



DECIPHER

A Creative Inquiry Magazine

This Creative Inquiry team is telling a story from eggs. Read more on page 22.

Volume 11

ABOUT DECIPHER

Decipher magazine is produced by a team of Clemson University's undergraduate students to highlight the accomplishments of their peers in Creative Inquiry, Clemson's unique brand of undergraduate research. Creative Inquiry is Clemson's way of engaging students in research topics they find interesting in their own, other or cross-disciplinary fields of study.

Each year, more than 4,000 Creative Inquiry students explore topics ranging from developing sensor technology in healthcare systems to studying extremism in politics to investigating the importance of microbes in the environment. Their Creative Inquiry projects provide them with the tools they need to explore diverse problems and issues in our community and beyond and to come up with possible solutions. Students value these opportunities to exercise the skills they learn in the classroom and apply them to the real world.

From the more than 390 current Creative Inquiry projects, we selected 24 projects to feature in this magazine. Our team interviewed the faculty, graduate students and undergraduate students involved with each of these projects in order to write these articles and produce photographs and illustrations. *Decipher* is printed and distributed to students, faculty, alumni and friends of Clemson to make them aware of the many accomplishments of students in the Creative Inquiry program. For example, Creative Inquiry students and faculty have made more than 2,200 presentations at professional conferences, authored more than 676 professional publications and received more than 650 awards.

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LETTER FROM THE DIRECTOR

As Creative Inquiry (CI) completes our 17th year, we can reflect back on how the program has consistently contributed to the Clemson University research enterprise.

From our start, Creative Inquiry offered a fresh approach to undergraduate research—as in the words of a 2006 *Clemson World* article [Summer 2006-Vol 59, No 3], “real-world research for real life results.” But our process, as well as results, especially distinguishes Creative Inquiry. When Creative Inquiry started, typical undergraduate research at most universities was a one-semester senior year experience for STEM honors students. In contrast, at Clemson, Creative Inquiry engages students from all disciplines and at all levels in student-driven projects that extend across multiple semesters.

What are the outcomes? Students who are equipped to delve into a problem, study it and find solutions. Our founding mantra is, “We want our students to be thinkers, leaders and entrepreneurs. We want them to be able to approach a task or problem and figure out how to solve it.”

And it works. CI alumnus Berkeley Patterson said, “Creative Inquiry has been one of the most rewarding things I have done in my three years at Clemson University. I have developed a close relationship with a diverse group of committed students and teachers, as well as developed as a thinker, citizen and student.”

As we build better students, Creative Inquiry has always emphasized research productivity—and we track it.

Faculty praise the value of Creative Inquiry...

“When we make connections between problems and work together to think through the shape of a problem, you can find creative ways to respond that can only happen when you collaborate and when you are open to the possibilities that arise from those conversations. That kind of collaboration could never have happened without CI,” Dr. Angela Naimou, associate professor of English and the 2022 recipient of the Bradley Award for Mentoring in Creative Inquiry, stated.

“Students have taken the lead on this project in so many ways. The work they have done could not have been confined to a 15-week seminar. So many of our students have said that this CI has changed the direction of their post-graduate plans ... I will have a life-long gratitude of

what CI does for our campus.”

Clemson’s Research Division acknowledges...

In the division’s 2019 report to the Board of Trustees, Vice President for Research Tanju Karanfil stated, “The Creative Inquiry program showcases the educational power of research. These students get invaluable experiences, while contributing to cutting-edge research with real-world impact. They are proof that our future is bright.”

CI contributed to Clemson’s quest for Carnegie R1 status and is perfectly positioned to support goals of Clemson’s new *ClemsonElevate* strategic plan—to expand experiential learning and increase research activity.

The full accomplishments of the more than 2,000 CI projects are too many to describe. But as you read this *Decipher* magazine, reflect on how the more than 55,000 students who have participated in CI since its start have not only built their own career successes but also contributed to building Clemson University’s research reputation.

“Being a part of Creative Inquiry has taught me lessons of greater practicality than I ever could have gleaned from a textbook. It has provided me with real-world opportunities to collaborate with a team, balance responsibilities, communicate effectively with different personalities and learn more about how to lead and follow,” Aleice Wilson said.



A handwritten signature in black ink that reads "Barbara Speziale".

Dr. Barbara J. Speziale

Director, Creative Inquiry +
Undergraduate Research

THE DECIPHER TEAM



Piper Starnes - Editor

Piper is a senior performing arts major with a concentration in music and minors in film studies and writing from Tega Cay, SC. She is also a publications intern for the Brooks Center, contributing to their biannual newsletter, *Expression*. In her free time, she enjoys playing the Clemson Memorial Carillon and spending time with friends in the Clemson Piano Club and TigerLive Entertainment.

Rebecca Keneally - Assistant Editor

Rebecca is a junior psychology major with a minor in business from Atlanta, GA. This is her first year working with the *Decipher* team and she is excited about her position. In her spare time, she enjoys reading, listening to music and spending time at the lake and/or beach.



Margaret 'Allie' Cheves - Writer

Allie is a sophomore bioengineering major with a minor in chemistry from Pauline, SC. She is happiest outside, and loves camping, hiking and playing with her dog, Darcy, on Bowman Field. On rainy days, you will find her inside with a good book.

Hailey Blackwelder - Photographer

Hailey is a sophomore fine arts major with a concentration in photography from Lake Charles, LA. Hailey is a member of the Zeta Nu Chapter of Alpha Delta Pi. She enjoys going on hikes with her dog, Clover Mae, cooking Cajun meals from her grandma's recipe books and photography.



Casey Pearce - Chief Graphic Designer

Casey is a senior architecture and history double-major with an emphasis in public history from Chicago, IL. When she is not in the studio, she enjoys hiking, biking, sailing and spending time at Lake Hartwell. After graduation, she hopes to continue working in graphic design while pursuing further education in architectural preservation.



Malik Sanders - Assistant Graphic Designer

Malik is a junior architecture major with a minor in art from Marion, SC. Malik has been a part of the Atelier InSite Public Art Creative Inquiry project for two semesters and is also a member of Clemson's chapter of the National Organization of Minority Architecture Students (cNOMAS). Fun fact: he can walk on his hands.

Katie Cary - Photographer

Katie is a senior visual arts major with an emphasis in photography. After she graduates from Clemson, her goal is to move to New York and work for a gallery or museum. In her free time, she likes to travel to cities she has never been to before, or stay in town to hangout with friends.



Grace Brackett - Marketing

Grace is a junior business management major with a focus on entrepreneurship from Greenville, SC. On the side she runs her own company, Wonder Prints, selling eco-friendly and sustainable goods. In her free time, you can find Grace kayaking, hiking and enjoying nature.

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AMERICAN ARTIFACTS

On August 1, 1776, at the height of the Revolutionary War in Essenecca Town, South Carolina, Cherokee and British Loyalists had just ambushed Major Andrew Williamson's militia. After suffering defeat from the surprise attack, the American militia regrouped and counter-attacked, devastatingly burning down Essenecca (and every other Cherokee town and farm in the region) in the process. With little to nothing remaining of the Cherokee civilization, the militiamen built Fort Rutledge over the scorched earth, naming it after John Rutledge, the then president of South Carolina. Today, the Archaeology from the Era of Fort Hill Plantation and the Revolutionary War Creative Inquiry project, led by Dr. David Markus from the Department of Sociology, Anthropology and Criminal Justice, is working to uncover artifacts from the lost and forgotten Native American and colonial frontier history that lies beneath Clemson University's grounds.

"As we lead up to the 250th anniversary of the American Revolution, we thought we'd try and locate [Fort Rutledge] and incorporate Native American perspectives into how we memorialize and talk about the site on campus, because we are on, what was at one point, a Cherokee sacred landscape," Markus said. The Creative Inquiry project is an extension of

the Archaeological Field School, a higher-level anthropology course taught by Markus, and allows students to participate in both excavation fieldwork and lab analysis of artifacts.

