

Amy M. Grunden

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EDUCATION

B.S. in Microbiology and Cell Sciences	1993
University of Florida, Gainesville, FL	
Ph.D. in Microbiology	1996
University of Florida, Gainesville, FL	
Advisor: K. T. Shanmugam	
Postdoctoral Fellow	1997-2000
University of Georgia, Athens, GA	
Advisor: Michael Adams	

PROFESSIONAL APPOINTMENTS

William Neal Reynolds Distinguished Professor of Microbiology	2019 –
Professor, Plant & Microbial Biology, North Carolina State University	2013 – 2019
Associate Faculty of Department of Plant Biology, NCSU	2011 – 2013
Associate Professor, Microbiology, NCSU	2006 – 2013
Assistant Professor, Microbiology	2000 – 2006
Member, Center for Integrated Fungal Research, Executive Committee	2014 –
Member, Functional Genomics and Bioinformatics Program	2005 –
Member, NIH Molecular Biotechnology Training Program	2004 –

PROFESSIONAL HONORS

NASA Institute for Advanced Concepts Fellow	2005 – 2009
Named Park Faculty Scholar	2006 – 2010
North Carolina State University Outstanding Teacher	2007
NSF ADVANCE Scholar Emerging Leader	2009 – 2012
College of Agriculture and Life Sciences Outstanding Graduate Instructor	2012
1 st Place winner of the NCSU Stewards of the Future Innovation Fair	2012
North Carolina State University Faculty Scholar	2013
Food Systems Leadership Institute Fellow	2017 – 2019

RESEARCH PROGRAM DESCRIPTION

My area of expertise is in the physiology and biotechnological application of microbial extremophiles (microorganisms capable of thriving in diverse extreme environmental conditions). As part of my research program, I conduct fundamental structure/function analyses of proteins to inform the innovative application of extremophile enzymes/pathways for three

distinct and important areas of need: crop improvement, biofuel production, and bio-decontamination. In a parallel effort, I also examine and characterize microbiomes of unique environments for application of newly discovered microbes to agriculture and biotechnology. In addition, I am leading a \$30 million international effort funded by the Novo Nordisk Foundation involving the collaboration of scientists from NCSU and three partnering Danish Universities (University of Copenhagen, the Danish Technical University, and Aarhus University) to harness the interactions of plants, soil, and microbes for enhancing crop resilience.

RESEARCH SUPPORT

Current Research and Industry Grants

NSF CBET INFEWS EAGER (Co-PI, \$130,000) Electrically Driven Microbial Nitrogen Fixation	2018 – 2020
NSF GCR (co-PI, \$105,000) Microbial response to a changing planet: the role of microbes in mineral precipitation resulting in exceptional fossil preservation and CO ₂ sequestration	2019 – 2021
Hanes Brand, Inc. (PI, \$94,755) Task Order #2: The End of Funk-Polyester Plans to Evaluate the Metabolism and Odor Production of Bacterial Polyester Isolates and to Analyze Methods of Inactivating Polyester Fabric Contaminating Spores	2019 - 2020
DOE (co-PI, \$4,627,161) Next Generation Miscanthus: Hybrid Performance Evaluation and Enhanced, Sustainable Feedstock Production and Supply in the Southeast U.S. for Biofuel and Bioproducts	2019 – 2023
Novo Nordisk Foundation (PI, \$1,528,000) Collaborative Crop Resiliency Program	2019 – 2025
Novo Nordisk Foundation (co-PI, \$9,600,000) INTERACT: Decoding the Rhizobiota Interactome for improved Crop Resilience	2019 – 2025
Hanes Brand Inc. (PI, \$35,497) TASK ORDER #3: Decoding the Relationship of Bacteria and Polyester to Eliminate Permafunk Odor and Bioremediate Dye Waste	2020 – 2021
GRIP4PSI (co-PI, \$75,000) Harnessing (bio-)electrochemical technologies as sustainable sources for on demand precision agriculture	2020 – 2023

Pending Research Grants

NSF (co-PI, \$749,316) AccelNet: International Collaboration to Accelerate Integration of Engineering, Plant Sciences, and Agricultural Research	2020 - 2023
NSF REU site (Co-PI, \$298,957) Integrative Molecular Plant Systems	2020 – 2022
NSF (co-PI, \$1,943,701) EFRI DChEM Preliminary Proposal: Fertigation on Demand- Combining Advanced Sensors and On-Site Production of Nitrogen-Fertilizer for Smarter Irrigation Systems	2020 – 2024
NSF (co-PI, \$483,968) EFRI-E3P: Convergent Approaches for Engineering the Decomposition of Environmentally Recalcitrant Polymeric Materials through Microbial Cometary Processes	2020 – 2024

