

R. Sean Norman, Ph.D.

Dept. of Environmental Health Sciences
Arnold School of Public Health
University of South Carolina
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Columbia, SC 29208
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rsnorman@sc.edu

EDUCATION:

2003 (Dec.): **Ph.D.**, Molecular Cellular Biology and Pathobiology/Marine Biomedicine and Environmental Sciences, Medical University of South Carolina, Charleston, SC.

Dissertation Advisor: Dr. Pamela J. Morris

Dissertation: The effect of *Pseudomonas aeruginosa* on the functional diversity of a crude oil-degrading microbial community.

1999 (May): **M.S.**, Environmental Studies, Medical University of South Carolina and the University of Charleston, Charleston, SC.

Thesis Advisor: Dr. Harold May

Thesis: Molecular determination of the microbial community structure associated with the dechlorination of 2,3,4,5-tetrachlorobiphenyl.

1994 (Dec.): **B.S.**, Department of Biological Sciences, Augusta State University, Augusta, GA.

PROFESSIONAL EXPERIENCE:

2013 – present: **Associate Professor**, Environmental Health Sciences, University of South Carolina, Columbia, SC. (**Tenure Awarded June 2013**).

2011 - present: **Associate Faculty**, Marine Biomedicine and Environmental Sciences Center, Medical University of South Carolina.

2007 - present: **Assistant Professor**, Environmental Health Sciences, University of South Carolina, Columbia, SC.

2007 - present: **Associate Faculty**, Marine Science, University of South Carolina, Columbia, SC.

2007: **Director**, USC Environmental Genomics Core Facility, University of South Carolina, Columbia, SC.

2006 (Feb) – 2007 (Aug): **Research Assistant Professor**, Environmental Health Sciences, University of South Carolina, Columbia, SC.

2005: **Adjunct Instructor**, Cook College, Rutgers, The State University of New Jersey, New Brunswick, New Jersey.

2004 (Feb.) – 2006 (Jan): **Postdoctoral Research Associate**, Biotechnology Center for Agriculture and the Environment, Rutgers University, New Brunswick, NJ.

1999 (June) – 2003 (Dec.): **Graduate Research Assistant**, Medical University of South Carolina, Charleston, SC. Work related to Ph.D. degree.

1997 (Jan.) – 1999 (May): **Graduate Research Assistant**, Medical University of South Carolina/University of Charleston, Charleston, SC. Work related to M.S. degree.

FUNDED GRANTS: (TOTAL FUNDING \$4,496,555; FUNDING TO RSN \$2,894,862)

1. 2015: **Environ Foundation**, \$50,000, '*Measuring and Modeling of Aerosolized Antibiotic Resistant Bacteria Concentrations from the Metropolitan Wastewater Treatment Plant to Address Public Health Concerns*', PI: C. Feigley, CoPIs: **RS Norman**, DE Porter, GI Scott.
2. 2014-2015: **NSF's Extreme Science and Engineering Discovery Environment Program**, '*Linking microbial community molecular ecology to ecosystem stability*', PI: **R.S. Norman** *This competitive award was for computational time on the Stampede Supercomputer. In total, 1.5 million compute hours were allocated to the PI as a result of this proposal. Estimated value is \$70,000.
3. 2014-2015: **University of South Carolina Magellan Program**, \$2,500, '*Phenotypic Variation and Genomic Evolution of Vibrio vulnificus After Exposure to Treated Wastewater Effluent*', PI: **R.S. Norman**, Co-I: C. Eckman (student)
4. 2012-2017: **National Science Foundation**, \$725,000, '*CAREER: Linking Microbial Phylogenetic and Functional Gene Diversity to Microbial Mat Ecosystem Function Following Environmental Disturbance*', PI: **R.S. Norman**
5. 2012-2013: **USC ASPIRE II**, \$96,000 '*Revolutionizing Treatment of Resistant-Infections using Engineered Nanoparticles to Inhibit Bacterial Cell-Cell Communication*. PI: A.W. Decho, Co-PIs **R.S. Norman (\$30,000)**, B.C. Benicewicz.
6. 2011-2014: **Department of Defense: Office of Naval Research**, \$224,795, '*Investigation of Microbe-based Proton Exchange Membranes (MPEMs) for Microbial Fuel Cells (MFCs)*', PI: **R.S. Norman**.
7. 2010-2013: **Department of Energy: Advanced Research Projects Agency-Energy (ARPA-E)**, \$2,340,000, '*Electroalcoholgenesis: Bioelectrochemical Reduction of CO₂ to Butanol*', PI: H.D. May, Co-PIs: **R.S. Norman (\$831,587)**, S Creager, M Henson.
8. 2007-2011: **National Science Foundation**, \$773,860, "*EN-Gen: Bacterial Communication in Microbial Mats: A metagenomic approach to understanding quorum sensing gene diversity and expression*". P.I.: **R.S. Norman** Co-PI: A.W. Decho.
9. 2008-2010: **National Institutes of Health USC Center for Colon Cancer Research**, \$240,000, '*Characterizing the role of the colon microbiome in the APC^{Min} mouse model of colon cancer*'. PIs: **R.S. Norman**, FW Outten

10. 2009-2010: **SC Sea Grant Consortium**, \$28,400, ‘*A metagenomic approach to understanding the impacts of wastewater treatment plants on the emergence of antibiotic resistant bacteria in surrounding ecosystems*. PIs: **R.S. Norman**, D.E. Porter
11. 2008: **Arnold School of Public Health Seed Grant**, \$12,000, “*Antibiotics in the Environment: A Metagenomic Approach to Examining the Emergence of Novel Bacterial Antibiotic Resistance Genes in Coastal Ecosystems*”. **PI: R.S. Norman**
12. 2006-2008: **Department of Energy**: JGI Community Sequencing Program: ‘*Sequencing the lithifying mat communities of marine stromatolites relevant to the carbon record*’ CSP 10881; PI: A.W. Decho, CoPIs: **R.S. Norman**, P.T. Visscher, J. Stolz, R.P. Reid.