Gavin Schrantz, a senior anthropology and history dual degree student, participated in the 2021 summer field school. She and her fellow Creative Inquiry team members discovered an ax head, battle ammunition and colonial era building materials, such as bricks and hand-wrought nails. After digging for hours a day, the students developed a greater appreciation for the physical intensity and difficulty of fieldwork. Though there were days when they did not find anything exciting, the moments when they did made their efforts more than worth it. "It was extremely satisfying and thrilling because you unearthed this piece of history that no one had seen for decades," Schrantz said. Among the dirt and clay, the students also found pottery and arrowheads

It was extremely satisfying and thrilling because you unearthed this piece of history that no one had seen for decades.



The team excavates an archaeological unit at Fort Rutledge in Clemson, SC. Photo by Gavin Schrantz.

that now serve as evidence of a civilization that was thought to be lost for good.

Schrantz's most notable finding was a belt buckle-like ring excavated from brick rubble on the second to last day in the field. Although she initially thought it was a revolutionary era ring, its Victorian style indicated that it could have been left behind around 1908 after the Daughters of the American Revolution completed the fort's monument construction.

Over the years, aside from the modern monument, Fort Rutledge's remains have disappeared or were flooded due to the construction of Lake Hartwell. Because of this, the fort's exact location is unknown. However, Margaret Milteer, a senior anthropology major, may have pushed her team one step closer to the location of the fort. "As we were digging in this one-by-two-meter rectangle of land, [I noticed that] the one side of the soil was a much darker color, whereas the other side was the kind of bright, good old South Carolina clay. [The soil distinction] was a straight line that extended exactly where we thought one of the walls would be. We think this is a record of a trench, either from the bastion or wall of the fort," Milteer said.

After a productive summer, the Creative Inquiry students moved to the lab during the fall to clean, analyze, catalog and build a timeline around the artifacts. By taking a closer look at their findings, they can more accurately identify an object's age, material and what culture it came from, helping them develop an interpretation of what actually took place on campus grounds centuries ago.

Due to the project's holistic nature, students learn to appreciate material culture from the moment an object comes out of the dirt through its exhibition in a museum. "Having participated in Clemson's Archaeological Field School and the Lab Analysis Creative Inquiry will make us more competitive candidates [for professional opportunities]," said Milteer, who hopes to work as a field technician before attending graduate school for historical archaeology. Schrantz anticipates pursuing museum studies at the graduate level and agrees. "This is not something that every university has or something that most people do at the undergraduate level, so it's an incredible opportunity that we've been provided with that will certainly help continue education and careers," Schrantz said.

by Piper Starnes



*Schrantz finds a ring at the Fort Rutledge dig site.
Photo by Gavin Schrantz.*

PRESERVING AN ENDEMIC SPECIES

The southeastern United States is known for its rich biodiversity—from amphibians to plants to fish. However, species extinctions decrease diversity which affects the entire ecosystem and, in the case of fish, the aquatic ecosystem. In the Savannah River Basin, which includes the lakes and rivers from Lake Jocassee to Lake Thurmond in South Carolina, a healthy aquatic ecosystem is important for water and recreation. The Native Bass Conservation Creative Inquiry project, led by Dr. Brandon Peoples and graduate students Caroline Cox and Tyler Zumwalt, from the Department of Forestry and Environmental Conservation, is investigating the life history of an imperiled, endemic bass of this basin. Bartram's redeye bass, *Micropterus sp. cf. cataractae*, lives only in the Savannah River basin in South Carolina and Georgia. Due to habitat loss and genetic deterioration from hybridization with the introduced Alabama bass, Bartram's bass are in danger.

Understanding the distribution of Bartram's bass, the water bodies they inhabit, and factors that affect hybridization and breeding with other species will contribute to the conservation of the bass. Cox guides the Creative Inquiry team to determine the distribution of Bartram's bass. The team fishes for bass in locations such as the Chattooga River and identifies each individual caught and, if it is a Bartram's bass, whether it is a pure or hybrid specimen. "I really like working with the undergraduates and seeing their

excitement about catching a bass. It's an honor being able to offer them advice because I was where they were at one point," Cox said.

The team also works with Zumwalt on a bass movement project. To map fish movement, the students catch bass and tag them. Small fish are tagged with a Passive Integrated Transponder tag (PIT-tag) similar to microchips used to locate lost pets. Larger fish are equipped with radio tags that enabled the team to use radiotelemetry to track fish. After tagged fish are returned to the water, subsequent collection trips involve scanning small caught fish with a PIT-tag reader and using a radio telemetry receiver for the big fish.

The team's results are important for the conservation of Bartram's bass as well as to aquatic biodiversity. Understanding all the factors that affect biodiversity in aquatic systems is important. "There is an incredible diversity of aquatic life right here under our nose. Streams that flow through Clemson's city parks and even through the golf course contain fish that are just as necessary to the ecosystem as any fish one would find in the coral reef. There are a lot of really interesting species out there, and many of them are in deep trouble. Considering many of them have restricted ranges, if we lose them here, we lose them everywhere and forever," Peoples emphasized.

by Rebecca Keneally



The Native Bass Conservation Creative Inquiry team fishes for Bartram's bass in Eastatoo Creek.



When the team samples for Bartram's bass in lakes, they fish from kayaks.

RUB THE ROCK

Howard's Rock, the Clemson football team's good luck charm since 1966, is known for being an exclusive and protected object. Former Clemson football coach Frank Howard, for whom the rock is named, once said, "If you're going to give me 110%, you can rub that rock. If you're not, keep your filthy hands off of it." Sealed under a glass shield and locked behind a gate, not many people outside of the team have a chance to touch it. This year, the Development and Assessment of Makerspace Standard Operating Procedures Creative Inquiry project, led by Dr. Todd Schweisinger from the Department of Mechanical Engineering and Kelsey Sheaffer from the Libraries, decided to change that.

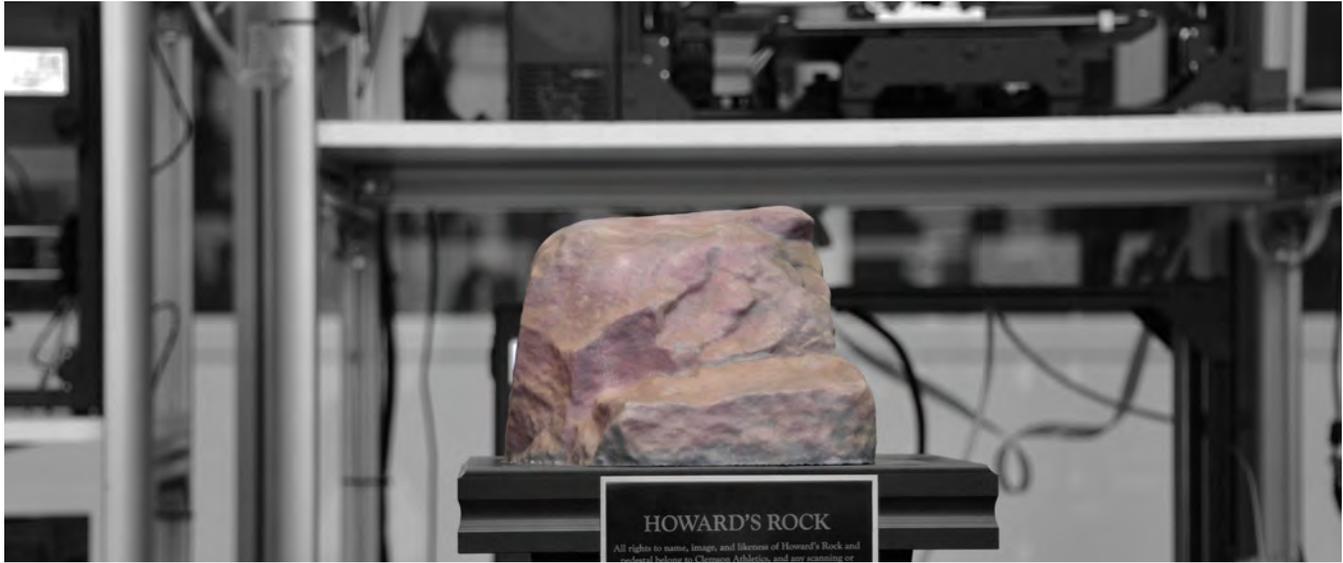
The Creative Inquiry team initiated a successful partnership with Clemson Athletics to create a 3D replica of Howard's Rock. This collaboration will strengthen the University brand and help promote the Makerspace's capabilities and Athletics' support of students. "By bringing this artifact to the Makerspace, we're making it

