Thursday, August 24, 2023

Basic Medical Sciences student discusses ongoing tick research at national conference

First-year graduate student Shovon Lal Sarkar was selected to present his research exploring tissue localization and profiling of bacterial organisms in the invasive Asian longhorned tick at the American Society for Rickettsiology 2023 meeting in Salt Lake City, Utah, this summer.
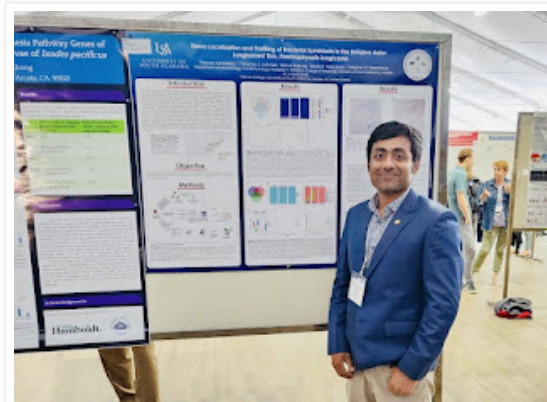

Shovon Lal Sarkar

He conducted the research during a rotation in the lab of Meghan Hermance, Ph.D., an assistant professor of microbiology and immunology at the Whiddon College of Medicine.

Sarkar's project identifies the normal bacterial symbionts – which are organisms living in symbiosis – associated with different organs and in the whole tick in different temperature conditions using high-throughput sequencing targeting regions of a specific gene, he said.

This fall, Sarkar is joining the lab of Kevin Macaluso, Ph.D., professor and Locke Distinguished Chair of Microbiology and Immunology at the Whiddon College of Medicine. His research will mainly focus on the role of the small RNAs in tick saliva, he said, and transmission of rickettsial agents to a host.

Rickettsial infections, such as Rocky Mountain spotted fever, are bacterial diseases that can produce mild to severe, flu-like symptoms and are transmitted through the bites of arthropods such as fleas and ticks.

If untreated, the toll of the disease on humans can be severe. In the United States, about 5,500 rickettsial infection cases are reported each year to the Centers for Disease Control and Prevention. The actual number is likely much larger because many cases go unreported. There are no vaccines available to prevent rickettsial infections, and antibiotics are not recommended for prevention of such diseases.

Meet a Med Student: Jada Ashford

Jada Ashford

Age: 24

Class: 2026

Hometown: Hoover, Alabama

Undergraduate education: B.S. in biomedical sciences, Auburn University

What do you enjoy most about being a medical student at the Whiddon College of Medicine?
Family environment. The faculty really care about the students academically and personally. They go out of their way to provide support whenever you need it.

Are you involved in any research, organizations or other initiatives at the College of Medicine?
I serve as one of the intramural chairs for my class, a clinical coordinator for the Student-Run Free Clinic, medical mentor for Project INSPIRE, and community service chair for the Family Medicine Interest Group. I am also involved in the Sports Medicine & Rehab Interest Group, Student National Medical Association, and Christian Medical Ministry of South Alabama.

What are your interests and hobbies?
I enjoy working out, watching sports, playing intramural sports with classmates, and finding new places to eat in town. I am also interested in sports medicine and health disparities.

What is something unique about you?
I am one of seven kids in my family, and there are two sets of twins in my family.

Meet a Med Student

Medical students receive awards for summer research

Winners of the Clyde G. Huggins Award for Summer Research, along with their faculty mentors, are: front row, Mohamed Shaban, Ph.D.; Cya Johnson; Thuy Phung, M.D., Ph.D.; Richard Fu; Amy R. Nelson, Ph.D.; back row, Kelly Blacksher; Brooke Tarrant; Robert Barrington, Ph.D.; Conner Hall; and Mark Swingle, Ph.D.

The Whiddon College of Medicine announced the top oral and poster presentations from the 50th Annual Medical Student Summer Research Day, held July 21 in the Medical Sciences Building.

Winners of the Clyde G. Huggins Award for Summer Research, all second-year medical students, each received a plaque and a $100 prize. The award honors the memory of Clyde G. "Sid" Huggins, who served as the first dean of students at the Whiddon College of Medicine.

This year's oral presentation winners are:

- **Richard Fu**: "Studying Alzheimer's disease development using human brain organoids"
  Faculty mentor: Amy R. Nelson, Ph.D., Department of Physiology and Cell Biology
- **Brooke Tarrant**: "Production of amyloid precursor protein is Herpes Simplex Virus 1 strain-dependent"
  Faculty mentor: Robert Barrington, Ph.D., Department of Microbiology and Immunology

Richard Fu

Fu's project studied the use of human stem cells to grow brain organoids, which he described as "essentially miniature organs," in an attempt to create an accurate model of the human brain when affected by Alzheimer's disease. "Having this kind of model would be useful for both Alzheimer's drug development and personalized medicine since stem cells could theoretically be engineered from the cells of an Alzheimer's patient, grown into brain organoids, and then treated with different drugs to see which is most effective before treating the patient," he said.

Fu's role mostly involved specimen maintenance and data collection, including imaging immunofluorescence stains of the brain organoids, and digitally counting the number of cells in the organoids that expressed certain proteins from their immunofluorescence images.

"I would like to thank everyone in the Nelson Lab for their help with summer, as I definitely would not have been able to bring out the full potential of my project without all of their support and advice," Fu said. "I would also like to thank

everyone involved with the Medical Student Summer Research Program for making this experience possible."