PENDING GRANTS:

1. 2016: **Bill and Melinda Gates Foundation**, \$100,000, Grand Challenges Phase I: ‘*Tracking Bacterial Antibiotic Resistance Burden at the Socioecological Interface in Sub-Saharan Africa*’ PI: **RS Norman** Co-PIs: E. Brenner.

PUBLICATIONS IN PROGRESS: (*Underlined authors are my students and postdocs*)

1. Ross D.E., Marshall C.W., May H.D., **Norman R.S.** 2015. Comparative genomic analysis of *Sulfurospirillum cavolei* MES reconstructed from the metagenome of an electrosynthetic microbiome. PLoS One. *In press*
2. Scott, GI, Porter, DE, Chandler, GT, **Norman RS**, Scott CH, Uyaguari-Diaz, MI, Maruya M., Weisberg, SB, Fulton, MH, Wirth, EF, Moore, J, Pennington, PL, Schlenk, D., Cobb, GB, Denslow, ND. Antibiotics as CECs: An Overview of the Hazards Posed by Antibiotics and Antibiotic Resistance. *Frontiers in Marine Science*. *In revision*.
3. Marshall, C., Ross, D.E., Handley, KM., Edirisinghe, PD, Weisenhorn, P., Henry, C., Gilbert, J., May, HD, **Norman RS**. Metabolic analysis and modeling of an electrosynthetic microbial community biofilm. *Nature Biotechnology*. *In review*
4. **Norman, R.S.**, E.B. Fichot, and A.W. Decho. Metatranscriptomic analysis of quorum sensing induced changes in microbial mat community gene expression. *In prep* for submission to ISME J.
5. Preisner E.C. and **R.S. Norman**. The Effect of Environmental Perturbation on Microbial Mat Functional Diversity and Ecosystem Stability. *In Prep* for submission to the ISME J.
6. Stroud, D., Glaven, S., Tender, L., and **R.S. Norman**. The development of a biofilm-based proton exchange membrane for microbial fuel cells. *In Prep* for submission to PLOS one.

PUBLICATIONS IN PRINT: (*Underlined authors are my students and postdocs*)

1. Ross D.E., Marshall C.W., May H.D., **Norman R.S.** 2015. Draft genome sequence of *Sulfurospirillum* sp. strain MES, reconstructed from the metagenome of a microbial electrosynthesis system. *Genome Announc.* 3(1):e01336-14.
2. Petrisor, A., Szyjka, S., Kawaguchi, T., Visscher, P., **Norman, R.S.**, A.W. Decho. 2014. Changing Microspatial Patterns of Sulfate-Reducing Microorganisms (SRM) During Cycling of Marine Stromatolite Mats. *Inter. J. Mol. Sci.* 15:850-877

3. Uyaguari, M., G. Scott, and **R.S. Norman**. 2013. Abundance of Class 1-3 Integrins in South Carolina Estuarine Ecosystems Under High and Low Levels of Anthropogenic Influence. *Marine Poll. Bull. In Press*.
4. Marshall, C., Ross, D.E., Fichot, E.B., **Norman, R.S.**, and H.D. May. 2013. Long-term Operation of Microbial Electrosynthesis Systems Improves Acetate Production by Autotrophic Microbiomes. *Environmental Science and Technology* 47:6023-6029.
5. Fichot, E.B., and **R.S. Norman**. 2013. Microbial phylogenetic profiling with the Pacific Biosciences sequencing platform. *Microbiome* 1:10. (Highly Accessed Designation)
6. Marshall, C., Ross, D.E., Fichot, E.B., **Norman, R.S.**, and H.D. May. 2012. Electrosynthesis of commodity chemicals by an autotrophic microbial community. *Applied and Environmental Microbiology* 78:8412-8420.
7. Uyaguari, M., E.B. Fichot, G. Scott, and **R.S. Norman**. 2011. Characterization and quantitation of a novel beta-lactamase gene found in a wastewater treatment facility and the surrounding coastal ecosystem. *Appl. Environ. Microbiol.* 77:8226-8233.
8. Bey, B.S., E.B. Fichot, and **R.S. Norman**. 2011. Extraction of high molecular weight DNA from microbial mats. <http://www.jove.com/details.php?id=2887> doi: 10.3791/2887. *J Vis Exp.* 53 (2011).
9. Bey, B.S., E., A.W. Decho, and **R.S. Norman**. 2010. Extraction of high molecular weight DNA from microbial mats. *Biotechniques* 49:631-640.
10. Decho, A.W., **R.S. Norman**, and P.T. Visscher. 2010. Quorum sensing in natural environments: emerging views from microbial mats. *Trends in Microbiology* 18:73-80.
11. Gallagher, K.L., Dupraz, C., Braissant, O., **Norman, R.S.**, Decho, A.W., and Visscher, P.T. 2010. Mineralization of sedimentary biofilms: Modern mechanistic insights. In: Columbus, F. (ed): *Biofilm: Formation, Development and Properties*. Nova Science Publishers, Hauppauge, NY.
12. Aelion, C.M., and **R.S. Norman**. 2010. Isotopic labeling in Environmental and biodegradation studies. In CM Aelion, P Höhener, D Hunkeler, and R Aravena (Eds.), *Environmental Isotopes in Biodegradation and Bioremediation*. (pp.327-349). CRC Press, Boca Raton, FL.
13. Stolz, J.F., R.P. Reid, P.T. Visscher, A.W. Decho, **R.S. Norman**, R.J. Aspden, E.M. Bowlin, J. Franks, J.S. Foster, D.M. Patterson, K.M. Przekop, G.J.C. Underwood, L. Prufert-Bebout. 2009. The microbial communities of the modern marine stromatolites at Highborne Cay, Bahamas. *Atoll Research Bulletin* No. 567.
14. Decho, A.W., P.T. Visscher, J. Ferry, T. Kawaguchi, L. He, K.M. Przekop, **R.S. Norman**, R.P. Reid. 2008. Autoinducers extracted from microbial mats reveal a surprising diversity of N-acylhomoserine lactones (AHL) and abundance changes that may relate to diel pH. *Environmental Microbiology* 11:409-420. **Cover Image**
15. **Norman, R.S.**, J.W. Stone, A. Gole, C.J. Murphy, T.L. Sabo-Attwood. 2008. Targeted photothermal lysis of the pathogenic bacteria, *Pseudomonas aeruginosa* with gold nanorods. *Nano Letters* 8, 302-306.
16. Dupraz, C., R.P. Reid, O. Braissant, A.W. Decho, **R.S. Norman**, P.T. Visscher. 2008. Processes of carbonate precipitation in modern microbial mats. *Earth Sciences Reviews* 96:141-162.