accessible, where everybody can come in and rub Howard's Rock if they're going to give 110% on their course, research or personal projects," Schweisinger said. The team hopes the replica will increase the Makerspace's visibility across campus and encourage more students to take an interest in its tools.

The Makerspace currently provides any student, faculty or staff member with access to technologies such as 3D printers and scanners, embroidery and textiles processing equipment, laser cutters and other electronics. With the addition of new technologies and equipment, the Creative Inquiry team is researching the best procedures to improve the culture and practices within the Makerspace. To do this, the team is identifying problems and finding answers to questions regarding safety requirements, student accessibility and overall productivity of the space.



Emily Petty uses a 3D scanner to image Howard's Rock in Memorial Stadium.



The 3D printed replica of Howard's Rock resides in the Clemson Makerspace in the Watt Center.

Emily Petty, a junior mechanical engineering major, has been in the Creative Inquiry project since 2019 and now serves as the team's student leader. She explains that the Makerspace can be a bit daunting for new visitors. "When people see the Makerspace, they're pretty intimidated because there's a bunch of people doing their own thing. But, if you see [the Howard's Rock replica], you're going to want to go inside and touch it," Petty said. Rylee Rollins, a sophomore materials science and engineering major agrees, remembering her first experience in the space. "I've never used the Makerspace before this year. I was scared to go into the Watt Center and use the machinery. This Creative Inquiry forced me to get over that fear... Now that I actually have experience working with 3D printing, I feel very confident using it," she said. Rollins' first 3D-printed object was a frog güiro that makes a croaking sound when stroked with a stick. While Rollins was making a frog just for fun, she learned that they are commonly used for elementary-aged

When people see the Makerspace, they're pretty intimidated... but, if you see [the Howard's Rock replica], you're going to want to go inside and touch it.

children learning about music and percussion. Schweisinger adds that these learning tools help start secondary projects and draw in other majors to the Makerspace and the Creative Inquiry project. "Music and elementary education are rare in the Makerspace, so we say, 'Hey, let's see if we can bring these [and other] majors in.' We are always looking for these types of connections," Schweisinger says.

Whether it takes an iconic rock or a 3D printer, introducing students to the Makerspace technologies can open up an array of opportunities and possibilities for their coursework, research and personal projects. Through their research and outreach, the Creative Inquiry team hopes to develop and implement a safe set of standard operating procedures, adhering to university culture and requirements, to invite new students in and train them to make the most of the Makerspace.

by Piper Starnes

PEACH PACKAGE INNOVATION

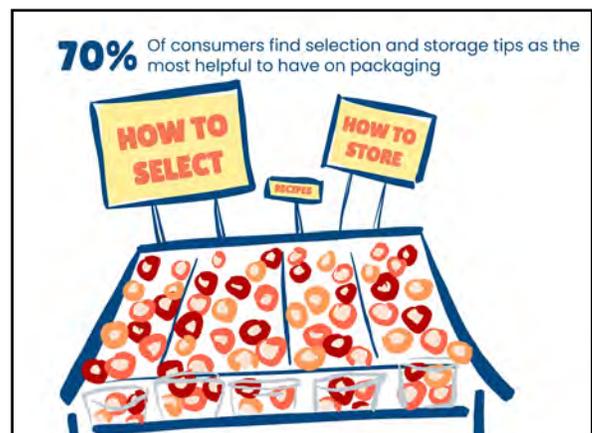
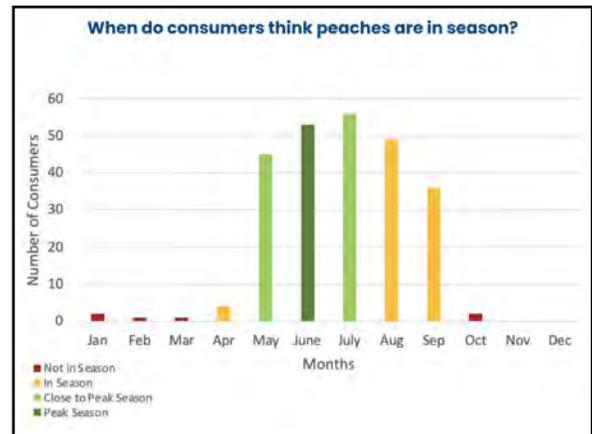
Peaches are delicious to eat—and can be difficult to market. To appeal to grocery store customers, peaches must be ripe, undamaged and just the right shade of peach. Part of the challenge in delivering ripe, unbruised peaches to market is using the best types of packaging. The Peach Package of the Future Creative Inquiry project, led by Dr. Andrew Hurley from the Department of Food, Nutrition and Packaging Sciences, worked on developing an innovative package to better market peaches to future generations of shoppers.

South Carolina hosts the largest peach-grower on the East coast, Titan Farms, with more than 6,200 acres of not just one, but 60 varieties of peaches. The team at Titan Farms works to maintain their brand’s integrity by ensuring that each peach meets the highest standards for the fresh produce marketplace and exceeds customer satisfaction. Chalmers III and Lori Anne Carr, owners of Titan Farms, have supported Creative Inquiry projects for many years through the Carr Family Endowment (see pgs. 34–35 for more information). This year, the endowment supported a project to develop an innovative peach package.

Students began their research by conducting reconnaissance on the produce market, packaging trends, the history of peach packaging and peach sales predictions across the United States. They also conducted a retail audit in which students visited several stores to collect peach packages for analysis. During this research, they discovered that sales and consumption of peaches has decreased for more than a decade. “Peaches are going to waste and if packaging can do anything to save them, then why not,” Caroline Joseph, a senior packaging science major, said. Their preliminary research also included a consumer survey which asked consumers questions regarding shape, size, storage methods and the peach packages they buy.

Based on the results of the survey, the Creative Inquiry team designed shopping scenarios in the CUshop™, a retail laboratory space designed to resemble a miniature grocery store. There, mock customers made selections based on the appearance and packaging of peaches. The data from the shopping scenarios was analyzed and used to inform design of new peach package prototypes. The new packaging was made from sustainable materials and featured eye-grabbing educational graphics that told consumers how to best store the peaches to achieve various stages of ripeness.

Peach Consumer Survey Results





In the spring, the team presented their work to the Carrs and at the 17th Annual Focus on Creative Inquiry poster forum. The students hope to see their peach packaging in stores in the future.

by Allie Cheves

We toured the packaging science facility and everything we learned and saw that day is something we take into consideration when we think about box or package, about how it's going to travel all of the road miles to get that peach safely to the store, so that it can go home with the consumer. It was so interesting to see that the Creative Inquiry team was so spot on for what we talk about and deal with.

- Lori Anne Carr ('90, M '92)



The team's baguette peach package prototype.



The team tests their peach package prototypes in the CUshop™.



Consumers prefer prototypes with information about peaches on the packaging.