Completed Research Grants

NSF EFRI PSBR (PI, \$2,000,000) Closing the loop-toward a PSBR design framework for self-sustained marine microalgal-based fuel	2013 – 2019
NSF REU site (Co-PI, \$273,021) Integrative Molecular Plant Systems	2016 – 2019
Novo Nordisk Foundation (PI, \$119,220) Crop Resiliency Workshop Proposal for Novo Nordisk Foundation	2018
Plant Soil Microbial Community Consortium (Co-PI, \$73,000) Are seed banks repositories of beneficial plant associated microbes?	2018
Hanes Brand, Inc. (co-PI, \$78,372) The End of Funk-Polyester- Plan to Analyze Polyester Processing Plants: Decoding the Relationship of Bacteria and Polyester to Eliminate Permafunk Odor	2016 – 2017
VF Denim, Inc. (co-PI, \$17,250) Sampling of Microorganisms Present on Denim Fabric Swatches Used in Wear Trials	2016 – 2017
NSF I-Corp, (PI, \$50,000) Industrial Enzymes from the Microbiome of Household Insects	2015 – 2016
North Carolina Biotechnology Center (co-PI, \$189,268) Analytical Ultracentrifuge for the Structural Biochemistry Resource at North Carolina State University	2015 – 2016
NCSU RISF (Co-PI, \$31,679) A Research Initiative to Develop Advanced Bio-Processing of Organic Residuals	2014 – 2015
NCSU Chancellor’s Innovation Fund (Co-PI, \$75,000) Production of Extremozymes in Marine Microalgae and Cyanobacteria	2014 – 2015
DOE ARPAe (Co-PI, \$7,998,200) Camelina to Jetfuel: A Systems Approach	2012 – 2016
NSF REU site (Co-PI, \$273,021) Integrative Molecular Plant Systems	2012 – 2015
USDA NNF (Co-PI, \$234,000) A Graduate Program of Study in Biological Processing of Forest Materials	2010 – 2015
NSF Center for Bioenergy Research and Development (Co-PI, \$25,000) Gas Stream CO _x Adsorption and Ethanol Synthesis using Latex-Film Immobilized Microbes	2010
NSF EFRI Hybi (Senior personnel, \$1,988,238) Algal Oils to Drop-in Replacements for Petroleum Transportation Fuels	2009 – 2013
USDA (Co-PI/PI, \$399,845) Dampening ROS metabolism: Increasing biomass production and decreasing the switch to secondary metabolism	2009 – 2014
North Carolina Biotechnology Center (Co-PI, \$250,000) Production of Biofuels from Waste Gas Streams Using textiles Coated with Microbial Catalysts	2008 – 2010
DSM Nutritional Inc. (PI, \$68,000) Development of a Functional Terminal Restriction Fragment Length Polymorphism (TRFLP) Method to Evaluate the Effects of DSM Feed Additives and Waste Treatments in Swine Waste Systems	2007 – 2009
U.S. Army Research Office (PI, \$301,189) Structural Analysis and Bioengineering of Thermostable <i>Pyrococcus furiosus</i> Prolidase for the Optimization of Organophosphorus Nerve Agent Detoxification	2006 – 2011

North Carolina Pork Council (Co-PI, \$25,000) Microbial Characterization of the Treatment Zone in Swine Waste Lagoons	2006 – 2008
North Carolina Pork Council (Co-PI, \$25,000) Microbial Characterization of the Treatment Zone in Swine Waste Lagoons	2006 – 2007
NASA Institute for Advanced Concepts (Co-PI, \$400,000) Redesigning Living Organisms to Survive on Mars- Phase II	2005 – 2007
NASA Institute for Advanced Concepts (Co-PI, \$75,000) Redesigning Living Organisms to Survive on Mars.- Phase I	2005
USDA (Subcontractor, \$75,000) Management of closure or remediation of swine waste treatment lagoons	2004 – 2006
Army Research Office (PI, \$184,258) Structural Analysis and Bioengineering of Thermostable <i>Pyrococcus furiosus</i> Prolidase for the Optimization of Organophosphorus Nerve Agent Detoxification	2003 – 2006

PUBLICATIONS

As of Jan. 2020 (over 65 pubs), Google Scholar Citations: 2,302, h-index = 25, i-10 index = 46

Journal Articles* (Since Promotion to Full Professor)

1. Ortiz MJF, Grunden AM, Hyman M, Call D. 2019. Nitrogen Gas Fixation and Conversion to Ammonium using Microbial Electrolysis Cells. *ACS Sustainable Chemistry and Engineering*. 7 (3): 3511–3519.
2. Mathews SL, Epps MJ, Blackburn RK, Goshe M, Grunden AM, Dunn RR. 2019. Public Questions Spur the Discovery of New Bacterial Species Able to Degrade Industrial Waste. *Royal Society Open Science*. 6(3), [dx.doi.org/10.6084/m9.figshare.c.4423301](https://doi.org/10.6084/m9.figshare.c.4423301).
3. Smith-Moore CM, Grunden AM. 2018. Bacteria and Archaea as a source of traits for enhanced plant phenotypes. *Biotechnology Advances*. 36(7):1900-1916.
4. Kitchener, RL, Grunden AM. 2018. Methods for enhancing cyanobacterial stress tolerance to enable improved production of biofuels and industrially relevant chemicals *Applied Microbiology and Biotechnology*. *Appl. Microbiol. Biotechnol.* 102(4):1617-1628. doi: 10.1007/s00253-018-8755-5.
5. Somalinga V, Klemmer H, Arun A, Wapshott H, Mathews S, Grunden AM. 2018. Cloning, Over-Expression, and Purification of Carbonic Anhydrase from an Extremophilic Bacterium: An Introduction to Advanced Molecular Biology. *The American Biology Teacher*, 80:29-34.
6. Duckworth OW, Andrews MY, Cubeta MA, Grunden AM, Ojiambo PS. 2017. Revisiting Graduate Student Training to Address Agricultural and Environmental Societal Challenge. *Agric. Environ. Lett.* 2:170019, doi:10.2134/aerl2017.06.0019.
7. Karam AL, McMillan CC, Lai YC, de Los Reyes FL, Sederoff HW, Grunden AM, Ranjithan RS, Levis JW, Ducoste JJ. 2017. Construction and Setup of a Bench-scale Algal Photosynthetic Bioreactor with Temperature, Light, and pH Monitoring for Kinetic Growth Tests. *J Vis Exp*. 14;(124). doi: 10.3791/55545
8. Whitham JM, Schulte MJ, Bobay BG, Bruno-Barcena JM, Chinn MS, Flickinger MC, Pawlak JJ, Grunden AM. 2017. Characterization of *Clostridium ljungdahlii* OTA1: a non-autotrophic hyper ethanol-producing strain. *Appl. Microbiol. Biotechnol.* 101(4):1615-1630. DOI:[10.1007/s00253-016-7978-6](https://doi.org/10.1007/s00253-016-7978-6)