17. Kawaguchi, T., Y-P. Chen, **R.S. Norman**, and A.W. Decho. 2008. An in-vitro rapid detection/quantification assay for N-acyl homoserine lactones in environmental samples. *Applied and Environmental Microbiology* 74:3667-3671.
18. Chadhain, S.M.* , **R.S. Norman***, K.V. Pesce, J.J. Kukor, and G.J. Zylstra. 2006. Microbial dioxygenase gene population shifts during polycyclic aromatic hydrocarbon biodegradation. *co-first author *Applied and Environmental Microbiology*, 72: 4078-4087.
19. **Norman, R.S.**, P. Moeller, T.J. McDonald, and P.J. Morris. 2004. Effect of pyocyanin on a crude oil-degrading microbial community. *Applied and Environmental Microbiology*, 70: 4004-4011.
20. **Norman, R.S.** 2003. The effect of *Pseudomonas aeruginosa* on the functional diversity of a crude oil-degrading microbial community. Doctoral Dissertation.
21. **Norman, R.S.**, R. Frontera-Suau, and P.J. Morris. 2002. Variability in *Pseudomonas aeruginosa* lipopolysaccharide expression during crude oil degradation. *Applied and Environmental Microbiology*, 68: 5096-5103.
22. **Norman, R.S.** 1999. Molecular determination of the microbial community structure associated with the dechlorination of 2,3,4,5-tetrachlorobiphenyl. Masters Thesis

HONORS AND AWARDS:

NSF CAREER Award (2012)

Nominated for the James A. Keith Excellence in Teaching Award. Arnold School of Public Health, University of South Carolina (2009 and 2010).

1st place in Ph.D. year 4 category. Medical University of South Carolina's Student Research Day oral presentation. (November 2002).

Slocum-Luntz Foundation Grant for studies related to understanding mechanisms of manipulating hydrocarbon-degrading microbial communities. (2001)

Outstanding Graduate Student Award- Masters in Environmental Studies (1999)

PROFESSIONAL ASSOCIATIONS:

American Society for Microbiology (Member since 1998)

South Carolina Branch of the American Society for Microbiology (Member since 2008)

International Society for Microbial Ecology (Member since 2003)

Sigma Xi (Member since 2003)

SYNERGISTIC ACTIVITIES:

2011 - 2013, President, South Carolina American Society for Microbiology

2011 - 2012, Steering Committee for a European Molecular Biology Organization meeting

2009 - 2011, President-Elect, South Carolina American Society for Microbiology

2012 - present, Editorial Board for Applied and Environmental Microbiology
Reviewer for the ISME Journal
Reviewer for the Journal of Applied and Environmental Microbiology
Reviewer for International Journal of Phytoremediation
Reviewer for Nano Letters
Reviewer for NSF's Division of Antarctic Biology and Medicine
Reviewer for NSF's Division of Environmental Biology
Reviewer for NSF's Microbial Observatories and Microbial Interactions and Processes
Mentor for REU and Minority Research Opportunity students
Mentor for Oversea Cooperative Research Program students-Korea Research Foundation
Mentor for high school students involved in the South Carolina Junior Academy of Science

RESEARCH CRUISES:

July 2006: R/V F.G. Walton Smith, 14 days from University of Miami Rosenstiel School of Marine and Atmospheric Science to Highborne Cay, Bahamas, Study of Bahamian marine stromatolites.

November 2006: R/V F.G. Walton Smith, 14 days from University of Miami Rosenstiel School of Marine and Atmospheric Science to Highborne Cay, Bahamas, Study of Bahamian marine stromatolites.

July 2007: R/V F.G. Walton Smith, 14 days from University of Miami Rosenstiel School of Marine and Atmospheric Science to Highborne Cay, Bahamas, Study of Bahamian marine stromatolites.

