

Nicolas Gray Shealy

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EDUCATION

Vanderbilt University – School of Medicine

Ph.D. Candidate in the Microbe-Host Interaction Program Aug 2019 – Current

Medical University of South Carolina, Charleston, SC

NIGMS Post-baccalaureate Research Education Program (PREP) May 2018 – May 2019

Summer Undergraduate Research Program (SURP) May 2017 – Aug 2019

College of Charleston, Charleston, SC

B.S. Biology *cum laude* Aug 2014 – May 2018

Minor: Chemistry

PUBLICATIONS

Torres TP, **Shealy NG**, Byndloss MX. Role of Gut Microbiota in gastrointestinal disease depends on the nature of perturbation. In preparation for submission *Gastroenterology*. Review. 2022.

Yoo W*, **Shealy NG***, Torres TP, Shelton CD, Byndloss MX. Salmonella Typhimurium uses aspartate-dependent fumarate respiration for expansion in the gut lumen. 2022. In preparation for submission to *Cell Host & Microbe*. *Both authors contributed equally

Shelton CD*, Yoo W*, **Shealy NG**, Torres TP, Foegeding NJ, Kim D, Kim J, Ryu S, Byndloss MX. *Salmonella* Typhimurium uses anaerobic respiration to overcome propionate-mediated colonization resistance. *Cell Reports*. 2021. Print. *Both authors contributed equally

Shealy NG, Byndloss MX. Trick and no treat: Carbohydrate preemption by commensal Enterobacteriaceae. *Cell Host & Microbe*. 2021. Preview. Print.

Shealy NG, Yoo W, Byndloss MX. Colonization resistance: Metabolic warfare as a strategy against pathogenic Enterobacteriaceae. *Current Opinions in Microbiology*. Review. 2021. Print.

Yoo W, Zieba J, Foegeding NJ, Torres TP, Shelton CD, **Shealy NG**, Byndloss AJ, Cevallos SA, Gertz E, Tiffany CR, Thomas JD, Litvak Y, Nguyen H, Olsan EE, Bennett BJ, Rathmell JC, Major AS, Baumler AJ, Byndloss MX. High-fat diet -induced changes in host metabolism escalate microbial choline catabolism to increase circulating trimethylamine-N-oxide levels. *Science*. Print.

RESEARCH EXPERIENCES

Graduate Student: Vanderbilt University, Department of Pathology, Microbiology, and Immunology (Nashville, TN)

Advisor: Mariana X. Byndloss D.V.M., Ph.D. (May 2020 - Current)

Techniques: Anaerobic Bacterial Culture, Germ-Free and Conventional Mouse *in vivo* studies, Cloning, RT-qPCR

Graduate Rotation Student: Vanderbilt University, School of Medicine (Nashville, TN)

Advisor: Holly Algood Ph.D. (March 2020 – May 2020)

“IL17A/F signaling by Th17 cells in response to *Helicobacter pylori* infection”

Techniques: Bacterial culture

Advisor: Maria Hadjifrangiskou Ph.D. (October 2019 – December 2019)

“Role of Cytochrome BD in directing biofilm formation in Uropathogenic *E. coli*”

Techniques: PCR, Bacterial Transformation, MALDI-IMS, LC-MS, MudPIT analysis

Advisor: Tina Iverson Ph.D. (September 2019 – October 2019)

“Structural and Kinetic Analysis of the Kinase Domain of FGR and its interaction with β Arrestins”

Techniques: Protein Expression & Purification, X-ray crystallography, MST, NMR – NOESY, COSY, TOCSY, ROESY

Post-Baccalaureate Research Education Scholar: Medical University of South Carolina, Department of Medicine (Charleston, SC)

Advisor: Dr. Amy D. Bradshaw (May 2018 – May 2019)

“Post-Translational Modifications of Tendon Extracellular Matrix Proteins via Transglutaminase 2”

Techniques: Western blot, Epifluorescence, Histological staining, 2D & 3D Cell culture

Undergraduate Research Assistant: Medical University of South Carolina, Department of Drug Discovery (Charleston, SC)

Advisor: Dr. Mark T. Hamann (Mar 2017 – May 2018)

“Isolation and Characterization of Bioactive Secondary Metabolites of *Akkermansia muciniphila*”

Techniques: Organic Synthesis, NMR, Mass spectrometry, HPLC purification, anaerobic bacterial culture