9. Somalinga V, Buhrman G, Arun A, Rose RB, Grunden AM. 2016. A High-Resolution Crystal Structure of a Psychrohalophilic α -Carbonic Anhydrase from *Photobacterium profundum* Reveals a Unique Dimer Interface. PLOS ONE. 11:12 DOI. 10.1371/journal.pone.0168022
10. Mathews SL, Smithson CE, Grunden AM. 2016. Purification and characterization of a recombinant laccase-like multi-copper oxidase from *Paenibacillus glucanolyticus* SLM1. J Appl. Microbiol. 2016 Nov;121(5):1335-1345. doi: 10.1111/jam.13241.
11. Savage AM, Hills J, Driscoll K, Fergus DJ, Grunden AM, Dunn RR. 2016. Microbial diversity of extreme habitats in human homes. PeerJ. Sep 13;4:e2376. doi: 10.7717/peerj.2376.
12. Mathews SL, Pawlak J, Grunden AM. 2016. Draft Genome Sequences of Two Strains of *Paenibacillus glucanolyticus* with the Ability To Degrade Lignocellulose. Genome Announc. Jun 23;4(3). pii: e00423-16. doi: 10.1128/genomeA.00423-16.
13. Geng X, Liu X, Ji M, Hoffman W, Xiang Q, Grunden AM. 2016. Enhancing heat tolerance of the little dogwood *Cornus canadensis* L. f. with introduction of a superoxide reductase gene from the hyperthermophilic archaeon *Pyrococcus furiosus*. Frontiers in Plants Science-Plant Biotechnology. 7:26, doi: [10.3389/fpls.2016.00026](https://doi.org/10.3389/fpls.2016.00026).
14. Mathews SL, Grunden AM, Pawlak JJ. 2016. Degradation of Lignocellulose and Lignin by *Paenibacillus glucanolyticus*. International Biodeterioration & Biodegradation. 110:79-86, doi:10.1016/j.ibiod.2016.02.012.
15. Whitham JM, Pawlak JJ, Grunden AM. 2016. *Clostridium ljungdahlii*: a Review of the Development of an Industrial Biocatalyst. Current Biotechnology. 5(1): 54-70.
16. Whitham JM, Tirado-Acevedo O, Chinn MS, Pawlak JJ, Grunden AM. 2015. Metabolic Response of *Clostridium Ljungdahlii* to Oxygen Exposure. Appl Environ Microbiol. 2015 Dec 15;81(24):8379-91. doi: 10.1128/AEM.02491-15.
17. Ji ML, Grunden AM. 2015. Cloning, Purification and Characterization of Recombinant Glutathione Reductase from the Psychrophilic Antarctic Bacterium, *Cobwellia psychrerythraea*. Extremophiles. DOI 10.1007/s00792-015-0762-1
18. Dalal, J., Yalamanchili, R., Hovary, C.L., Ji, M., Rodriguez-Welsh, M., Aslett, D., Ganapathy, S., Grunden, A., Sederoff, H. and Qu, R. 2015. A novel gateway-compatible binary vector series (PC-GW) for flexible cloning of multiple genes for the genetic transformation of plants. Plasmid, 81:55-62. doi: 10.1016/j.plasmid.2015.06.003
19. Utturkar S, Klingeman DM, Bruno-Barcelona JM, Chinn MS, Grunden AM, Köpke M, Brown SD. 2015. Sequence Data for *Clostridium autoethanogenum* using Three Generations of Sequencing Technologies. Scientific Data 04/2015; 2:150014. DOI: 10.1038/sdata.2015.14
20. Mathews SL, Pawlak JJ, Grunden AM. 2015. Bacterial Biodegradation and Bioconversion of Industrial Lignocellulosic Streams. Appl. Microbiol. Biotechnol. 99(7):2939-2954.
21. Mathews SL, Pawlak JJ, Grunden AM. 2014. Isolation of *Paenibacillus glucanolyticus* from Pulp Mill Sources with Potential to Deconstruct Pulping Waste. Bioresource Technology. 164: 100–105.
22. Killens R, Turner R, McInnes C, Grunden AM. 2014. Characterization of a recombinant *Metallosphaera sedula* carboxylesterase for use in algal-based biofuel production. Advances in enzyme Research. 2:1-13.

23. Killens-Cade RR, Kitchener RL, Mathews SL, Schreck S, Ji ML, Turner R, MacInnes C, Grunden AM. 2014. Production of extremophilic proteins using *Escherichia coli*-based expression systems. In Basic Methods in Protein Purification and Analysis. iConcept Press.
24. Schreck S, Killens-Cade R, Grunden AM. 2014. Characterization of a Halophilic Acyl-CoA Thioesterase from *Chromohalobacter salexigens* for Use in Biofuel Production Current Biotechnology. 2: 275-283.
25. Wang W, Allen E, Campos A, Killens-Cade R, Mixson S, Srirangan S, Sauer ML, Schreck S, Thapaliya N, Wilson C, Burkholder J, Stikeleather LF, Sederoff H, Grunden AM, Roberts WL. 2013. *Dunaliella* to Drop-In Replacement Liquid Transportation Fuel. Environmental Progress and Sustainable Energy. 32: 916–925.
26. Schreck SD, Grunden AM. Biotechnological Applications of Halophilic Lipases and Thioesterases. 2013. Applied Microbiology and Biotechnology, 98(3):1011-21
27. Im YJ, Smith C, Phillippy B, Strand D, Kramer D, Grunden AM, Boss WF. 2014. Increasing phosphatidylinositol (4,5) bisphosphate biosynthesis affects basal signaling and chloroplast metabolism in Arabidopsis thaliana. Plants. 3:27-57. doi:[10.3390/plants3010027](https://doi.org/10.3390/plants3010027)
28. Mathews SL, Ayoub AS., Pawlak J, Grunden AM. 2013. Methods for Facilitating Microbial Growth on Pulp Mill Waste Streams and Characterization of the Biodegradation Potential of Cultured Microbes. Journal of Visualized Experimentation. 82 doi: 10.3791/51373
29. Veal MW, Grunden AM, Chinn MS, Caffrey KR. 2013. Algae for Biofuels – Production and Conversion. Southern Regional Aquaculture Center. Publication Number 4309.
30. Veal MW, Chinn MS, Caffrey KR. Grunden AM. 2013. Algae for Biofuels – Economic and Environmental Costs. Southern Regional Aquaculture Center. Publication Number 4310.
31. Bruno-Barcena JM, Chinn MS, Grunden AM. 2013. Genome Sequence of the Autotrophic Acetogen Clostridium autoethanogenum JA1-1 Strain DSM 10061, a Producer of Ethanol from Carbon Monoxide. Genome Announcements. Aug 15;1(4). pii: e00628-13. doi: 10.1128/genomeA.00628-13.