TEACHING EXPERIENCE:

2014: Instructor, University of South Carolina ENHS 793 "The Human Microbiome" Spring semester

2014: Instructor, University of South Carolina ENHS 771 "ENHS Seminar" Spring semester

2014: Instructor, University of South Carolina ENHS 675 "Infectious Disease Ecology" Fall semester

2014: Instructor, University of South Carolina ENHS 771 "ENHS Seminar" Spring semester

2013: Instructor, University of South Carolina ENHS 793 "Public Health Microbiology" Spring semester

2012: Instructor, University of South Carolina ENHS 675 "Infectious Disease Ecology" Fall semester

2012: Instructor, University of South Carolina ENHS 793 "Public Health Microbiology" Spring semester

2011: Instructor. University of South Carolina ENHS 675 "Infectious Disease Ecology" Fall semester

2011: Instructor. University of South Carolina ENHS 793A "Public Health Microbiology" Spring semester

2011: Instructor. University of South Carolina MSCI 399 "Independent Study"

- 2010: Instructor. University of South Carolina ENHS 793B “Infectious Disease Ecology”
Fall semester
- 2010: Instructor. University of South Carolina ENHS 793A “Public Health Microbiology”
Spring semester
- 2009: Instructor. University of South Carolina ENHS 793 “Ecology of Infectious Disease”
Fall semester
- 2009: Instructor. University of South Carolina ENHS 793 “Environmental Genomics” Spring
semester
- 2009: Instructor. University of South Carolina ENHS 793 “Applied Research in ENHS”
Spring semester
- 2008: Instructor. University of South Carolina ENHS 790 “Ecology of Infectious Disease”
Fall semester
- 2008: Instructor. University of South Carolina ENHS/ENVR 221 “Environmental Pollution
and Health” Spring semester
- 2008: Instructor. University of South Carolina ENHS 790 “Independent Study”
- 2007: Guest lecturer. “Molecular methods to assess microbial functional diversity”. October
19, 2007, ENHS 787 Analytical Concepts in Environmental Health Sciences,
Department of Environmental Health Sciences, University of South Carolina,
Columbia, SC.
- 2007: Guest lecturer. “Microbial degradation of environmental pollutants”. November 19,
2007, ENHS 774 Environmental Toxicology, Department of Environmental Health
Sciences, University of South Carolina, Columbia, SC.
- 2005: Adjunct Instructor. Cook College, Rutgers, The State University of New Jersey, New
Brunswick, New Jersey. “Perspectives on Agriculture and the Environment”.
- 2002: Guest lecturer in Special Topics in Marine Biomedicine and Environmental Sciences.
Topic: "Bioremediation"
- 2001: Facilitator for Hot Topics in Marine Biomedicine and Environmental Sciences Journal
Club. Topic: "Bacterial cell-density dependent gene regulation"

MENTORING:

Previous:

Postdoctoral fellow:

1. Daniel Ross, Ph.D. USC, Dept. of Environmental Health Sciences. 2012-2014.
Currently: Research Associate, Carnegie Mellon University, PA
2. Rion Taylor, Ph.D., USC, Dept. of Environmental Health Sciences. 2008-2010.
Currently: Associate Professor of Biology, MidAmerica Nazarene University, KS.

Graduate Students:

1. Andrew Stroud, M.S. USC Dept. of Environmental Health Sciences (2014)
Thesis: “Microbial-based proton exchange membranes for microbial fuel cells”
Currently: Environmental Scientist, Terracon

2. Gargi Dayama, Ph.D., USC Dept. of Environmental Health Sciences (2012)
Dissertation: “Development of a bioinformatic pipeline for the characterization and dysbiosis of gut microbiota in APC^{min/+} mice with and without colon tumors”
Currently: Postdoctoral Associate, Department of Computational Medicine and Bioinformatics, University of Michigan Medical School.

3. Eva Preisner, M.S., USC Dept. of Environmental Health Sciences (2012)
Thesis: “Identification of Quorum Sensing Genes in the Halophilic Archaea *Halococcus hamelinensis* sp. nov. 100NA”
Currently: A Ph.D. student, USC Dept. of Environmental Health Sciences

4. Miguel Uyaguari, Ph.D., USC, Dept. of Environmental Health Sciences. (2011)
Dissertation: “Microbial Antibiotic Resistance and Integron Gene Distribution Within an Urbanized Coastal Estuarine Ecosystem”
Currently: a Postdoctoral Associate, British Columbia Centre for Disease Control, Public Health Microbiology and Reference Laboratory, Canada.

5. Benjamin Bey, Ph.D., USC, Dept. of Environmental Health Sciences. (2011)
Dissertation: “Identification of Quorum Sensing Genes in Hypersaline Microbial Mats”
Currently: Postdoctoral Associate, Department of Biological Sciences, University of Calgary, Canada.

6. John McKenzie, M.S. (Co-Chair) USC, Dept. of Environmental Health Sciences. (2011)
Thesis: Wastewater Treatment Plant Bioaerosols as a Possible Infectious Source of Antibiotic Resistance”
Currently: EHS Engineer, Bose Corp., Blythwood, SC.

7. Michelle Johnston, Ph.D., (Co-Chair) USC, Dept. of Environmental Health Sciences (2010).
Dissertation: “American Alligator Fecal Coliform and Potential Pathogen Bacterial Pollution Identification, Genotypic Fingerprinting, and REP-PCR BOX A1R Bacterial Source Tracking in Coastal South Carolina”
Currently: Research Ecologist at the National Oceanic and Atmospheric Administration Flower Garden Banks National Marine Sanctuary, Texas.

8. Jeon Eun Mi (Seoul Metropolitan Government Research Institute of Public Health and Environment). Oversea Cooperative Research Program-Korea Research Foundation (2006)

Undergraduate students:

1. Justin Skinner (CofC), NSF-REU Program in Marine Biogeochemistry (2014)
2. Megan Arias (LSU), NSF-REU Program in Marine Biogeochemistry (2013)

3. Sandra Szyjka, University Duisburg-Essen, Visiting student thesis work (2012)
4. Allyson Shea, B.S. – USC Honor's College, Marine Science. (2011)
5. Elizabeth Hambleton (Williams College), NSF-REU Program in Marine Biology (2002)
6. Hugo Tapia (Univ. of Texas at El Paso), MUSC Undergraduate Minority Program (2003)

High School:

1. Sarah Buchanan, Heathwood Hall School (2014)
2. Mckenna Savoca, Heathwood Hall School (2014)
3. Laura Hungiville, Heathwood Hall School (2013)
4. Jae Hun Ro, Spring Valley High School (2011)
5. Chelsea Joseph, Heathwood Hall School (2011)
6. Kate Hoffman, Heathwood Hall School (2011)
7. Caroline Plowden, Heathwood Hall School (2009)
8. Pierce Jones, Heathwood Hall School (2009)

Current:

Postdoctoral Associate:

none

Graduate Students:

1. Eva Preisner, Ph.D. candidate, USC, Dept. of Environmental Health Sciences (2012-)
2. Kelly Fleming, Ph.D. student, USC, Dept. of Environmental Health Sciences (2014-)
3. Andres Gaviria-Figueroa, Ph.D. student, USC, Dept. of Environmental Health (2014-) Sciences/Epidemiology and Biostats
4. Ben Torkian, Ph.D. student, USC, Dept. of Environmental Health Sciences (2014-)
5. Jimmy Duc, MSPH student, USC, General Public Health, (2015-)

Research Associate:

none

Undergraduate Students:

1. Charlotte Eckman, USC Marine Science and Honor's College (2013-)

Student Awards:

Charlotte Eckman- 2014 USC Magellan Scholarship

Andrew Stroud- 2014 ENHS Graduate Student of the Year Award

Eva Preisner- 2012 USC Graduate Student Research Day, Oral Presentation, Honorable Mention.

Eva Preisner- 2012 South Carolina American Society for Microbiology Graduate Student Poster Presentation Award, first place.

Katharine Hoffman- 2012 SC Junior Academy of Science Annual Meeting, Awarded 2nd place Microbiology Oral Presentation Category.

Miguel Uyaguari – 2011 ENHS Graduate Student of the Year Award

Eva Preisner– 2011 South Carolina American Society for Microbiology Graduate Student Oral Presentation Award, first place.

Eva Preisner– 2011 USC Graduate Student Research Day, first place poster presentation.

Eva Preisner– 2011 South Carolina American Society for Microbiology Graduate Student Poster Presentation Award, second place.

Gargi Dayama– 2011 South Carolina American Society for Microbiology Graduate Student Presentation Award, Second Place.

Michelle Johnston – 2010 ENHS Graduate Student of the Year Award

Miguel Uyaguari – 2010 South Carolina American Society for Microbiology Best Poster Award.

Benjamin Bey – 2009 ENHS Graduate Student of the Year Award

Benjamin Bey – 2009 South Carolina American Society for Microbiology. Graduate Student Presentation Award, second place.

Michelle Johnston – 2009 USC Graduate Student research Day. 1st place oral presentation.

Leslyn Brusck-Richardson – 2009 USC Graduate Student Research Day. 1st place poster division.

Caroline Plowden – 2009 Junior Science and Humanities Symposium, Selected as one of the 7 finalists for the entire meeting. Placed 2nd at the Symposium and represented South Carolina at the 47th 2009 National Junior Science and Humanities Symposium.

Pierce Jones - 2009 Junior Science and Humanities Symposium, Selected as one of the 7 finalists for the entire meeting. Placed 2nd at the Symposium and represented South Carolina at the 47th 2009 National Junior Science and Humanities Symposium.

Benjamin Bey – 2008 USC Graduate Student Research Day. 3rd place poster division.

Miguel Uyaguari – 2008 received a competitive Slocum-Lunz Foundation Award for studies involving antibiotic resistant bacteria in coastal environments.

Caroline Plowden – 2008 South Carolina Junior Academy of Science Annual Meeting, Awarded 4th Place for Written Paper in the Microbiology Division.

Pierce Jones - 2008 South Carolina Junior Academy of Science Annual Meeting, Awarded 4th Place for Written Paper in the Microbiology Division.

Student Committees:

Doctorate Committee Chair:

- Eva Preisner (present)
- Kelly Fleming (present)
- Andres Gaviria-Figueroa (present)
- Ben Torkian (present)
- Gargi Dayama (Completed 2012)
- Benjamin Bey (Completed 2011)

- Miguel Uyaguari (Completed 2011)
- Michelle Johnston (Co-chair, Completed 2009)

Doctorate Committee Memberships:

- Suvarthi Das, USC Dept. of Environmental Health Sciences
- Amjed Al-Abresm, USC Dept. of Environmental Health Sciences
- Steve Ratigan, USC Dept. of Chemistry and Biochemistry
- Odell Glenn, USC Dept. of Chemical Engineering
- Kristen Miller, USC Dept. of Environmental Health Sciences (completed 2015)
- Ibrahim Savran, USC Dept. of Computer Science (Completed 2014)
- Prea Thathiah, USC Dept. Epidemiology and Statistics (Completed 2014)
- Krystal Yozzo, USC Dept. of Environmental Health Sciences (Completed 2013)
- Gustavo Dominguez, USC Dept. of Environmental Health Sciences (Completed 2013)
- Sean McGee, USC Dept. of Environmental Health Sciences (Completed 2012)
- Yun Wu, USC Dept. of Chemistry and Biochemistry (Completed 2011)
- Karin Gaertner, USC Dept. of Environmental Health Sciences (Completed 2010)
- Christopher Farrell, USC Dept. Pathology and Microbiology (Completed 2008)

Master's Committee Chair:

- Andrew Stroud (Completed 2014)
- Eva Preisner (Completed 2012)
- John McKenzie (Co-chair, Completed 2011)

Master's Practicum Advisor:

1. Jimmy Duc, MPH, USC, General Public Health (2015-)
2. Mohamed Traore, MPH student, USC, Dept. of Environmental Health Sciences Practicum with Water Missions International (completed 2015)
3. Keri Lydon, USC Dept. of Environmental Health Sciences, Practicum: Coastal Environmental Health Science Internship at the National Oceanic and Atmospheric Administration's Center for Coastal Environmental Health and Biomolecular Research-Charleston, SC (Completed 2012)