FLOWER POWER

Pink muhly grass is an unique plant, often described as regal. The pinkish-red blossoms wave to passersby in the autumn breeze as they walk through McGinty Mall, also known as the agriculture quad, on Clemson's campus. The Sustainable Landscape Demonstration Garden Creative Inquiry project, led by Dr. Ellen Vincent from the Department of Plant and Environmental Sciences, is responsible for this beautiful display of color. Vincent teaches her team two valuable lessons: how to incorporate sustainable greenery into Clemson's green spaces and the value of native plants in gardens.

Vincent's research focuses on the therapeutic and sustainable potential of gardens and natural spaces. She mentors the Creative Inquiry team on designing, building and maintaining such spaces while also assessing how these gardens impact passersby. The students not only maintain the gardens but deploy surveys to students and faculty on their comfort and understanding of the natural world. Since the garden's installation in 2012, survey participants report an increase in aesthetic pleasure and feelings of safety in the area. More than 30% of survey participants felt they had learned something from the landscape just by walking through.

The demonstration garden in the agriculture quad inspired several additional greenspaces on Clemson's campus and fueled a new-found passion within the Clemson community for plant sustainability. "It's extremely important to expose people to sustainable landscape design. It increases and capacitates ecosystems and brings back that natural environment from before we stepped in," Mary Claire Zimmerman, a senior architecture major, said. By learning about how to care for and maintain South Carolina's native plants, students are contributing to the health of the ecosystem as well as enhancing natural beauty.

In the coming years, the Sustainable Landscape Demonstration Garden Creative Inquiry team plans to install gardens in the empty mulch beds around the Academic Success Center. Incorporating native life into the campus's educational and professional spaces grows a respect for nature and, through that respect, makes Clemson University a better place for people and vegetation alike.

by Amy Maistros and Allie Cheves



*Molly Glaser, Emma Hanson and Owen Lancaster work in the garden outside Barre Hall.
Photo by Ellen Vincent.*

SIGN LANGUAGE REVIVAL

Just a 45-minute ferry ride from mainland Massachusetts, the island of Martha's Vineyard is known for its historic fly fishing culture and summer tourism, but many people are not aware that it was one of the United States' first known deaf communities. Since the 18th century, deaf, hard-of-hearing and hearing citizens had equal communication access and participation in public life on the island—everyone could understand each other through speech or Martha's Vineyard Sign Language (MVSL). When the last person fluent in MVSL died in the early 1950s, the language and once-accessible society slowly withered away. The Martha's Vineyard Sign Language Creative Inquiry project, led by Dr. Jody Cripps from the Department of Languages, is helping reduce communication barriers and to readapt the island's society to accommodate the deaf and hard-of-hearing community.

During the team's two trips to Martha's Vineyard, they visited popular lighthouses, Lambert's Cove Beach and the Chilmark Library to explore the community and research its history. Through the Martha's Vineyard Chamber of Commerce, the students visited several restaurants, medical centers and other local businesses to speak with community members about sign language conversational skills and vocabulary they need to learn to make their services more inclusive. After compiling the feedback, the Creative Inquiry team partnered with Martha's Vineyard Television Station (MVTV) to create a series of beginner's sign language demonstration videos. When complete, the students plan to upload their video library to MVTV for viewers to rewatch, learn and hopefully bridge the gaps between native, novice and non-signers.

Introducing a new way of doing things to people requires patience, consideration and a clear explanation of intentions. "I didn't want to step on people's toes and move too fast. [As outsiders], when we intrude on people's lives, their culture and communities, you have to take time to build that trust and grow that relationship," Cripps said. Allison Schippert, a senior modern languages major, interviewed a woman who works at a local medical center and saw some of this mentality. "Even though she wasn't willing to learn all 50-something signs we had planned, she was very open to learning signs that she felt would be beneficial to her team," Schippert said. "I thought it was a lot more effective to ask them what they wanted, as opposed to us hoping that we

gave them the right words. It was good to just have ideas from people who don't necessarily know the history or have the same perspective as we do," August Vincelette, a junior modern languages major, said.

If the MVTV video library is successful, the team will use their creative research process as a model for other organizations to improve their accessibility and inclusivity. In the future, the Creative Inquiry project plans to return to Massachusetts to collaborate with Martha's Vineyard Playhouse and international film festivals to bring more deaf stories to live stage productions and entertainment on the big screen. With much ahead of them to do, the students are eager to help restore the inclusive legacy of Martha's Vineyard.

by Piper Starnes



The CI team prepares the set for filming with Martha's Vineyard Television Station. Photo submitted by Jody Cripps.

TRACKING TWEETS

In today's age of heightened political turbulence and accessibility to digital communication, it can be difficult to discern fact from fake news. The Media Forensics Hub Creative Inquiry project, mentored by Dr. Patrick Warren from the Department of Economics and Dr. Darren Linvill from the Department of Communication, is combating misinformation through social media observation, analysis and action.

The Media Forensics Hub at the Watt Family Innovation Center was established in April 2020 with funding from the South Carolina Research Authority. The Creative Inquiry project evolved from the hub to further engage students in media forensics and the concept of inauthenticity of media. Linvill, the lead researcher at The Media Forensics Hub, spearheads the Creative Inquiry project and collaborates with a team of faculty co-mentors from the College of Behavioral, Social and Health Sciences, the Wilbur O. and Ann Powers College of Business and the Watt Family Innovation Center.



Patrick Warren presents the concept of misinformation to the CI students.

Throughout the school year, the Creative Inquiry students worked together to investigate the suspected inauthenticity surrounding a network of Twitter accounts affiliated with Muhammad Shojaee, a religious leader in Tehran, Iran. "Combined with my interest in interdisciplinary political science, psychology and computer science, [this CI] is a perfect fit to learn a lot about something I'm curious about in a low stress and collaborative environment," Jack Taylor, a junior economics and mathematics double major, said.

The Creative Inquiry team discovered that there are more ways to decipher tweets than just translating the text from Arabic (or other Middle Eastern languages) to English. Students observed the frequency of tweets, profile photos, the type of device posts originate from and who is in the network of the accounts. Resources such as Bellingcat's Online Investigation Toolkit, NodeXL (network analysis software) and Maltego (open-source intelligence and forensics software) are key resources for the Creative Inquiry team's research, from gathering superficial information to uncovering more complex details. Each tool has a different specialty, "They [can help us] find a network between accounts and scrub an account's timeline for keywords and links to others," Taylor said. The team is confident that their efforts will be able to expose inauthentic accounts and uncover what is true and what is not surrounding stories on social media.

While a human runs a social media account, there are also a few other possibilities as to who or what is really behind the account. "Some of these accounts are automated bots and other times it is run by people overseas. You can hire people very cheaply to run social media accounts," Linvill said. It gets especially tricky when cyborg accounts are involved. They can be much harder to identify because they are both human and computer-run accounts. The Media Forensics Creative Inquiry team hypothesizes that extremist groups use marketing firms to run inauthentic social media accounts to boost their media and messaging; however, the challenge is finding the evidence to support this hypothesis.

Year after year, technological advancements allow disinformation tactics and strategies to evolve, forcing researchers to keep up with the changes. "There have been some times when it seemed like we weren't making headway or were going to hit a dead end. Luckily, however, the nature of the CI and the expertise of the professors and graduate student mentor, Stephen Sheffield, allowed us to adapt and turn our setbacks into something that was still of substance," Taylor said. The Creative Inquiry team's final report will be available to other researchers and they hope will provide evidence that these accounts are violating Twitter community guidelines and spreading disinformation which will potentially shut down these Twitter accounts.

by Piper Starnes

 **Muhammad Shojaee**
1.09K subscribers

HOME VIDEOS PLAYLISTS COMMUNITY CHANNELS ABOUT

Uploads SORT BY

 4:36 "Music "Mercy To All" 125 views · 4 months ago	 1:21 The Holy land of Palestine calls upon every clear... 432 vIEWS · 1 year ago	 1:36 "Ramadhan" Music video By Hasan Tavakoli" 446 views · 1 year ago	 5:01 The Promised Saviour, I Believe You Will Come [...] 5.8K views · 1 year ago	 1:22 Lady Fatima, a role model for women of every age 328 views · 1 year ago
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Tweets from accounts similar to Zeinab network and follow social media accounts of the religious leader Muhammad Shojaee.