* a full listing of publication as indexed in PubMed is available at MyBibliography collection: <https://www.ncbi.nlm.nih.gov/sites/myncbi/18yur5cTD9B1vx/bibliography/56134517/public/?sort=date&direction=ascending>)

Book Chapters

1. Grunden AM, Adams, MW, 2012. X-Pro Dipeptidase (Archaea) in Handbook of Proteolytic Enzymes 3rd Edition, Barrett, AJ, Rawlings, ND, Woessner, JF (eds), Academic Press, London.
2. Grunden AM, Comfort DA, Malotky, EL, Kelly RM. 2004. Expression of Extremophilic Proteins in Expression Technologies: Current Status and Future Trends, Horizon Scientific Press. Baneyx F (ed). Horizon Scientific Press. Norfolk. 1-84.
3. Grunden AM, Adams, MW, 2002. X-Pro Dipeptidase (Archaea) in Handbook of Proteolytic Enzymes 2nd Edition, Barrett, AJ, Rawlings, ND, Woessner, JF (eds), Academic Press, London.

Manuscripts in Review

1. Slivka R, Chinn MS, Grunden AM. 2020. Influence of Carbon Source Preadaptation on *Clostridium autoethanogenum* Culture Performance. Bioprocess and Biosystems Engineering.
2. Slivka R, Chinn MS, Grunden AM, Bruno-Barcena J. 2020. Influence of pH Adjustment on *Clostridium autoethanogenum* Xylose Consumption. Biomass and Bioenergy.
3. Smith-Moore CM, Li K, Aslett D, Ji M, Lin X, Xie D, Sederoff H, Grunden AM. 2020. A Synthetic Condensed Reverse TCA Cycle for Carbon Fixation in Plants. PNAS.

Patents and Invention Disclosures

1. Grunden, A. M., and H. I. A. Sederoff. "Methods and Compositions for the Production of Extremophile Enzymes from Green Microalgae and Cyanobacteria." U.S. Patent 20,130,323,803, Issued January 7, 2020.
2. Grunden, A. M., and H. I. A. Sederoff. "Synthetic Pathway for Biological Carbon Dioxide Sequestration." U.S. Patent Application 14/088,142, filed November 22, 2013.
3. Grunden, A. M., H. I. A. Sederoff, and R. D. Yalamanchili. "Transgenic Expression of Archaea Superoxide Reductase." U.S. Patent 20,140,026,255 issued January 23, 2014.
4. Zering K, Natelson R, Mayer M, Sederoff HI, Grunden AM. "Advanced Information Systems for Crop Agriculture". October 2014. IDF # 15129.
5. Mathews, S.L., Grunden, A. M. Dunn, R. "Isolation of Industrial Enzymes from Household Insect Microbiomes". Invention Disclosure. November 2015. IDF # 16092.
6. Grunden, A. M. and H. I. A. Sederoff. "Expression of Bacterial Enzymes for Biological Carbon Sequestration in Plants" WO2017015321A1. August 2016, licensed to the company Yield 10.
7. Grunden, A. M., Sederoff H.I.A, Aslett, L. D., Smith, C. Expression of bacterial biotin ligase and ferredoxin in plants for enhanced biomass production. WO2017015326A1. January 2017.

Popular Press Publications Highlighting Research

TV Broadcast

Future Channels Interview on the "Redesigning Life for Mars" project. 2006

Magazine Articles

1. North Carolina Research Perspective, the News magazine for North Carolina Agricultural Research Services in the College of Agriculture and Life Sciences, "College researchers mine microbes for genes that may help plants in extreme environments" Website: <http://www.cals.ncsu.edu/agcomm/magazine/winter06/microbes.html>
2. Results, Research and Graduate Studies at North Carolina State University, "Researchers find fuel in odd places" Vol. VIII, #2
3. North Carolina Research Perspective, the News magazine for North Carolina Agricultural Research Services in the College of Agriculture and Life Sciences, "Designing jet fuels of the future"

Newspaper Articles

Smith, Robin, 'Genes from undersea creature may help crops prosper', *Raleigh News and Observer*, April 16, 2012.

Internet Publications

1. Srivastava, Chantal, Québec Science.

http://www.cybersciences.com/cyber/fr/magazine/mai_2007/retour_au_sommaire.html

2. Weir. William of the Hartford, Ct Courant for his March 22, 2007 article entitled "No "Advanced Concepts" In NASA's Future?"

<http://pqasb.pqarchiver.com/courant/access/1241207041.html?dids=1241207041:1241207041&FMT=ABS&FMTS=ABS:FT&type=current&date=Mar+22%2C+2007&author=WILLIAM+WEIR&pub=Hartford+Courant&edition=&startpage=D.1&desc=NO+%60ADVANCED+CONCEPTS%27+IN+NASA%27S+FUTURE%3F>

Radio Interviews

1. Ennis, Bridgett, Interview for a MicrobeWorld segment (produced by the American Society for Microbiology) to be aired on National Public Radio

Website: www.microbeworld.org

2. Hollingham, Richard, Interview for BBC Radio 4, *Tulips on the Moon*, The program aired Sept. 4th, 2007.

RESEARCH PRESENTATIONS

Selected presentations from over 120.