Master's Thesis Committee Memberships:

- Virginia Hopkins, USC Dept. of Environmental Health Sciences (Completed 2014)
- James Evans, USC Dept. of Environmental Health Sciences (Completed 2014)
- Renee Dickman, USC Dept. of Environmental Health Sciences (Completed 2013)
- Michelle Flowers, USC Dept. of Environmental Health Sciences (Completed 2013)
- Brian Nevius, USC Dept. of Environmental Health Sciences (Completed 2009)
- Gustavo Dominguez, USC Dept. of Environmental Health Sciences (Completed 2009)
- Sara Powell, USC Dept. of Environmental Health Sciences (Completed 2009)
- Lucas Odom, USC Dept. of Environmental Health Sciences (Completed 2008)
- Emily McDonald, USC Dept. of Environmental Health Sciences (Completed 2008)
- Carrie Beth Hadden, USC Dept. of Environmental Health Sciences (Completed 2007)

PUBLICATION OF ABSTRACTS AT (INTER)NATIONAL MEETINGS: *(Underlined authors are my students and postdocs)*

1. **Norman, R.S.**, and Preisner, E. 2015. The Effect of Environmental Perturbation on Microbial Mat Functional Diversity and Ecosystem Stability. General Meeting of the American Society for Microbiology, New Orleans, La, May 30-June 2, 2015. *Contributed*
2. Marshall, C.W., Ross, D.E., Handley, K.M., Fichot, E.B., Gilbert, J.A., **Norman, R.S.**, and H.D. May. 2015 Microbial Communities Catalyzing Commodity Chemical and Fuel Production. General Meeting of the American Society for Microbiology, New Orleans, La, May 30-June 2, 2015. *Contributed*
3. Marshall, C.W., Ross, D.E., Handley, K.M., Fichot, E.B., Gilbert, J.A., **Norman, R.S.**, and H.D. May. 2014 Microbial Communities Catalyzing Commodity Chemical and Fuel Production. General Meeting of the American Society for Microbiology, Boston, May 17 – 21. *Contributed*
4. Fichot, E.B., Bey, B.S., and **R.S. Norman**. 2012. Diversity and biogeographic variation in microbial mat archaeal and bacterial populations within three natural Bahamian hypersaline lagoons. The 14th International Symposium on Microbial Ecology, Copenhagen, Denmark August 19-24. *Contributed*
5. Preisner E.C., **R.S. Norman**. 2012. Identification of Quorum Sensing Genes in the Halophilic Archaea *Halococcus hamelinensis* sp. nov. 100NA. The 14th International Symposium on Microbial Ecology, Copenhagen, Denmark August 19-24. *Contributed*
6. Marshall, C., Fichot, E.B., Ross, D.E., **Norman, R.S.**, and May, H.D. 2012. Co-Production of acetate and methane by an electrosynthetic autotrophic microbial community. The 14th International Symposium on Microbial Ecology, Copenhagen, Denmark August 19-24. *Contributed*
7. Marshall, C., LaBelle, T., Fichot, E.B., Ross, D.E., **Norman, R.S.**, and May, H.D. 2012. Electroautotrophic Synthesis of Acetate and Methane. American Institute of Chemical Engineers 2012 Annual Meeting, Pittsburgh, PA. October 28-November 2, 2012. *Contributed*
8. Taylor, R.G., B.S. Bey, G. Dayama, A.W. Decho, and **R.S. Norman**. 2010. Microbial diversity among the rare members of a hypersaline mat. The 13th International Symposium on Microbial Ecology, Seattle, WA. August 22-27. *Contributed*
9. Fichot, E. B. and **R.S. Norman**. 2010. New Biosensor for Quorum Sensing: Broad Detection on a Fine Scale. The 13th International Symposium on Microbial Ecology, Seattle, WA. August 22-27. *Contributed*
10. Uyaguari MI, Fichot EB, and **R.S. Norman**. 2010. “Impact of Wastewater Treatment on the Amplification and Dissemination of a Novel Class A β -lactamase Gene”. International Society for Microbial Ecology, 13th General meeting. Seattle, WA. August 22-27. *Contributed*
11. Bey, B., EB Fichot, AW Decho, **R.S. Norman**. 2010. “Identifying Quorum Sensing Activity in Hypersaline Mats Using a Functional Metagenomic Approach” International Society for Microbial Ecology, 13th General meeting. Seattle, WA. August 22-27. *Contributed*
12. Dayama, G., Wu, Y., Outten, W. F. and **R.S. Norman**. 2010. Analysis of the Gut Microbiome Contained in the *APC min/+* Mouse Model of Colon Cancer as Compared to That of Humans. The 13th International Symposium on Microbial Ecology, Seattle, WA. August 22-27. *Contributed*

