

## Original coronavirus research being conducted at Georgia College

Its triangular spikes are what make coronavirus such a formidable foe. But they could also be its Achilles' heel.

Georgia College Assistant Professor of Chemistry Dr. David Zoetewey and three students are working to expose this weakness and prevent the virus' spear-like mechanism from harpooning into human cells.

This research could someday result in a medicine that prevents coronavirus from attaching.

"Spike proteins are very important for the virus and its ability to cause infection," Zoetewey said. "Without the spike protein, there is no viral infection. If we can do something that disrupts how the spike protein works, then we can prevent the virus from becoming infectious."

Scientists all over the world are working on COVID-19—and the spike protein is just one small piece. Every little bit contributes to our understanding of how the virus works. It's important to not only eradicate coronavirus—but also be ready for the next pandemic.

"What made COVID-19 so bad was how fast it spreads, and that's really made it the perfect storm," Zoetewey said.

"It may not be a coronavirus next time. It may be a strain of the flu. It may be something else that we don't even know of yet," he said. "The fact we had SARS and then MERS and now COVID-19—and they're all coronaviruses from the same family—tells us coronaviruses have high potential to do this again."

All viruses hijack cells. But the coronavirus known as COVID-19 is particularly cunning, because its pegs act as spears connecting



Dr. David Zoetewey works to isolate fragments of the spike protein with freshman Gabe Allred.

to other cells. These spikes are proteins, and proteins are built with a sequence of amino acids that dictate their particular shape and movement.

The coronavirus spikes remain folded, until "a target is recognized," Zoetewey said. Then, one pops out "like a jackknife" to harpoon into a victim cell—effectively taking command. The harpoon is what enables the two cell membranes to fuse

before as a doctorate student at the University of Colorado in the early 2000s.

At that time, another outbreak had occurred: Severe Acute Respiratory Syndrome (SARS). It had a higher fatality rate than COVID-19 but was quickly contained and died out. Zoetewey's lab collaborated with an expert in coronaviruses, who identified the coils as a "critical piece" of the spike protein.

When COVID-19 spread globally in early 2020, Zoetewey recalled the coiled-coil as "the linchpin to the coronavirus' infectious mechanism." He realized his students could work on this small piece of the puzzle.

Freshman chemistry major Gabe Allred said he was amazed to be doing undergraduate research his first year in college. Even more remarkable, he's doing research on a virus that's currently challenging the entire world population.

"I always knew it was a dangerous virus," Allred said, "but it wasn't until I joined Dr. Zoetewey's group that I learned what makes it dangerous, and how exactly it spreads from cell to cell and replicates."

Students are not working with the actual coronavirus—just little pieces of the spike protein created from a sequence of amino acids. Spike proteins are made from a chain of 1,300 amino acids. Zoetewey's team is looking at about 100 of these, which make up two separate coiled-coil regions from the spike's stem.

Once Zoetewey's team is able to grow these spike protein fragments in large batches, students will separate them from the bacterium.

It's "a long game of connect-the-dots," Zoetewey said. With help from a colleague at the University of Oklahoma, who has a NWR machine, he hopes to learn how the spike unfolds and harpoons.

"The ultimate outcome is way down the line," Zoetewey said. "By looking at the way all these atoms interact with each other, we can potentially design a molecule that would prevent the harpoon interaction from taking place."

together.

"Obviously, this is a really big complicated protein," Zoetewey said. "The function of the spike protein is to attach to the cell it's going to be infecting. The contents of the virus get dumped inside. And, so now you have this RNA that goes inside the cell, and the RNA contains the instructions to make new viruses and cause infection. That's its only purpose."

Scientists know what the spike protein looks like before and after the harpoon effect. But they can only speculate on what occurs in between.

Proteins are so small that even the wavelength of invisible light is much bigger, Zoetewey said. A researcher in China was able to determine the structure of a small piece of the spike protein—called a "coiled-coil"—in 2020 by using X-ray crystallography. From that, Zoetewey noticed he'd seen this kind of coiled-coil

## History major appreciates learning from the past

Many people think history's boring, something found in dusty old books.

But Juniper Guthrie can tell you that's not true.

History is alive and a part of everyday life. After four years of study and being on the cusp of earning dual degrees in history and liberal studies with minors in women and gender studies, French and museum studies—the only thing Guthrie knows for sure is there is so much more to learn.

"Academically, I've learned things are not as simple as I thought they were," Guthrie said. "In my first history class, I thought I already knew world history. Then, I realized I didn't know as much about this as I thought."

When Guthrie crosses the commencement stage next month and celebrates at Lavender Graduation—where students of the LGBTQ+ community are affirmed and recognized by chosen names and pronouns—they'll reflect on how lucky they were to come to Georgia College and how much they'll miss being here.

"We just have such an incredibly amazing history department," Guthrie said. "I'm just really lucky I ended up here, because the faculty support I've received there and in the museum studies department is amazing."

"There are so many hyper-specific fields that I had no idea were there, and there's so much more history to learn," they said. "There's so much out there, and it's all absolutely fascinating."

When touring Georgia College as a prospective student and seeing the Old Governor's Mansion decked out for Christmas, Guthrie thought, "This is a place where history is clearly valued."