1. Craig KJ, Grunden AM. 2019 The Effect of Spray Drying on Diversity and Abundance of a Soil Bacterial Community. North Carolina ASM Branch Meeting, Greensboro, NC
2. Cuebas-Irizarry M, Sanders D, Grunden AM. 2019. Characterization of Bacterial Strains for Biodegradation of Polyester and Pulp Milling Waste. American Society for Microbiology General Meeting (ASM Microbe), San Francisco, CA.
3. Wapshott H, Garcia, E, Vazquez G, Grunden AM. 2019. Engineering an efficient SOR:OleT_{JE} fusion protein system for in vivo stress mitigation and alkene production.. American Society for Microbiology General Meeting (ASM Microbe), San Francisco, CA.
4. Ortiz MJF, Grunden AM, Hyman M, Call D. 2018. Performance of Nitrogen-Fixing Anodic Biofilms for Potential Ammonia Production in Microbial Electrochemical Technologies. 2018 National ACS Meeting.
5. Cuebas-Irizarry M, Gray R, Grunden AM. 2018. Evaluating Lignin Degradation Potential of Bacterial Isolates from Carpenter Bees. 2018 North Carolina Branch American Society for Microbiology Symposium.
6. Wapshott H, Vazquez G, Grunden AM. 2018. Developing OleT_{JE}-Superoxide Reductase enzyme fusions to facilitate efficient production of terminal alkenes for use as renewable drop-in transportation fuels. 2018 NIH MBTP Symposium.
7. Greenstein J, Wapshott H, Hamilton P, Grunden AM. 2017. Two-step enzymatic conversion of algal triacylglycerides to hydrocarbons. Frontiers in Biorefining Conference. St Simon's Island, Georgia.

8. Buhrman G, Somalinga V, Arun A, Grunden AM and Rose RB. 2016. Crystal structure of an alpha-carbonic anhydrase from a barotolerant psychrophile with a novel chloride ion in the dimer interface 46th Mid-Atlantic Macromolecular Crystallography Meeting Charlottesville, VA.
9. Kitchener BL, Murphree C, Young D, Sederoff H, Grunden A. 2016. Expression of Extremozymes in Biofuel-Producing Cyanobacteria: Two Valuable Applications. NCSU Springboard Innovation Forum.
10. Mathews SL, Hamilton P, Dunn R, Grunden AM. 2015. Industrial Enzymes from the Microbiome of Household Insects. NSF I-CORPS Lesson Learned meeting. Los Angeles, CA.
11. Aslett LD, Ji ML, Li K, Lin X, Smith CM, Wapshott HL, Dalal J, Bobay B, Sederoff H, Xie D, Grunden AM, Jet Fuel from Camelina. 2015. DOE Innovation Summit, Gaylord Convention Center, Washington, D.C.
12. Aslett LD, Ji ML, Li K, Lin X, Smith CM, Wapshott HL, Dalal J, Bobay B, Sederoff H, Xie D, and Grunden AM, 2015. "Increasing photosynthetic CO₂ capture in *Camelina* with a synthetic carbon fixation cycle composed of select microbial enzymes", Meeting of the North Carolina Branch of American Society for Microbiology, North Carolina State University, Raleigh, North Carolina 3rd October 2015. (Won best poster award).
13. Kay K, Fratamico P, Grunden AM, Oh D-H, Breidt F. Investigation of Carbon Storage Regulation Network (*csr* genes) and Phenotypic Differences Between Acid Sensitive and Resistant *Escherichia coli* O157:H7 Strains. 2015. 115th General Meeting of the American Society for Microbiology. New Orleans, LA.
14. Mathews SL, Pawlak J, Grunden AM. 2015. Biodegradation and Bioconversion of Pulping Waste by *Paenibacillus glucanolyticus*. Poster presented at the NCSU Graduate Student Research Symposium. Raleigh, North Carolina. Won best poster award.
15. Kai Li, Denise Aslett, Benjamin Bobay, Mikyoung Ji, Xuili Lin, Caroline Smith, Hannah Wapshott, Jyoti Dalal, Deyu Xie, Heike Sederoff, Amy M. Grunden. 2014. "Increasing Photosynthetic CO₂ capture in Camelina with a Synthetic Carbon Fixation Cycle Composed of Select Microbial Enzymes", ARPA-E PETRO program industry meeting. NC Biotechnology Center, Raleigh, NC
16. Mikyoung Ji, Denise Aslett, Kai Lee, Xuili Lin, Caroline Smith, Hannah Wapshott, Jyoti Dalal, Benjamin Bobay, Deyu Xie, Heike Sederoff, Amy Grunden, 2014. "Increasing Photosynthetic CO₂ capture in Camelina with a Synthetic Carbon Fixation Cycle Composed of Selected Microbial Enzymes", US-Korea 2014 Conference, San Francisco, CA.
17. Smith, C.M., Aslett, D., Ji, M., Li, K., Lin, X., Dalal, J., Wapshott, H., Bobay, B., Xie, D., Sederoff, H., and Grunden, A.M. 2014. Development of a Microbe-Derived, Synthetic Condensed Reverse TCA Cycle to Improve Carbon Fixation in the Seed Oil Crop *Camelina sativa*. Poster presented at: American Society for Microbiology, General Meeting; Boston, MA.
18. Mikyoung Ji, Callie Barnwell, and Amy Grunden. 2014. "Characterization of recombinant glutathione reductase from the psychrophilic Antarctic bacterium, *Cowellia psychrerythraea*", Genetics and Environmental Mutagenesis Society, NC Biotechnology Center, RTP, NC.
19. Mathews, S.L., Pawlak, J.J., Grunden, A.M. 2014. "Biodegradation and Bioconversion of Pulping Waste by *Paenibacillus glucanolyticus*", Chemical Biology & Biotechnology Research Symposium, Poster, Durham NC