Tarrant's research aimed to determine whether different strains of herpes simplex virus-1 differentially regulate the production and processing of amyloid precursor protein, or APP. The protein is most well-known for contributing to the development of Alzheimer's disease, but it also plays a beneficial role in protecting against microbial infection.
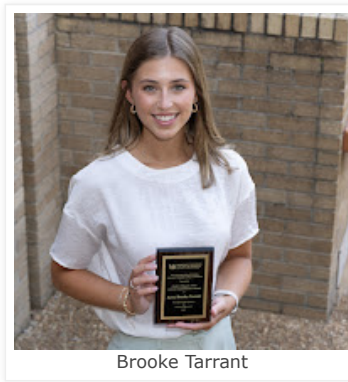

Brooke Tarrant

"By determining that APP and the genes involved in its processing are expressed differentially by different strains of HSV-1, our findings may help elucidate the role of APP in the body's response to viruses, as well as in Alzheimer's disease," she said.

Her task was to set up and run experiments, and then analyze the results of those experiments.

"I was really interested in the premise of my project, so it was something I was excited to work on this summer," Tarrant said. "I loved getting to know the people in my lab and I benefited immensely from their knowledge and expertise. Dr. Barrington and his graduate students, Rachel Rodenberg and Killian Brewer, were such great mentors throughout the summer."

This year's poster presentation winners are:

- **Kelly Blacksher**: "Exploring TOMM22 as a novel biomarker and therapeutic target in liver hepatocellular carcinoma"
  Faculty mentors: Santanu Dasgupta, Ph.D.; Mohammad Aslam Khan, Ph.D.; Seema Singh, Ph.D.; Ajay Singh, Ph.D.; Devanand Sarkar, Ph.D.; Mitchell Cancer Institute, Department of Pathology, Department of Biochemistry and Molecular Biology
- **Conner Hall**: "Discovery of fragment-like ligands of serine/threonine protein phosphatase 5"
  Faculty mentor: Mark Swingle, Ph.D., Department of Biochemistry and Molecular Biology
- **Cya Johnson**: "Application of artificial intelligence: a deep learning diagnostic framework to detect malignant melanoma"
  Faculty mentors: Thuy Phung, M.D., Ph.D., Department of Pathology; Mohamed Shaban, Ph.D., Department of Electrical and Computer Engineering

Kelly Blacksher

Blacksher's project studied TOMM22, a mitochondrial import protein, as a novel diagnostic tool and therapeutic target for liver hepatocellular carcinoma, the most common type of primary liver cancer. She compiled data on previous mRNA studies and collected data on current tissue samples at the protein level.

"I am very grateful to have worked with Dr. Dasgupta and Dr. Khan because they continued to show me grace and patience throughout the research process," Blacksher said. "I was given the opportunity to learn and study in ways I have not been able to in the classroom and am confident they have prepared me for research endeavors in the future."

Blacksher performed the research at the USA Health Mitchell Cancer Institute, where she had the opportunity to develop new skills and build new relationships over the summer.

"The entire MCI staff has been so phenomenal throughout this process. I hope everyone continues to support the incredible work and initiatives they have," Blacksher said. "It was truly such an honor to play a small role on their team."

Hall worked with Swingle's lab team on further developing an effective drug against a generally accepted anti-cancer target, serine/threonine protein phosphatase 5 (PP5). "The drug we were working on developing may eventually be involved in anti-cancer chemotherapy regimens that would hopefully be more targeted and specific while having fewer side effects and complications of treatment, resulting in better patient outcomes overall," he said.
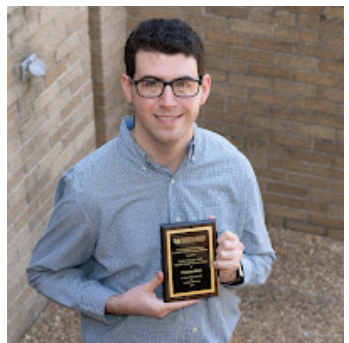
Conner Hall

Hall performed the screening experiments with potential drugs mixed with PP5 in a controlled environment simulating the protein's normal habitat to see whether each of the drugs attaches to the protein to deactivate it. His research was technically demanding, biochemistry-heavy, and "had several complications throughout the summer," he said, "but I was thrilled at the end to have attained the results that I had."

Hall's desire to be more involved in clinical research stems from his participation in clinical trials as a patient himself. "I would like to return the favor for others through offering the safe administration of experimental therapeutics designed to help with conditions in people that may not have any other options available or to better understand disease processes that are still not well understood like those of the conditions I face personally," Hall said. "Thus, this experience has motivated me to pursue further research positions and a future career in academic medicine."

Cya Johnson

Johnson's research sought to use artificial intelligence to diagnose melanoma, an aggressive form of skin cancer. She used the programming software MATLAB to analyze data, develop algorithms, and create models.

"I explored how deep-learning algorithms could be exploited to distinguish between patterns of cell architecture in tissue slides from benign and cancerous skin lesions," she said.

Johnson said the summer research program was a positive experience, and she enjoyed the weekly seminars in which she learned about other research projects from her classmates. Her mentors, Phung and Shaban, provided guidance and offered many opportunities to learn about the field of pathology.

"I am grateful for the opportunity to be a part of such a program," Johnson said. "It is an honor to be recognized for the work that I put into my research project."