They dived right in as a student, taking advantage of every opportunity to research, write and share history. Guthrie wrote a paper on the 50th anniversary of the honors program at Georgia College. They worked a summer internship at the Southeastern Museum Conference in Atlanta, helping with organization and promotional efforts. And, they became a docent at Andalusia, the home of famed alumna and author Flannery O'Connor.

It's in this position—giving public tours the past three years, selling items in the gift shop and cataloging historical items into the archival collection—that Guthrie found their true love. They now want to work at a small museum and eventually get their master's degree in history.

"I just fell in love with it. This is what I want to do," Guthrie said. "It's just really amazing being able to literally hold a part



of history."

"Museums are about public history, about taking what you know and sharing it with people," they said. "I think a lot of people have a misconception of history as something that's boring and dusty and doesn't change. Being able to share with people what history actually is and why it's important and relevant to us today—that's what really gets me excited."

History can help people understand why things are the way they are in society. Seeing patterns in history can help solve today's problems and give people a greater understanding of the world, Guthrie said. Studying history has also helped them see things in context and "not to just take ideas for granted."

These skills have come in handy while writing their senior thesis paper. Guthrie's topic focuses on Russian women and the practice of telling folklore to transmit cultural ideals. Although the theme has been studied before, Guthrie believes they're the first to show "how male academics have taken women's stories and used them to facilitate a patriarchal narrative that diminishes the female role in society."

It's a culmination of everything Guthrie's learned at Georgia College. They point to Dr. Stephanie Opperman and Dr. Mark Huddle as their favorite educators. Guthrie said Opperman gives a "mind-blowing" oral history class, and Huddle "destroys the conventional narrative of the civil rights movement."

Their advice to incoming students is simple: Communication is key to success. As an honors student and secretary of Pride Alliance, Guthrie keeps busy. Communicating with professors has been paramount in accomplishing their goals.

"I would say definitely do everything that interests you," they said. "This is the time for exploration and figuring out what you want to do."

## Graduate students recognized for outstanding work

The Graduate School at Georgia College recognizes students in programs across the university each spring semester in several ways. They are celebrated for their contribution both in the classroom through their research as well as their work as graduate assistants.

Six students recently received the Outstanding Graduate Assistant Award. In its third year, the award is designed to recognize the contributions graduate assistants provide in supportive roles to students, faculty, staff and the university as a whole while pursuing graduate studies.

"Graduate assistants are vital in supporting and promoting the institution, whether they are teaching assistants, tutors or supporting faculty and staff in their work and/or research," said Dr. Holley Roberts, interim associate provost of academic affairs and director of the Graduate School. "Graduate assistants bring knowledge, skills and experience with them but are able to further develop through their roles as graduate assistants."

This year's winners are:



Taylor Chapman is pursuing a Master of Science in Biology and worked in the Department of Biological and Environmental Sciences. She collaborated with Dr. Al Mead on a manuscript accepted by the Journal of Environmental Quality. She's also worked on a competitive grant to U.S. Egg and Poultry, which made it to the last round of review, and serves as a science tutor at Georgia Military College.



Madison Coty is working towards a Master of Accountancy and served as an assistant in the Department of Accounting. She helped coordinate

Constitution Week events this year, which included professors from across the country. Coty also provided support in organizing a regional conference and worked as a moderator in key sections of the conference.



Cheng Lam Ku worked in the Department of English and is pursuing a Master of Arts in English. During the COVID-19 spring

2020 shutdown, she went back to her home of Macau, China. Ku went to great lengths to get back to Milledgeville and finish what she had started: Introducing a group of Georgia College students to the fundamentals of Chinese language and culture. She taught courses synchronously online from Macau,

which meant teaching in the middle of the night, due to the time difference.



Samuel Mullis has worked for the Department of Management, Marketing and Logistics. He's pursuing a Master of Accountancy. Working with several faculty members, he became a coauthor for a conference paper that involved in-depth research into the history of Artisan Vendors and Brand

Communities. This research won best paper in the "Branding, Research and Strategy" track at the Marketing Management Association Conference. His research has also contributed to professors having four journal articles under review this semester and five conference presentations.



Denechia Powell worked in the Office of Grants and Sponsored Projects and is pursuing a Master of Fine Arts in Creative Writing. Her work has been essential in helping the Andalusia Institute to grow as a public arts and humanities institute for central Georgia. She partnered with a dean, a

department chair, the Deal Center executive director, an associate provost, a major donor and a gifts officer to produce a powerful statement of strategy and effectiveness in the crafting of the Institute mission, vision, values and goals statement.



Catherine Woodall has worked in the Center for Health and Social Issues and is pursuing a Master of Science in Health & Human Performance- Health Promotion. She was integral in the promotion and implementation of community stakeholder needs assessments,

chronic disease health education programs and a flu vaccination and diabetes screening clinic. As part of her work, she became certified as a CDC Diabetes Prevention Program (DPP) Lifestyle Coach.

These graduate assistants were nominated by faculty, staff and administrators. The award winners received \$200 cash from the Georgia College Foundation, a framed certificate and a Georgia College lapel pin.

"Graduate assistants are vital to the success of many of our academic programs and support areas and their efforts should be celebrated," said Roberts. "Celebrating graduate students also gives us the opportunity to shine a light on the quality of our graduate students and the impact they make at Georgia College."