 **ZEINAB** @ZEINAAB_313

Replying to @ZEINAAB_313

🔥 Arizona USA
Seyed Ali Khamenei, #Leader of Iran:
A look at the streets of America, the treatment of American people by their statesmen, the deep valley of class distance in that country, the horrific racial discrimination in it, reveals the depth of the moral #Trump



Zeinab is an example of an inauthentic account that ties into the network of extremist Muhammad Shojaee.

1:36 PM · Aug 1, 2020 · Twitter for Android

1 Retweet 10 Likes

Combined with my interest in interdisciplinary political science, psychology and computer science, [this CI] is a perfect fit to learn a lot about something I'm curious about in a low stress and collaborative environment



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IN THE SPOTLIGHT

The transition from home to college is something all students experience. However, the adjustments to college life are not handled the same by everyone nor are these experiences a topic of everyday discussions. Three years ago, Terryn Witherspoon, a senior biological sciences major, and Ashley Larkins, a senior genetics major, did have that discussion—the challenges of their transitions. At the time Witherspoon and Larkins were first year students and they decided to find a way to open the sometimes vulnerable conversations about adjusting to college life for all students.

The Coach, Connect, Appreciate, Retain, Evolve (C.C.A.R.E.) Special Research Group: College Students, Our Lived Experiences and the Research to Help us Thrive Creative Inquiry project, led by Danielle McFarquhar from the Honors College, started with just Witherspoon and Larkins, but is now triple in size. In the fall of 2021, the team helped first year students develop coping strategies and understand their issues better. They decided these topics were relevant to all students so they started a podcast, *In the Spotlight*.

The Creative Inquiry students identify relevant and current topics for the podcast. They each complete research for the upcoming podcasts on topics related to student well-

being such as social media, time management and belonging in college. Each 30-40 minute podcast summarizes the research on the topic and then features discussions among the team members. “We definitely want to communicate what the research says, but an almost bigger part of it is sharing our own experiences with struggles that we’ve had through college,” Jason Teets, a junior computer science major, said.

The podcast is a safe and honest place to discuss feelings and share experiences that foster emotional well being. Through the podcasts, the Creative Inquiry team encourages college students to have those hard conversations with their peers. “I feel like I learned a lot for myself personally. The most interesting thing about doing the research is learning how different people approach different things, and that allows me to do a lot of self-reflection,” Larkins said. The team wants to make their work sustainable and relevant for years to come as they continue to shine light on college students, lived experiences and the research that helps them thrive.

by Rebecca Keneally



Students Darin Spitzer, Nathan Brown, Aaron Woolfolk, Ashley Larkins, Terryn Witherspoon and Jason Teets celebrate a successful podcast recording session.

SILK OF STEEL

Walking through a spider web is an irritating yet intriguing experience—the sticky texture yet surprising strength of the silk is fascinating. The molecular properties of spider silk make the fibers stronger than they appear. If millions of strands of spider silk assembled into a wire, it would be stronger than most man-made synthetic fibers. The Molecular Dissection of the Spider Silk Self-Assembly Process Creative Inquiry project, led by Dr. William R. Marcotte in the Department of Genetics and Biochemistry, works to understand and replicate the molecular properties of spider silk in order to one day replace non-renewable materials such as steel.

To understand silk strength, it is important to understand the process of silk creation. Silk glands in the spider's abdomen host genes that code for the activation of specific enzymes and proteins that assemble the silk fiber. The Creative Inquiry project's goal is to isolate one of the assembly proteins and determine its role in the making of silk fibers. The team hopes to determine if the protein is capable of functioning outside of the spider's body. If so, this research could lead to the artificial manufacturing of spider silk in a laboratory.

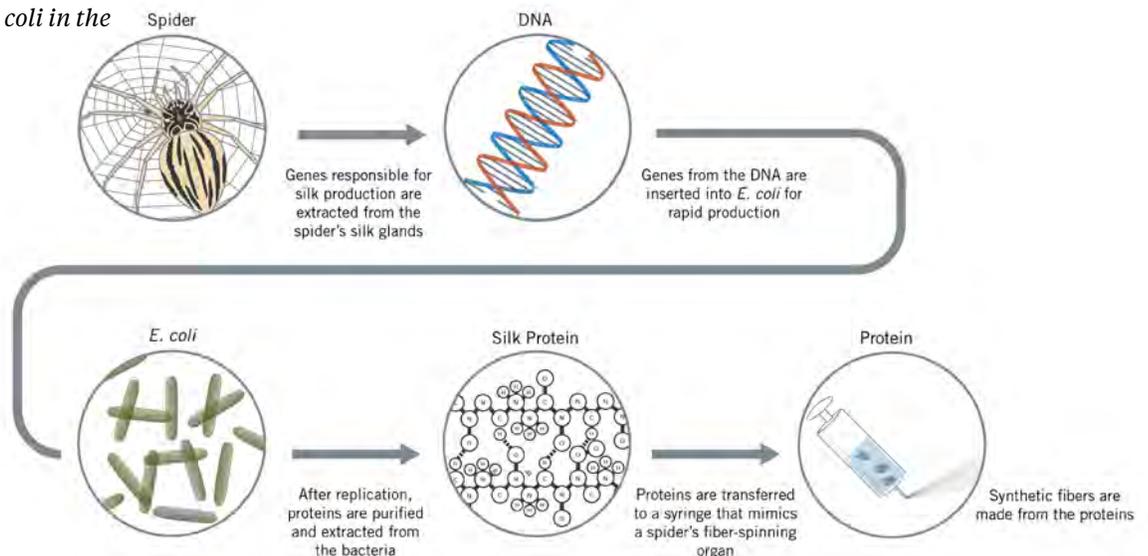
As in many research groups, the team experienced some setbacks. They observed a perceived chemical block of an enzyme they were working with, but luckily, they identified the issue. "*E. coli* was putting the enzyme into what is called inclusion bodies, or insoluble particles, that make it very difficult to get an active enzyme," Marcotte said. The team addressed the setback by altering the culture conditions to identify what was causing inclusion bodies to form. Many students were surprised when the initial procedure was not successful, but they worked hard to overcome this setback and were happy with the results.

The team learned the valuable lesson—that laboratory research requires persistence. In a research setting, the first try almost never yields expected results, and sometimes it takes years before a breakthrough discovery. Though Marcotte's students experienced a taste of the frustration involved in research, they have also learned how to navigate setbacks. Producing spider silk in a lab may be years away, but the team is working hard to make this dream a reality. Someday, steel wire could be replaced by spider silk.

by Allie Cheves

Making Synthetic Spider Silk

*The process of spider silk production using *E. coli* in the laboratory.*

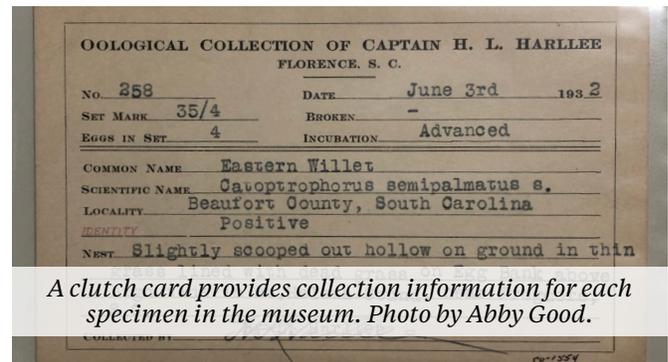


STORIES FROM AN EGG

Regardless of which came first, an egg can tell us a lot about the bird it came from and what the world was like when it was laid. The Research Using Museum Collections Creative Inquiry project, led by Dr. Virginia Abernathy and Melissa Fuentes from the Department of Biological Sciences, works with Clemson University's Bob & Betsy Campbell Museum of Natural History to gather information on shorebird egg clutches and answer questions about the effects of climate change on these species.