20. Mathews, S.L., Pawlak, J.J., Grunden, A.M. 2014. "Biodegradation and Bioconversion of Pulping Waste by *Paenibacillus gluconolyticus*", ASM general meeting, Poster, Boston, MA
21. Sederoff, H., Grunden, A., Natelson, R., Zering, K., Srirangan, S., Singer, K. 2014. "Extremozymes as high-value co-products for algae biofuels". *Third Prize Awardee*, Exhibit at North Carolina Agriculture Biotechnology Summit Innovation Fair, Raleigh, NC.
22. Aslett LD, Bobay B, Ji ML, Li K, Lin X, Smith C, Wapshott H, Xie D, Sederoff HI, Grunden AM. 2013. Increasing Photosynthetic CO₂ capture in *Camelina* with a Synthetic Carbon Fixation Cycle Composed of Select Microbial Enzymes. ARPA-E PETRO program industry meeting, Danforth Plant Science Center, St. Louis, Missouri.
23. Killens-Cade R, Roberts WL, Burkholder JM, Lamb HH, Sederoff HI, Stikeleather LF, Grunden AM . 2013. Algal Oils as 'Drop-in' Replacements for Petroleum-derived Transportation Fuels. 113th General Meeting of the American Society for Microbiology, Denver, Colorado.
24. Mathews SL, Pawlak, JJ, Grunden AM. 2013. Isolation of microbes from pulp mill sources with potential to deconstruct pulp waste. Poster presented at:113th American Society for Microbiology general meeting, abstract Q-747. Denver, Colorado.
25. Schreck SD, Killens-Cade R, Grunden AM. 2013. Characterization of a Halophilic Thioesterase from *Chromohalobacter salexigens* for Use in Biofuel Production. 113th General Meeting of the American Society for Microbiology, Denver, Colorado. May 18-21.

RECENT INVITED TALKS

2019

- AgBiome Industrial Advisory Board Meeting Seminar, Microbial Desiccation Stress Tolerance Mechanisms: A Guide for Formulation Processing, Research Triangle Park, NC
- Novozymes and NC State Partnerships, Franklinton, NC
- Harnessing Plant-Microbe Interactions and Bio-electrochemical Technologies for Sustainable Agriculture, Meeting to discuss UN Sustainability Goals Alignment between NC State and Novozymes, Raleigh, NC
- Harnessing Bio-electrochemical Technologies for Sustainable Agriculture, Workshop on microbial nitrogen fixation and solubilization of phosphorus, University of Mohammed VI Polytechnic, Ben Guerir, Morocco
- Overview of the Collaborative Crop Resilience Program, meeting with the Novo Nordisk Foundation, Raleigh, NC

2018

- Novo Nordisk Foundation Crop Resiliency Workshop, Convener and organizer, Copenhagen, Denmark
- Seminar, Microbiomes of aquaponic systems, BASF, Raleigh NC
- Seminar, Outcomes of the Crop Resiliency Workshop, Novo Nordisk Foundation, Copenhagen, Denmark
- Seminar, Outcomes of the Crop Resiliency Workshop Denmark Technical University, Copenhagen, Denmark
- Seminar, Outcomes of the Crop Resiliency Workshop Novozymes, Copenhagen, Denmark

2017

Seminar, Biology Program Seminar Series, University of North Carolina, Chapel Hill, NC
Seminar, Microbiology Seminar Series, University of Georgia, Athens, GA.
Seminar, VIB-NC State Strategic Alliance Workshop, Ghent Belgium
Seminar, Integrative Molecular Plant Systems NSF REU program, NCSU, Raleigh NC
Seminar, USDA BeeMore REE program, NCSU, Raleigh, NC

2016

Seminar, BASF Site Visit, NCSU, Raleigh, NC
Seminar, Biology Seminar at University College of the North in Northern Manitoba,
Manitoba, Canada
Seminar, PDAW NRC: Science on Stage at the North Carolina Museum of Natural Sciences,
Raleigh, NC
Seminar, Integrative Molecular Plant Systems NSF REU program, NCSU, Raleigh NC

2015

Seminar, Valent Bioscience Site Visit, NCSU, Raleigh, NC
Seminar, BASF and NCSU Partnership Session. NCSU., Raleigh, NC
Seminar, Center for Integrated Fungal Research Symposium. North Carolina Biotechnology
Center, RTP, NC.
Seminar, International Seminar on Biotechnology – Challenging the Challenges of the
Changing World. Justice Basheer Ahmed Sayeed College for Women, Chennai, India
Seminar, Integrative Molecular Plant Systems NSF REU program, NCSU, Raleigh NC

2014

Seminar, 53rd Annual Meeting of the Phytochemical Society of North America, Raleigh, NC
Seminar, Integrative Molecular Plant Systems NSF REU program, NCSU, Raleigh NC
Seminar, Plant & Molecular Biology Seminar Series, NCSU, Raleigh, NC
Seminar, Biochemistry Seminar Series, NCSU, Raleigh, NC

2013

Seminar, Nagoya University Tech Crop Science & Biotechnology Roundtable, North
Carolina Biotechnology Center, Research Triangle Park, NC
Seminar, Fulbright Global Food Security Conference, Raleigh NC
Seminar, Integrative Molecular Plant Systems NSF REU program, NCSU, Raleigh NC

TEACHING & ADVISING

Graduate Students

Current Graduate Students

Hannah Wapshott (Microbiology, Ph.D. candidate, 2014-)
Mara Cuebas-Irizarry (Microbiology, Ph.D. program, 2017-)
Jabeen Ahmad (Plant Biology, Ph.D. Program, 2018 –)
Dylan Brown (Forst Biomaterials. M. S. candidate, 2018 –)
Kelly Craig (Microbiology, M.S. candidate, 2018 –)
Enrique Garcia (Biochemistry, M.S. candidate, 2018 –)
Deaja Sanders (Microbiology, Ph.D. program, 2018 –)
Micaela Robson (Microbiology, Ph.D. program, 2019 –)

Completed Ph.D. Students

Caroline Smith-Moore (Functional Genomics Ph.D., 2018)
 Senior Scientist, BTEC, NCSU, Raleigh, NC