Summer Undergraduate Research Fellow: Medical University of South Carolina, Department of Medicine (Charleston, SC)

Advisor: Amy D Bradshaw (May 2017 – Aug 2017)

“Transglutaminase Mediated Serotonylation of Extracellular Matrix Proteins in Periodontal Disease”

Techniques: Western blot, Histological Staining, Confocal Microscopy

AWARDS & HONORS

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| 2022 | Carl H. Storm Minority Student Travel Award – Gordon Research Conference - Awardee |
| 2021 | Vanderbilt Microbiome Initiative – Venture Microbiome Fund - Awardee |
| 2021 | HHMI Gilliam Foundation Fellowship – Howard Hughes Medical Institute - Awardee |
| 2021 | ASM Student and Postdoctoral Travel Award – World Microbe Forum - Awardee |
| 2020 | HHMI Gilliam Foundation Fellowship – Vanderbilt University – Nominee |
| 2020 | Environmental Toxicology (T32) Training Grant – Vanderbilt University – Trainee |
| 2019 | Russell G. Hamilton Scholar – Vanderbilt University – Awardee |
| 2018 | Poster Presentation Award – Annual Biomedical Research Conference for Minority Students - Awardee |
| 2018 – 2019 | NIH – Post-Baccalaureate Research Education Program – Medical University of South Carolina - Fellow |

- 2017 2nd place Oral Presentation – 52nd Annual Perry V. Halushka Medical University of South Carolina Research Day - **Awardee**
- 2017 Student Travel Award – Annual Biomedical Research Conference for Minority Students – **Awardee**
- 2017 Summer Undergraduate Research – Medical University of South Carolina – **Fellow**
- 2015 Outstanding Student Service to Freshmen Students – College of Charleston – **Awardee**
- 2015 Faculty Honors – Spring – College of Charleston – **Awardee**
- 2014, 2015, 2017 Faculty Honors – Fall – College of Charleston – **Awardee**
- 2014 Presidential Scholarship – College of Charleston – **Awardee**
- 2014 AP Scholar with Distinction – College Board – **Awardee**
- 2013 SC Health Occupation Students of America – 3rd place Biotechnology - **Awardee**
- 2012 SC Health Occupation Students of America – 2nd place Medical Reading - **Awardee**

PRESENTATIONS

Shealy NG, Torres TP, Yoo W, Shelton CD, Foegeding NJ, Byndloss MX. Microbiota-derived Amino Acids Enable Salmonella Typhimurium to Overcome Enterobacteriaceae Mediated Colonization Resistance. Vanderbilt Institute for Infection, Inflammation, and Immunology Symposium. 2022. Online. Poster.

Shealy NG, Torres TP, Yoo W, Shelton CD, Foegeding NJ, Byndloss MX. Microbiota-derived Amino Acids Enable Salmonella Typhimurium to Overcome Enterobacteriaceae Mediated Colonization Resistance. HHMI Microbe-Host interactions Meeting. 2022. Online. Poster.

Shealy NG, Torres TP, Yoo W, Shelton CD, Foegeding NJ, Byndloss MX. Microbiota-derived Amino Acids Enable Salmonella Typhimurium to Overcome Enterobacteriaceae Mediated Colonization Resistance. HHMI Gilliam Fellows Annual Meeting. 2021. Online. Poster.

Shealy NG, Torres TP, Yoo W, Zieba J, Shelton CD, Foegeding NJ, Byndloss MX. Microbiota-derived Amino Acids Enable Salmonella Typhimurium to Overcome Enterobacteriaceae Mediated Colonization Resistance. World Microbe Forum. 2021. Online. Poster.

Shealy NG, Torres TP, Yoo W, Zieba J, Shelton CD, Foegeding NJ, Byndloss MX. Microbiota-derived Amino Acids Enable Salmonella Typhimurium to Overcome Enterobacteriaceae Mediated Colonization Resistance. Vanderbilt Institute for Infection, Inflammation, and Immunology Symposium. 2021. Nashville, TN. Poster.

Shealy NG, Byndloss MX. Metabolic interactions of pathogenic Enterobacteriaceae and the gut microbiota in the inflamed gut. Digestive Disease Research Center Retreat. 2021. Nashville, TN. Poster.