Shorebirds have long bills and stick-like legs designed for wading in oceans and freshwater bodies. With more than 50 species of shorebirds across North America, the Creative Inquiry team decided to concentrate on three threatened species—the Eastern willet, the black-necked stilt and the Wilson's plover. “Shorebirds are long-distance migrants that typically nest along the coastline, making them vulnerable to rising ocean levels, hurricanes and changes in timing of food availability during their breeding season. Additionally, none of these species are in the same family, or taxonomic grouping, so they aren't that closely related. This helps ensure that any results we find aren't due to similarities in evolutionary history,” Abernathy said.

In the museum, each clutch, or group of eggs laid in the same nest, has a card that includes the bird's common and scientific names, a description of its nest, incubation status and collection date and location. “Some information is typed on a formal template, and others are just written on little snippets of paper with holes in them. Sometimes the handwriting is so hard to read, but we try to help each other out and decipher it together,” Abby Good, a junior wildlife biology major, said. Fuentes, the museum's curator, works with the Creative Inquiry students on proper scientific photography techniques and classification of the museum's



A clutch card provides collection information for each specimen in the museum. Photo by Abby Good.



A shorebird egg is staged to photograph and digitize data for future submission to an online database.

clutch collection. Students catalog the egg photos and collection data in an online database which will be accessible to the public when it is complete. With approximately 3,000 clutch cards to file, this can be a long and tedious task for students.

If climate has a significant impact on bird species, it could impact so many other things in the world, including humans.

Though the curation process is daunting, the team is excited to use the data to answer their research question. “We are analyzing if there is a relationship between temperature, precipitation and nest initiation. We’ve already seen that climate affects nest initiation in other studies, so we’re testing our three vulnerable species within these variables,” Gabriella ‘Gabi’ Pulsifer, a senior biology major, said. By referencing the clutch cards, the Creative Inquiry team will be able to see if nest initiation correlates with changes in climate over time.

Shorebirds are considered indicator species—animals that offer insight into the overall health and function of an ecosystem. “If climate has a significant impact on bird species, it could impact so many other things in the world, including us humans,” Autumn Blanchard, a senior environmental and natural resources major, said. The Creative Inquiry team hopes their findings will paint a clearer picture of how climate impacts bird nesting.

Tucked between Jordan Hall and Long Hall at Clemson, the Bob & Betsy Campbell Museum of Natural History may be a small building, but it has a big impact. “With our research and digitizing efforts, we’re taking an asset that Clemson has and making it [more] known to the public,” Abernathy said. The Creative Inquiry team looks forward to inviting the public to access and learn from their online catalog of shorebird eggs.

by Piper Starnes



Eleni Chaknis holds a shorebird egg from the museum collection.

COLLABORATIVE CHEMISTRY

Chemistry is all around us and even within us. Everything is made up of atoms consisting of neutrons, protons and electrons. When a molecule, or group of bonded atoms, has an unpaired electron, it is called a free radical. Due to its high reactivity and instability, a free radical will steal electrons from other molecules, causing an ongoing and potentially dangerous cycle to occur within the human body. Free radicals are often created by metal ions and can cause severe DNA damage, resulting in mutations and cancer, tissue damage in heart attack and stroke and neurodegenerative diseases. To prevent this cycle and gain insight into the environment around the metal ions, the Imaginative Ligands and Unique Metal Complexes: A Marriage of Organic and Inorganic Chemistry Creative Inquiry project, led by Drs. Julia Brumaghim and Modi Wetzler from the Department of Chemistry, is designing ligands—molecules that bind metal ions to prevent radical generation and more broadly control metal reactivity.

To function properly, the body needs an appropriate amount of metals such as iron and copper. With Brumaghim's expertise in bioinorganic chemistry, she and the students investigate how these metals generate free radicals and damage DNA. "It turns out that there are a lot of antioxidants, either ones that occur naturally in your cells or ones you eat in your diet (fruits, vegetables, green tea and all those things that people tell you [that] you should eat) that can prevent cancer and degenerative diseases," Brumaghim said. Many of the antioxidants that the Creative Inquiry team observes are coordination compounds, which are bonded metals and ligands—some of which are the ligands Wetzler mentors the students in designing.

The students in this Creative Inquiry project recently worked to develop a ligand that can completely encapsulate a metal ion and prevent or slow down generation of radicals. Two versions of a ligand were designed using four hydroxamic acid arms branching from a common backbone. The first, a hydroxamic acid analog of ethylenediaminetetrapropionic acid (EDTP), a chemical used to bind calcium, was made by a former graduate student through a five-step process. Each of the four arms of this ligand has three carbons, and it proved to be too big and did not bind well to the metal. This led Maclean Hutmacher, a junior chemistry major, on a mission to produce a smaller ligand.

For several months, Hutmacher and Wetzler followed the graduate student's methodology, but this time used a hydroxamic acid analog of ethylenediaminetetraacetic acid (EDTA). Like EDTP, EDTA, a chemical agent used to bind iron, also has four arms. However, it is significantly smaller in size due to each of its arms only having two carbon atoms rather than the three carbon atoms of EDTP. "The process was painful for a while. Our chemical products kept decomposing and requiring purification steps. It was super tedious and took a super long time," Hutmacher said. With no luck, they decided to try a different method that would convert the EDTA's acetic acid arms into hydroxamic acid arms, resulting in a more direct, two-step process. "Wouldn't you know it, the easier and more direct route worked the first time we tried it," Wetzler exclaimed. With the successful development of this ligand, the bioinorganic team can observe and better understand how the binding of the antioxidant ligand with the metal controls free radical formation and damage.

Though preventing DNA damage and degenerative diseases is the Creative Inquiry project's current focus, the team has ambitious goals. In the future, Brumaghim and Wetzler hope to explore antioxidants and other ligands that can separate nuclear waste, by pairing their ligands with the larger, riskier lanthanide and actinide metals. After seeing how uniting their perspectives and expertise succeeds on the smaller scale, they can only imagine what great things collaborative chemistry will accomplish on a larger scale.

by Piper Starnes



Julia Brumaghim, Modi Wetzler and Maclean Hutmacher discuss their progress in the laboratory.



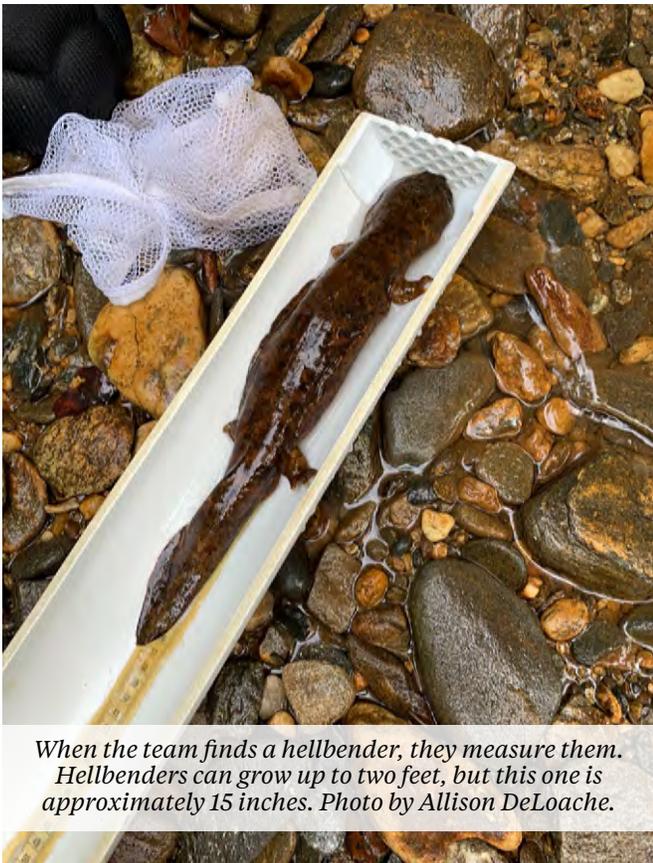
Maclean Hutmacher in the process of creating a ligand.