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14. **Norman, R.S.**, J.W. Stone, A. Gole, C.J. Murphy, T.L. Sabo-Attwood. 2009. Targeted photothermal lysis of the pathogenic bacteria, *Pseudomonas aeruginosa* with gold nanorods. Poster presentation at 109th General Meeting of the American Society for Microbiology, Philadelphia, May 17 – 21. *Contributed*
15. Uyaguari, M., E.J. Biers, **R.S. Norman**. 2009. A functional metagenomic approach to understanding the role of wastewater treatment plants on the dissemination of antibiotic resistance genes in coastal ecosystems. Poster presentation at 109th General Meeting of the American Society for Microbiology, Philadelphia, May 17 – 21. *Contributed*
16. Bey, B.S., E. Biers, A.W. Decho, and **R.S. Norman**. 2009. Identifying Quorum Sensing Activity in Hypersaline Mats Using a Functional Metagenomic Approach. Poster presentation at 109th General Meeting of the American Society for Microbiology, Philadelphia, May 17 – 21. *Contributed*
17. Taylor RG, **Norman, R.S.** “Using a metagenomics approach to determine the microbial ecology of hypersaline mats.” 2009. Poster presented at 109th General Meeting of the American Society for Microbiology. Pennsylvania Convention Center, Philadelphia, May 17 – 21. *Contributed*
18. **Norman, R.S.**, B. Bey, R. Taylor, E. Biers. 2008. Molecular ecology of hypersaline mats. International Symposium on Microbial Ecology, Cairns, Australia. *Contributed*
19. Taylor RG, Biers EJ, Bey BS, **Norman, R.S.** 2008. Using a metagenomics approach to determine the microbial ecology of hypersaline mats. Metagenomics 2008. University of California, San Diego. *Contributed*.
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21. Myshrall, K.L., K.M. Przekop, R.P. Reid, P.T. Visscher, **R.S. Norman**, J.S. Foster, A.M. Bush. 2008. An Evaluation of Microbial Communities, Metabolisms, and Community Interactions in Modern Stromatolites in Highborne Cay, Exumas, Bahamas. Astrobiology Science Conference, Santa Clara CA. *Contributed*
22. Bey, B., M. Uyaguari, **R.S. Norman**. 2008. An efficient method for extracting high molecular DNA from hypersaline mats. American Society for Microbiology General Meeting, Boston, MA. *Contributed*
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25. Stone, J.W., **R.S. Norman**, A. Gole, C.J. Murphy, T.L. Sabo-Attwood. 2007. Targeted Photothermal Lysis of the Pathogenic Bacteria, *Pseudomonas aeruginosa*, Using Gold Nanorods. Material Research Society Meeting, Boston, MA. *Contributed*
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27. Decho, A.W., **R.S. Norman**, L.P. Ferguson, J. Ferry. 2007. Quorum sensing in natural microbial mats: A biogeochemical challenge. ASM conference on cell-cell communication in bacteria, Austin, TX. *Contributed*
28. **Norman, R.S.**, S. Ní Chadhain, G. J. Zylstra, and J. J. Kukor. 2005. Shifts in Microbial Community Composition During Polycyclic Aromatic Hydrocarbon Biodegradation. Superfund Basic Research Program 2004 Annual Meeting: Applying Molecular Technology Methods to Characterize and Reduce Risks to Humans and the Ecosystem. 3-4 November, Seattle, Washington. *Contributed*
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PUBLICATION OF ABSTRACTS AT LOCAL MEETINGS:

1. Preisner E.C., **R.S. Norman**. 2013. Modeling Microbial Mat Activity to Study Ecosystem Resilience, American Society for Microbiology. Bi-annual Branch Meeting. Charleston, SC April 20. *Contributed*
2. Stroud, A., Tender, L.M. and **R.S. Norman**. 2013. Microbes as Proton Exchange Membranes in Microbial Fuel Cells, American Society for Microbiology. Bi-annual Branch Meeting. Charleston, SC April 20. *Contributed*
3. Dayama, G., and **R.S. Norman**. 2012. Data Management Pipeline for Pre-Processing, Analyzing, Storing and Querying Metagenomic Datasets, American Society for Microbiology. Bi-annual Branch Meeting. Aiken, SC April 13. *Contributed*
4. Preisner E.C., **R.S. Norman**. 2012. Identification of Quorum Sensing Genes in the

- Halophilic Archaea *Halococcus hamelinensis* sp. nov. 100NA, American Society for Microbiology. Bi-annual Branch Meeting. Aiken, SC April 13. *Contributed*
5. Stroud, A., Tender, L.M. and **R.S. Norman**. 2012. “Microbes as Proton Exchange Membranes in Microbial Fuel Cells”, American Society for Microbiology. Bi-annual Branch Meeting. Aiken, SC April 13. *Contributed*
 6. Dayama, G., Wu, Y., Outten, W.F. and **R.S. Norman**. 2011. “Dysbioses of Gut Microbiota and the Development of Colon Cancer”, American Society for Microbiology. Bi-annual Branch Meeting. Columbia, SC October 21. *Contributed*
 7. Preisner E.C., **R.S. Norman**. 2011. Identification of Quorum Sensing Genes in the Halophilic Archaea *Halococcus hamelinensis* sp. nov. 100NA, American Society for Microbiology. Bi-annual Branch Meeting. Columbia, SC October 21. *Contributed*
 8. Dayama, G., Wu, Y., Outten, W.F. and **R.S. Norman**. 2011. “Dysbioses of Gut Microbiota and the Development of Colon Cancer”, American Society for Microbiology. Bi-annual Branch Meeting. Clemson University, SC April 1-2. *Contributed*
 9. Preisner E.C., **R.S. Norman**. 2011. Identification of Quorum Sensing Genes in the Halophilic Archaea *Halococcus hamelinensis* sp. nov. 100NA, American Society for Microbiology. Bi-annual Branch Meeting. Clemson University, SC April 1-2. *Contributed*
 10. Preisner E.C. and **R.S. Norman**. 2011. Putative Quorum Sensing Activity in *Halococcus hamelinensis* sp. nov. 100NA1. Graduate Student Research Day, University of South Carolina, April 2011. *Contributed*
 11. Dayama, G., Wu, Y., Outten, W.F. and **R.S. Norman**. 2011. “Dysbioses of Gut Microbiota and the Development of Colon Cancer”, Graduate Student Research Day, University of South Carolina, April 2011. *Contributed*
 12. Uyaguari M.I., Fichot E.B., and **R.S. Norman**. 2010. “A Functional Metagenomic Approach to Understanding the Role of Wastewater Treatment Plants on the Dissemination of Antibiotic Resistance Genes in Coastal Ecosystems”. American Society for Microbiology. Bi-annual Branch Meeting. Charleston, SC, April 15-16. *Contributed*
 13. Bey, B., E.B. Fichot, A.W. Decho, **R.S. Norman**. 2010. “Identifying Quorum Sensing Activity in Hypersaline Mats Using a Functional Metagenomic Approach”. American Society for Microbiology. Bi-annual Branch Meeting. Charleston, SC, April 15-16. *Contributed*
 14. Uyaguari, M.I., and **R.S. Norman**. 2010 Oral presentation. Characterization and Quantitation of a Novel b-lactamase Gene within a Wastewater Treatment Facility and Surrounding Estuarine Ecosystem. ASM-South Carolina branch Meeting. October 22, **2010**. USC Aiken, Aiken, SC. *Contributed*
 15. Dayama, G., Wu, Y., Outten, W.F. and **R.S. Norman**. 2010. Analysis of the Gut Microbiome Contained in the *APC min/+* Mouse Model of Colon Cancer as Compared to That of Humans. ASM-South Carolina branch Meeting. April 16-17, 2010. Charleston, SC. *Contributed*