Shealy NG, Gross C, Bradshaw AD. Transglutaminase Mediated Post Translational Modifications of Extracellular Matrix Proteins. Mid-Atlantic PREP & IMSD Research Symposium. 2019. Winston-Salem, NC. Poster.

Shealy NG, Gross C, Bradshaw AD. Transglutaminase Mediated Post Translational Modifications of Extracellular Matrix Proteins. MUSC PREP End of Year Symposium. 2019. Charleston, SC. Oral.

Shealy NG, Zhang Y, Zile MR, Bradshaw AD. Investigation in the Role of Serotonylation in the Cardiac Microenvironment. Annual Biomedical Research Conference for Minority Students. 2018. Indianapolis, IN. Poster.

Shealy NG, Zhang Y, Zile MR, Bradshaw AD. Investigation in the Role of Serotonylation in the Cardiac Microenvironment. 53rd Annual Perry V. Halushka Research Day. 2018. Charleston, SC. Poster.

Shealy NG, Bradshaw AD. Investigation into Serotonylation of Extracellular Matrix Proteins in Periodontal Disease. Undergraduate Research and Creative Activities Presentation. 2017. Charleston, SC. Poster.

Shealy NG, Bradshaw AD. Investigation into Serotonylation of Extracellular Matrix Proteins in Periodontal Disease. 52nd Annual Perry V. Halushka Research Day. 2017. Charleston, SC. Oral.

Shealy NG, Bradshaw AD. Investigation into Serotonylation of Extracellular Matrix Proteins in Periodontal Disease. Summer Undergraduate Research Colloquia. 2017. Charleston, SC. Oral.

Shealy NG, Hill Z. Germinating Budding Scientists through Supplemental Instruction. Mountain-to-Coast Peer Leader Conference. 2017. Clemson, SC. Oral.

LEADERSHIP EXPERIENCE

Center for Student Learning – College of Charleston

Senior Supplemental Instructor

2017-2018

Responsible for managing as many as five new and returning supplemental instructors per semester. Set up weekly meetings with each. Supervised and critiqued overall performance. Participated in hiring interviews. Planned monthly training for the department. Represented department for new student programs to explain what services were available.

Supplemental Instructor

2015-2018

Assigned to a specific course with a historically high DFW rate at the college. Responsible for planning and conducting three weekly sessions to review class material. Attended classes and assisted professors during class activities by guiding students through information. Exposed students to new and helpful study skills. Working to improve performance, based on regular evaluations by supervisory staff.

Center for Excellence in Peer Education – College of Charleston

Peer Facilitator – Gateway to Neuroscience First Year Experience

2017

Conducted 2 weekly classes for 40 students to ease the adjustment to life on the college campus. Planned and discussed topics like diversity, sexual misconduct as well as general academic advising. Attended weekly meetings to give and receive guidance from my peer group. Met one on one to evaluate and assist students with their future goals.

PROFESSIONAL MEMBERSHIPS

American Society for Microbiology – **Member**

Alpha Chi Sigma – College of Charleston – **Member**

- Outreach to K-12 students to encourage the pursuit of science-related subjects. Participation in community outreach.

Phi Sigma Pi – College of Charleston – **Member**

- Service Committee – planning and participation in multiple service events.

PROFESSIONAL DEVELOPMENT & SERVICE

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| Basic Science DEI Committee – Vanderbilt University – VI4/PMI Student Member | 2022-Current |
| VI4 DEI Committee – Vanderbilt University – Student Member | 2022-Current |
| PMI GSA – Vanderbilt University – <i>The Pathogen</i> – Contributing Editor | 2021-2022 |
| PMI GSA – Vanderbilt University – Diversity, Equity, & Inclusion Liaison | 2020-2022 |
| SC-PEACH – Medical University of South Carolina - Volunteer | 2018 – 2019 |
| Freshmen Move-in – College of Charleston – Alumni Volunteer | 2018 |
| Dance marathon – Charleston Miracle – Volunteer | 2018 |
| Light the Night – Leukemia & Lymphoma Society – Volunteer | 2017 |
| Sweep the Beach – College of Charleston – Volunteer | 2017 |
| Relay for Life – College of Charleston – Volunteer | 2016 |
| CofC Orchestra – College of Charleston – Violinist | 2014 – 2016 |
| National Healthcare Corporation – Intern/Volunteer | 2013 |