RIVER MONSTERS

Each year approximately three million tourists visit western North Carolina's Pisgah National Forest to enjoy the great outdoors. Little do they know, one of the largest salamander species in the United States might be creeping along the riverbed around their feet. The fully-aquatic *Cryptobranchus alleganiensis*, commonly called hellbenders, can grow up to two-feet long yet are still easy to miss. Hellbenders are highly secretive and harmless to humans despite their intimidating name. They dine almost entirely on crayfish and rely on large rocks for cover, nesting and foraging space. For more than 15 years, Dr. Cathy Jachowski in the Department of Forestry and Environmental Conversation has been researching the habitat requirements and the ecosystem that hellbenders inhabit throughout the southeastern United States in hopes of informing conservation actions. Since arriving at Clemson in 2016, she has worked closely with North Carolina Wildlife Resources Commission biologists to learn more about hellbender conservation status.

The Hellbender Ecology Creative Inquiry project was established to find, track and log hellbender activity in western North Carolina. There is little known about hellbenders due to their cryptic nature. "The species was petitioned to be listed under the Endangered Species Act just a couple years ago, and it was decided that there wasn't enough data to support listing. So, students get a chance to be involved in the processes to start harnessing data that will inform science, policy-making and protection of the species in the future," Jachowski said.

We're able to present findings that start facilitating actions to protect the species and their habitat.



When the team finds a hellbender, they measure them. Hellbenders can grow up to two feet, but this one is approximately 15 inches. Photo by Allison DeLoache.

This past fall, the team surveyed for hellbenders in part of the French Broad River system near Brevard, North Carolina—just a portion of the nearly 500,000-acre Pisgah National Forest. Though these salamanders typically stay hidden under large rocks for protection, many of them were moving about to breed, which generally occurs during the first two weeks of September. The students inventoried the salamanders and microchipped them with PIT (Passive Integrated Transponder) tags. Tagging cryptic species is a common practice among researchers to understand their social interactions and monitor their movements. The team also scanned the area for previously tagged salamanders. Back on campus, the team began to process the data they collected. "There are many hours that go into processing the [PIT tag] data, documenting our work and reading scientific literature, but this is where the real change happens. We're able to present findings that start facilitating actions to protect the species and its habitat," Andrew 'Drew' Kanen, a senior environmental and natural resources major, explained.

Hellbenders are an indicator species, meaning their health correlates with the river's health. A hellbender can live up to 30 years, spending most of its life in a 30 to 100-foot length of stream. "When you think about it, the resources that this animal needs to grow from about two inches to over two feet long need to be right there [in their living space] for a really long period," Jachowski said. Anything that affects water quality in the river or disturbs the rock crevices in their small home range can drive hellbender populations down. Once prevalent from New York to Georgia, these salamanders are now mainly found in the western Carolinas and Virginias. The team wants to provide information that will keep the hellbenders from disappearing from more of their range.

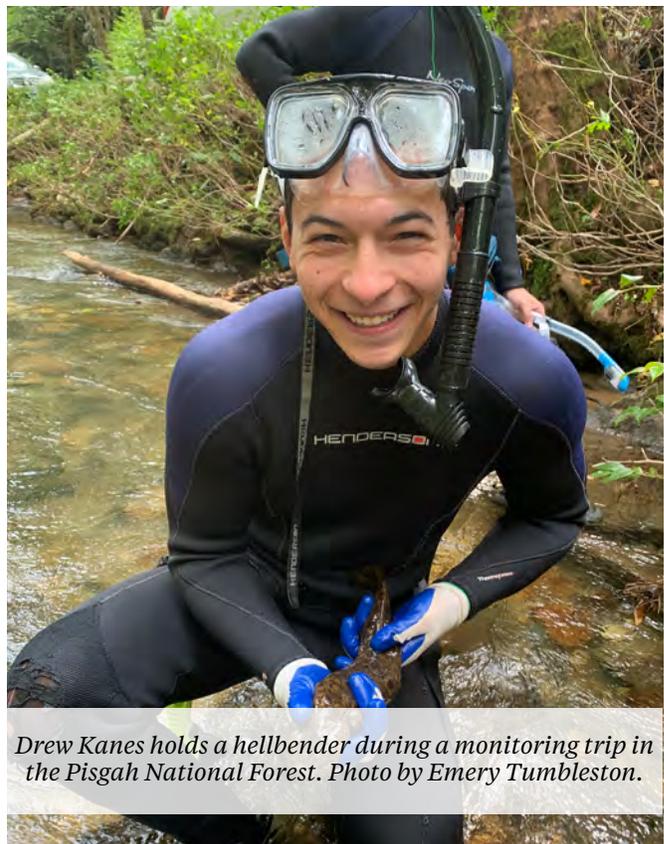
During the Summer Creative Inquiry and Undergraduate Research (CI+UR) program, Jachowski developed a collaboration with biologists from the United States Forest Service (USFS), which manages Pisgah National Forest. Zoe Wills, a senior wildlife and fisheries biology major, devoted her time to collecting hellbender data to further the Creative Inquiry team's research, in addition to serving in a Pisgah Conservancy internship position as a River Ranger. Lorie Stroup, the USFS Pisgah Zone Fisheries Biologist, started the River Ranger program to address the growing human impacts on streams in Pisgah and worked with Jachowski and the Summer CI+UR program to provide Wills with a salary, housing, training and opportunities to lead education and outreach initiatives. "One of my favorite parts of the summer was being involved with the education and outreach program. I really enjoyed teaching the public about this species and getting them excited about salamanders. We talked about how hellbenders are affected by recreation and what we can do (or not do) to help mitigate harm," Wills said.

Even if hellbenders are not commonly seen, recreation enthusiasts have an important and immediate impact on the ecosystem and especially its imperiled species. The Hellbender Ecology Creative Inquiry team encourages others to be active in the wilderness, but be sure to clean up your space and leave rocks in the river just as you find them—a hellbender might be underneath!

by Piper Starnes



Hellbenders lay eggs in a gelatinous sack underneath rocks in moving water. Photo by Emery Tumbleston.



Drew Kanen holds a hellbender during a monitoring trip in the Pisgah National Forest. Photo by Emery Tumbleston.

WORLD-WIDE BIG DATA

Behind the scenes of every action movie, in every hospital and in every weather station, there is a computer scientist: coding to create special effects, analyzing big data to improve efficacy of patient treatment, and using machine learning to predict the daily weather. Computer science is everywhere, and the Machine Learning and Big Data Creative Inquiry project, led by Dr. Melissa Smith and Ben Shealy, a graduate student, both from the Department of Electrical and Computer Engineering, is making the field more accessible to students while emphasizing its impact in the world.

This project began in 2016, but this year Smith piloted Clemson's first International Virtual Exchange Creative Inquiry project by partnering with An-Najah National University in Palestine. The Clemson team and students from An-Najah met weekly to discuss their projects which helped Tasneem Khalil, a senior computer engineering major at An-Najah, gain experience in machine learning and big data which she hopes will make her a more valuable member of the workforce post-graduation. "It was a special chance to improve in this field and experience something new with new people," Khalil said. The project had some challenges—for instance the team's meeting time was bedtime in Palestine. However, the Clemson Creative Inquiry students were so impressed by Khalil's dedication and hard work that they were determined to make the collaboration work and make it the best experience that they could for their international team members.