16. **Norman, R.S.**, P. Moeller, T.J. McDonald, and P.J. Morris. 2003. The effect of microbial community dynamics on crude oil degradation. Carolinas Society of Environmental Toxicology and Chemistry Annual Meeting, Charleston, SC. April. *Contributed*
17. **Norman, R.S.**, P. Moeller, T.J. McDonald, and P.J. Morris. 2002. Pyocyanin production by *Pseudomonas aeruginosa* in crude oil-degrading cultures. Student Research Day, Medical University of South Carolina, Charleston, SC. November. *Contributed*
18. **Norman R.S.** and P.J. Morris. 2001. *Pseudomonas aeruginosa* cell surface adaptation to growth on crude oil. Student Research Day, Medical University of South Carolina, Charleston, SC. November. *Contributed*
19. **Norman R.S.**, R. Frontera-Suau, M. Sprank, P. Moeller, and P.J. Morris. 1999. Detection of N-acyl homoserine-L-lactones in crude oil-degrading cultures. Southeastern Branch of the American Society for Microbiology Annual Meeting. Jekyll Island, GA. October. *Contributed*
20. **Norman R.S.**, R. Frontera-Suau, M. Sprank, P. Moeller, and P.J. Morris. 1999. Detection of N-acyl homoserine-L-lactones in crude oil-degrading cultures. Marine Biomedicine and Environmental Sciences Poster Series, Medical University of South Carolina, Charleston, SC. July. *Contributed*

INVITED SEMINARS:

1. Bioaerosolization of Antibiotic Resistant Bacteria from WWTPs. January 19, 2016. Charleston Air Quality Conference, Charleston, SC.
2. Molecular Ecology of Hypersaline Microbial Mats. August 2, 2012. Gerace Research Centre, San Salvador, The Bahamas.
3. Anthropogenic influence on the ecology of antibiotic resistant bacteria in coastal estuarine ecosystems. July 11, 2012. Marine Biomedicine and Environmental Sciences Center, Hollings Marine Laboratory, Charleston SC.
4. Microbes and Sustainability: From Antibiotic Resistance to Biofuels. April 20, 2012. Clemson University, Department of Environmental Engineering and Earth Sciences.
5. Nanotechnology, Environment, and Sustainability: Promise or Peril? April 26, 2011 (7:30-9:00 pm). Clemson student environmental science meeting, Clemson University, Clemson, SC.
6. Nanotechnology, Environment, and Sustainability: Promise or Peril? April 26, 2011 (5:30-7:00 pm). Nanotechnology focus group held at the Unitarian church of Clemson, Clemson, SC.
7. Microbes and Sustainability: From Antibiotic Resistance to Biofuels. April 18, 2011. USC Department of Biological Sciences.
8. The Chemistry and Toxicology of Oil. March 29, 2011. Marine Biomedicine and Environmental Sciences seminar, Hollings Marine Lab, Charleston SC.
9. The impact of society on the ecology of antibiotic resistant bacteria in coastal estuarine ecosystems. April 4, 2009. South Carolina American Society for Microbiology meeting, conference held at the University of South Carolina, Columbia, SC.

10. **Keynote Lecture:** A metagenomics approach to understanding the molecular ecology of hypersaline microbial mats. March 20, 2009. Frontiers in Environmental Microbiology Symposium, Universidad del Turabo, Gurabo, Puerto Rico.
11. The impact of society on the emergence of antibiotic resistant bacteria...and future treatment methods. March 6, 2009. University of South Carolina at Aiken Department of Biology and Geology.
12. A metagenomic approach to understanding the molecular ecology of hypersaline microbial mats. March 2008. MUSC/CofC Fort Johnson Seminar Series, Charleston, SC.
13. Targeted photothermal lysis of the pathogenic bacteria, *Pseudomonas aeruginosa* with gold nanorods. September 23, 2008, University of South Carolina, Department of Chemistry and Biochemistry, Columbia, SC.
14. A metagenomic approach to understanding the molecular ecology of hypersaline microbial mats. September 29, 2008. University of Florida, Dept. Microbiology and Cell Science. Gainesville, FL.
15. An alternative treatment for antibiotic resistant bacteria using nanotechnology. May 14, 2008. Capitol Rotary Club, Columbia, SC.
16. Targeted photothermal lysis of the pathogenic bacteria, *Pseudomonas aeruginosa* with gold nanorods. January 25, 2008, University of South Carolina, Department of Exercise Science, Columbia, SC.
17. Bacterial Communication in Microbial Mats:A Metagenomic Approach to Understanding Quorum Sensing Gene Diversity. March 16, 2007, Duquesne University, Department of Biology, Pittsburgh, PA.