Rebecca Kitchener (Microbiology Ph.D., 2017)
 Postdoctoral Researcher, NCSU

Jason Whitham (Microbiology Ph.D.; Forest Biomaterials Ph.D., 2015)
 Senior Research Scientist, BD Life Sciences

Stephanie Mathews (Microbiology Ph.D., Forest Biomaterials Ph.D., 2015)
 Assistant Professor, Department of Biology, Campbell University

Rushyannah Killens (Microbiology Ph.D., 2013)
 NRC Postdoctoral Fellow, US Army Edgewood Chemical Biological Center

William (Darnell) Graham (Microbiology Ph.D., Forest Biomaterials Ph.D., 2013)
 Naval Research Scientist

Casey Theriot (Microbiology Ph.D., 2010)
 Assistant Professor Infectious Disease, Department of Population Health and Pathobiology, NCSU

Oscar Tirado-Acevedo (Microbiology Ph.D., 2010)
 Senior Scientist. Global Microbiology R&D. The Procter & Gamble Company

Alice Lee (Microbiology Ph.D., 2009)
 Teaching Assistant Professor, NCSU

Andrew Devine (Microbiology Ph.D., 2009)
 Research Scientist, Research Triangle Institute, Research Triangle Park, NC

Mikyong Ji (Microbiology Ph.D., 2007)
 Senior Research Associate, Duke Human Vaccination Institute

Xuelian Du (Microbiology Ph.D., 2006)

Completed Masters Students

Steven Schreck (Microbiology M.S. 2013)
 IT specialist, Nationwide

Mikyong Ji, (Microbiology M.S., 2003)
 Senior Research Associate, Duke Human Vaccination Institute

Erika Malotky (Microbiology M.S., 2002)
 Research Associate, NIEHS, Research Triangle Park, NC

Dissertation Committees

Since 2000, I have served on over 80 dissertation committees for students in Microbiology, Plant Biology, Functional Genomics, Chemical & Biomolecular Engineering, Civil Engineering, Biological & Agricultural Engineering, Food Science, Biochemistry, and Biological sciences. I have also served on Ph.D. advisory committees for students at UNC-CH, Duke University, and Drexel University.

International Graduate Students Mentored

Richard Tambalo, Fulbright Scholar, University of the Philippines, Los Baños	2012 – 2103
Guijie Fang, University of Hubei, Chinese Science Foundation Scholar	2014 – 2015

Postdoctoral Associates

Denise Aslett, North Carolina State University Senior Research Scientist, Jacobs Engineering, Research Triangle Park, NC	2011 – 2015
Jimmy Gosse, University of Minnesota Senior Research Scientist, BioCee, Minneapolis, MN	2008 – 2010
Mikyong Ji, North Carolina State University Research Associate, North Carolina Central University, Durham, NC	2012 – 2015
Kai Li, University of Florida, Associate Head, TCM Research Institute, Shandong Hong JiTang Pharmaceutical Group Co. Ltd, Jinan, Shandong China	2012 – 2015
Vijay Somaling, Caltech University Assistant Professor, Department of Biological Sciences Southwestern Oklahoma State University, Weatherford, OK	2014 – 2017
Karen O’Connell, Duke University	2016 – 2018

Undergraduate Researchers

The following is a partial list of past and present undergraduates who have conducted research in my laboratory from over 75 students.

Jessica Badger	MB 493 (University honors research honors fellowship 2005)
Callie Barnwell	ALS 498-499 CALS Honors Research
Peter Chisnell	Summer 2009 NSF Synthetic Biology REU student
Stephen Cohen	Summer 2011 NSF Synthetic Biology REU student
Roslyn Gray	USDA BeeMore REE student, 2018
Leslie Hughes	ALS 498-499 CALS Honors research
Prashant Joshi	ALS 498-499 CALS Honors Research
Sara Levison	ALS 498-499 CALS Honors Research, Summer 2010 NSF Synthetic Biology REU student
Jonathan Mancao	Summer 2016 NSF IMPS REU student
Julia Marrs	Summer 2009 NSF Synthetic Biology REU student
Christine McInnes	Summer 2011 NSF Synthetic Biology REU student, ALS 498-499 CALS Honors Research, 2012 Undergrad Research award winner
Sara Rowell	ALS 498-499 CALS Honors Research, Undergrad research award
Nadia Russell	USDA BeeMore REE student, 2017
Johanna Schafer	ALS 498-499 CALS Honors Research, Undergrad research award
Julie Shelton	ALS 498-499 CALS Honors Research
Catherine Smithson	Summer 2015, NSF IMPS REU students
Rachel Turner	ALS 498-499 CALS Honors Research, 2012 Undergraduate Research award winner, NCBC UG research fellowship, 2012
Tatiana Varca	BIO 499 Undergraduate Research (Meredith College)
Gina Vasquez,	Summer 2018 NSF IMPS REU student
Gretchen Walljaspar	NSF Integrated Molecular Plant Systems REU student, 2012
Catherine Ward	ALS 498-499 Honors Research, Honors research fellowship, 2001
Kathryn Westfall	ALS 498-499 CALS Honors Research
Jason Whitham	BCH 493 UG Research, NCBC UG research fellowship, 2010

Kaylan Whitaker
Elizabeth Wilson

ALS 498-499 CALS Honors Research
ALS 498-499 Honors research (CALS Research fellowship 2003)

Courses Taught

I have taught MB 351 General Microbiology, the introductory foundational course for our undergraduate Microbiology majors, as well as a number of sections of the Agriculture and Life Science Honors special topics course ALS 398H for undergraduates in the CALS Honors Program. For each ALS 398H section, I developed a new focus topic and supporting activities. Example topics include: Extreme Biology: What Are the Limits?; What are the world's emerging infectious diseases and how will they impact the quality of life around the world?; Food vs. Fuel: Finding Creative Solutions for Feeding and Fueling our Communities. My primary current teaching responsibility is the graduate level microbial physiology course MB 714 Microbial Metabolic Regulation, which I designed to provide an in-depth study of microbial physiology and its regulation based largely on information from journal articles, which I update each year.

