Jeju National University (Korea), 2006-2007  
 Professor Barry Logan, Bowdoin College, 2004

**Service**

*Department of Ecology & Evolutionary Biology (2003-present) and Environmental, Population, and Organismic Biology (1990-2003), University of Colorado at Boulder*

Undergraduate Committee, 2020-  
 Faculty Affairs Committee, 2020-  
 Chair, Teaching Evaluation Committee, 2005-2010, 2013-2020  
 Curriculum Committee, 2007-2020  
 General Biology Committee, 2009-2020  
 Scribe, 1993-2015, 2020  
 Departmental Merit Committee, 2003, 2006, 2008, 2010, 2012, 2014, 2017, 2019  
 Chair, Comprehensive Reappointment Committee for Scott Taylor, 2019  
 Chair, Tenure and Promotion to Associate Professor Committee for Erin Tripp, 2018  
 Lead Writer, Question 1 *Unit Summary*, Departmental ARPAC, Fall 2018  
 C405 (4<sup>th</sup>/5<sup>th</sup> floor space at south end of Ramaley) Evaluation Committee, 2017  
 Promotion and Tenure Committee for Stacey Smith, 2016  
 Comprehensive Review Committee for Erin Tripp, 2015  
 Graduate Student Committee, 1990-1992, 1997, 1999-2009, 2010-2014  
 Promotion and Tenure Committee for Kendi Davies, 2014  
 Comprehensive Review Committee for Samuel Flaxman, 2012

Lead organizer and writer for ARPAC Question 3: *Undergraduate Education* (2011)  
 Chair, Reappointment Committee for Stephanie Mayer, 2011  
 Chair, Reappointment Committee for John Basey, 2010  
 General Biology Co-Coordinator (EBIO 1210-1220), 2007-2009  
 Special Assignment to compile and analyze publication and citation data for comparative purposes among EBIO and peer departments at other institutions for the PRP, 2005  
 Reappointment and Promotion to Senior Instructor Committee for Stephanie Mayer, 2003-2004  
 Tenure and Promotion to Associate Professor Committee for Alan Townsend, 2003  
 Special Unit Merit Assignment, to compile and analyze publication, citation, and FCQ data for comparative purposes among departments, 2000  
 Greenhouse Committee, 1994-2000  
 Search Committee, Writing Instructor, 1999  
 Chair, Greenhouse Committee 1998-1999  
 Early Advising, 1991, 1993, 1996, 1998  
 Colloquium Committee, 1994-1996  
 Greenhouse Construction Committee, 1992-1994  
 Advising Committee, 1992-1994

University of Colorado at Boulder

Alpha of Colorado chapter of Phi Beta Kappa, 2002-present  
 Pre-Health Advisory Committee, 2006-2015, 2017-2018  
 EBIO 1210 – OIT-TLC-Exploratory Project, 2016-2018  
 Boulder Faculty Assembly Committee for Excellence in Teaching Award, 2005, 2017  
 Evaluation of Faculty Applications to the Faculty Teaching Excellence Program New Assistant Professor Program Course Development Grant for the Advancement of Teaching and Learning, 2017  
 Teaching Quality Framework Committee, 2016-2017  
 Crisp Fellowship Committee, Alpha of Colorado chapter of Phi Beta Kappa, 2002-2007, 2011, 2012, 2014  
 Learning Management System Strategy Team, 2008-2009  
 Dean Gleeson's Introductory Biology Task Force, 2008  
 Dean Gleeson's Task Force in the Life Sciences, 2007  
 Search Committee, Director of Parking and Transportation Services, August – November 2005  
 Participant, President's Learning Academy Planning Group, 6 June 2005, Fitzsimons (Anschutz) Campus

Journal Editor

*Frontiers in Plant Science*, Associate Editor for Plant Abiotic Stress, 2016-present  
*Plant Biology*, 2004-present; Section Editor (Ecophysiology), 2002 – 2003  
*Environmental and Experimental Botany*, Guest Editor for Special Issue on “An Integrative Approach to Photoinhibition and Photoprotection of Photosynthesis”, 2016-2018  
*Copy Editor* for Govindjee, Historical Corner Editor, *Photosynthesis Research*, as well as for other publications, 2016-2018  
*Tree Physiology*, 1999, 2005

Reviewer for the Journals:

Advances in Horticultural Research	Environmental and Experimental Botany	Planta
American Journal of Botany	F1000 Faculty Reviews	Plant Biology
Arctic and Alpine Research	Frontiers in Plant Science	Plant Direct
Arctic, Antarctic, and Alpine Research	Functional Ecology	Plant Physiology
Australian Journal of Plant Physiology	Functional Plant Biology	Photosynthesis Research
Biochimica et Biophysica Acta	Global Change Biology	Physiologia Plantarum
Botanica Acta	Journal of Experimental Botany	Plant, Cell and Environment
Canadian Journal of Botany	Journal of Plant Research	Tree Physiology
Ecology	Oecologia	Trends in Plant Science

MCAT Science Content Respondent for CU (with assistance from S. Flaxman), Fall 2009

Service on Federal Granting Agency Panels

Multiple prompts to serve on the Physiological and Structural Systems panel of the Division of Integrative Organismal Systems Program, National Science Foundation. Ineligible to serve due to proposals under review.

Plant Responses to the Environment panel meeting, United States Department of Agriculture, Washington, DC, 26-29 March 2001

Invited to serve on the Plant Responses to the Environment Panel (USDA) in March 2002

Invited to serve on the National Science Foundation panels:

Ecological and Evolutionary Physiology; Population Biology and Physiological Ecology

Reviewer of Proposals to:

National Science Foundation; Department of Agriculture; Department of Energy

American Society of Plant Biologists

Staffed the Education and Outreach Booth at the National Association of Biology Teachers meeting, Denver, CO, 3-4 November 2016

Community Service

-June, July, August 2020. Content Consultant for Discover Biology – Photosynthesis, London M., Abdo Publishing, Minneapolis

-26 November 2018. Discussions with students in two AP classes regarding research and independent projects. Erie High School

-27 August 2016. Member of Panel Discussion on Genetically Modified Organisms at a Teaching Controversial Topics Workshop for K-12 educators. University of Colorado at Boulder.

-29 February 2016. Testified about genetically engineered crops during a public hearing before the Boulder County Commissioners and the Boulder County Open Space Advisory Committee as they considered the adoption of a new Cropland Policy on the planting of crops on Boulder County Open Space. Plaza Event Center, Longmont, CO.

-9 February 2016. Provided 30 minutes of testimony on genetically engineered crops before the Boulder County Commissioners as they considered the adoption of a new Cropland Policy on the planting of crops on Boulder County Open Space. Boulder County Courthouse, Boulder, CO.

-16 March 2013. Presentation on Genetically Engineered Organisms for Middle and High School teachers. Teaching Controversial Topics workshop, University of Colorado, Boulder, CO

-8-9 December 2011. Provided testimony on genetically engineered crops before the Boulder County Commissioners as they considered the adoption of a new Cropland Policy on the planting of crops on Boulder County Open Space. Plaza Event Center, Longmont, CO.

-7 May 2009. Presentation to AP Biology class on Plant Physiology and Response to the Environment, Boulder High School

-22 April 2007. Participant in the Volunteer Day “Better Boulder Better World” sponsored by the CU Volunteer Clearing House for the Celebration of Earth Day. 5 hours of creating outdoor habitats for rescued reptiles. Colorado Reptile Humane Society, Longmont, Colorado

-11 March 2005, 90-minute presentation to a Fort Collins high school biology class on the physiology and ecology of plants with Crassulacean Acid Metabolism.

-8 September 2004, responded to reporter for the Dailey Camera, who sought my input on autumnal changes in plants.

-20<sup>th</sup> and 23<sup>rd</sup> of September 2002, responded to Ron Bain, a reporter for the Boulder Weekly, who sought my input about various issues with respect to the genetic engineering of plants.

-March 2002, Science Fair Judge, Bixby School

-August 2000, Presentation on the plant and animal life of Australia, Bixby School.

-March 1999, Science Fair Judge, Bixby School

-1998, Responded to an email request from Beverly Wachtel of *Earth & Sky Radio* for information pertaining to the question of a listener: "What would happen if all the plants disappeared?" Provided a detailed answer that included the role of plants in climatic stability, in atmospheric processes, in geologic processes, in the biosphere, and their importance to humans.

-Autumn 1997, Presentation on the geography and plant & animal life of Australia, Bixby School.