Course	Semester	# of Students	Course Rating	Instructor Rating
<i>Undergraduate</i>				
MB 351 General Microbiology	F 2001 2	45	3.78	3.90
	S 2002	280	4.31	4.50
	F 2002	285	4.50	4.60
ALS 398H Honors Seminar	S 2004	12	3.82	4.55
	S 2005	9	4.38	5.00
	S 2006	23	4.71	4.74
	S 2007	11	4.38	4.50
	S 2011	15	5.00	5.00
	S 2015	9	5.00	5.00
	S 2017	15	4.10	4.60
<i>Graduate</i>				
MB 714 Microbial Metabolic Regulation	F 2003	21	4.81	4.91
	F 2004	23	4.65	4.48
	F 2005	24	4.63	4.88
	F 2006	30	4.18	4.68
	F 2007	27	4.22	4.39
	F 2008	23	4.50	4.70
	F 2009	24	4.60	4.70
	F 2010	26	4.40	4.60
	F 2011	26	4.70	4.80
	F 2012	30	4.80	4.80
	F 2013	19	4.70	4.70
	F 2014	23	4.90	4.90

F 2015	33	4.80	4.70
F 2016	27	4.60	4.70
F 2017	30	4.90	4.80
F2018	19	4.80	4.80
F2019	32	4.70	4.90

SERVICE & OUTREACH

Department

Microbiology Graduate Program Curriculum Committee, Chair	2000 – 2006 – 2013
Microbiology Graduate Admissions Committee	2000 –
Masters of Microbial Biotechnology Program Admissions and Curriculum Committee	2004 –
Masters of Microbial Biotechnology Program Advisory Board	2009 –
Bacterial Pathogenesis Position Faculty Search Committee	2008
Masters of Microbial Biotechnology Program Director Faculty Search Committee, chair	2009
Departmental Faculty Mentor for Paul Hamilton, Terri Long, Ross Sozzani, Anna Stepanova, Manuel Kleiner	2014 –

College

CALS Diversity Management Team Committee	2002 – 2007
CALS Undergraduate Honors Curriculum Committee Member, Chair	2004 – 2004 – 2005
CALS Research Committee	2010, 2018-
CALS Dean Search Committee Member	2011
Dean's Enrichment Grants reviewer	2014
Plant Sciences Initiative Governance Task Force co-chair	2015 – 2017
BAE Metabolic Engineering Position Faculty Search Committee	2017
Plant Pathology Chemical Interactome Position Faculty Search Committee	2017
Plant Pathology Phytobacteriology Position Faculty Search Committee	2018
Plant Sciences Initiative Governance Steering Committee (co-chair)	2018 –
Plant Sciences Initiative Executive Direct Search Committee	2019 –
PMB Microbiome Extension Faculty Search Committee	2019 –
PMB Plant/Microbial Ecologist Faculty Search Committee	2019 –

University

University Biosafety Committee, Member	2001 –
Chair,	2003 – 2007
Park Scholarship Program Interviewer	2005 –
Park Scholarship Program Mentor	2003 –
Park Faculty Scholar for class of 2010 (provided advisement and guidance for 50 Park Scholars)	2006 – 2010
Park Scholarship Program Elkan Lectureship Selection Committee	2015 –
NCSU Internal Reviewer for Packard Grant Program	2013
BTEC Advisory Board Member	2014 –
Center for Integrated Fungal Research Advisory Committee	2014 –

Chancellor's Faculty Excellence Cluster Hire Program - Systems and Synthetic Biology Faculty Search Committee	2014 – 2015
Proposal Development Unit Grants Coordinator Position Interviewer	2015
NCSU OTCNV Intellectual Property Committee	2018 –
NCSU Strengthening University-Wide Interdisciplinarity Task Force	2020 –

National and International

Grant & Fellowship Panels

Sigma Xi Grants In Aid of Research	2006-2013
NASA Institute for Advanced Concepts	2012, 2013
NSF Energy and Sustainability	2012, 2016
NSF Career Panel in MCB	2013, 2016
NSF EFRI PSBR	2013
NSF Postdoctoral Research Fellowships in Biology	2017, 2019
Foundation for Food and Agriculture Research's (FFAR)	2017

<i>Ad hoc</i> reviewer for: U.S. Army Research Office, NSF Biomolecular Structure and Function Program, NSF HRD HBCU, Natural Sciences and Engineering Research Council of Canada, Discovery Grants Program, Environmental Research and Education Foundation, USDA AFRI, United States-Israel Binational Science Foundation	2004 –
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Editorial

Frontiers in Microbiology, Microbiological Chemistry and Geomicrobiology, Editorial Board	2012 –
Frontiers in Microbiology, Extreme Microbiology	2012 –
Applied and Environmental Biology, Editorial Board	2015 –
<i>Ad hoc</i> reviewer for: Applied Microbiology and Biotechnology, BBA Proteins and Proteomics, Biochemical Engineering Journal, Biochemistry, Bioresources and Bioprocessing, Bioresource Technology, European Journal of Biochemistry, European Journal of Biophysics, FEMS Microbiology, Journal of Bacteriology, Journal of Biophysics, mBio, Metallomics, Microbiology and Molecular Biology Review, Molecular Microbiology, Nature, Plos One, Proteome Science, Science	2005 –

Societies

Sigma Xi Grants in Aid of Research, Executive Committee Member	2007 – 2013
American Society for Microbiology, NC Branch, Executive Committee, President	2007 – 2015 2012 – 2013

K-12 Outreach

North Carolina Science Olympiad coach	2013 –
Elementary, Middle, High School Science Fair judge	2010 –
Visit local schools to inform students about research and careers in science	2010 –

(Holly Ridge Elem, Exploris Middle School, Raleigh Charter HS, etc.)
Developed and led a High School Student Research Internship Program 2013 – 2016
focused on Algal Biofuels (15 high school students trained over 6 weeks)