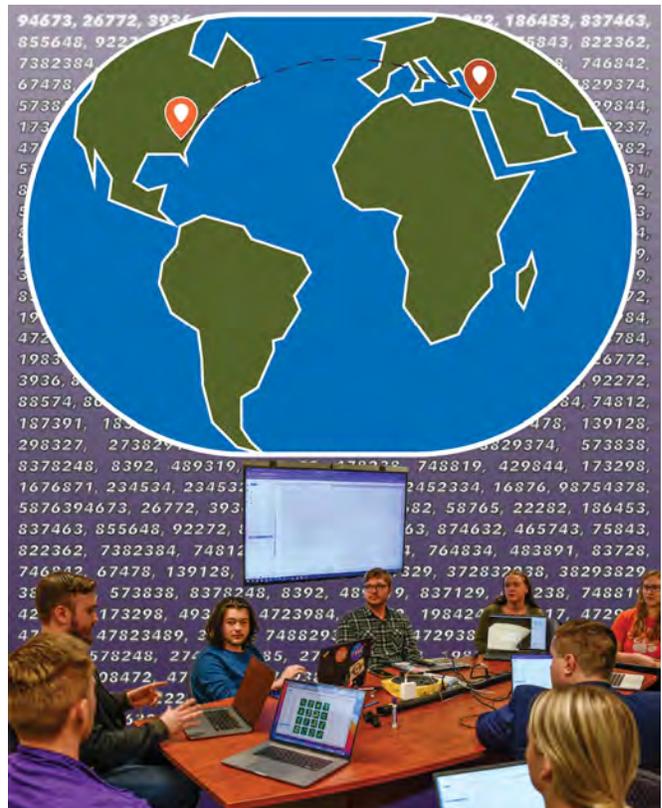
To familiarize students with coding and data, Shealy introduced them to the open-source platform *Jupyter Notebook* which provides interactive computational modules and lessons to prepare students for using coding, big data analysis and machine learning for research.

[This CI] was a special chance to improve in this field and experience something new with new people.

(L to R) Grant Wollam, Zach Oldberg, Wade Gossman, Max Faykus, Mikaila Gossman, Emily Sandlin, Tripp Herlong and Macy Roberts discuss data in *Jupyter Notebook* modules.

"When we talk about big data, we mean hundreds of thousands, even millions, of data entries in Excel. That's infeasible for humans to look over and analyze, so you need statistical methods of looking at this data," Mikaila Gossman, a computer engineering graduate student that works with the Creative Inquiry students, said. The *Jupyter Notebook* materials prepare students to analyze big data and code on their own. This preparation allowed students on the Creative Inquiry team to work on an array of research projects from using climate data to inform meteorological predictions to advanced coding to create two-dimensional animations. Perhaps these students will be the next computer scientists behind the action scene in the latest movie or weather report on the national news or hospital efficacy in Palestine.

by Allie Cheves



TEAM DYNAMICS

Understanding how teams work in high pressure situations is important, even more so when the teams are in the United States Army. Considering the multiple and rapidly changing challenges that the Army faces, the need for efficient analysis of team composition and dynamics is intensified. The Mission Impossible? Teamwork and Team Composition in High Risk, High Stress Environments Creative Inquiry project, led by Dr. Marissa Shuffler and graduate students Kyle Christenson and Kirby Allen from the Department of Psychology, collaborates with four other universities to determine efficient strategies for teams in dangerous and uncertain situations. The project is supported by a grant funded by the Army Research Institute for the Behavioral and Social Sciences and includes collaborators at Rice University, The University of Akron, University of Georgia, Arizona State University, Clemson University, Aptima and the Group for Organizational Effectiveness.

The Creative Inquiry team runs two quasi-realistic military operation scenarios each week at the T. Ed Garrison Livestock Arena. During the simulations, participants work in groups of five to conduct three missions: Humanitarian Aid; Search and Retrieve; and Escape. The teams must work together to complete the missions within a set time. “For our escape scenario, we’ll have zones that our participants can’t cross, so you have to work together to either build something to transport humanitarian aid, find some extra food supplies so you can make it to the village or escape from the island by building a tower with a beacon on top,” Carson Goodier, a junior psychology and world cinema double-major, said.

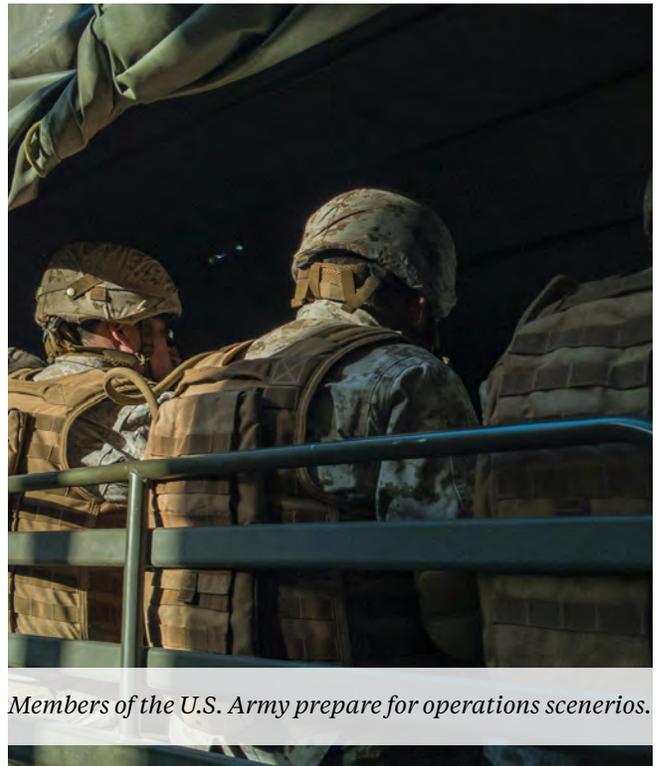
The simulations are recorded in order for the Creative Inquiry team to observe and collect data on the team dynamics and participant behaviors during the mission. After simulations, the participants respond to survey questions pertaining to the mission and its level of difficulty, their impression of each teammate and their teams’ overall performance. The survey responses help the Creative Inquiry team calculate the perceived intensity of each mission and the complex dynamics of each unique team.

A future goal for the Creative Inquiry project is to develop sensors for participants, or real soldiers, to wear in order to collect real-time data which will help control observer bias. The team is currently refining their rating system to prepare for the use of sensors.

The Creative Inquiry students are excited that their work contributes to the research of this multi-institution initiative to benefit the armed forces. “Our research is actually going to be implemented, as we design a paradigm for teamwork and team composition that will be applied in the actual Army so they can effectively face the threats that come up in the future,” Goodier said.

by Rebecca Keneally

Our research is actually going to be implemented... in the actual Army so they can effectively face the threats that come up in the future.



Members of the U.S. Army prepare for operations scenarios.

DESIGN JUSTICE

The study of spaces and how they affect behavior and represent issues of justice and equality in society is the focus of the Design Justice in Architecture Creative Inquiry project led by Clarissa Mendez, a senior lecturer in the School of Architecture. To inform their work, the Creative Inquiry team analyzes case studies of institutional racism and social inequities in built environments throughout history, including archetypes such as prisons, school systems, medical systems, museums and political spaces. The students discuss and reconsider how these types of spaces can better serve and maintain justice.

Analyses and discussions of case studies magnify the sheer weight and complexities of these issues. For instance, the Sofi Stadium and Los Angeles California Museum of Art (LACMA) case studies revealed that in a quest to develop tourism, the state grew a disparity gap between the upper class and impoverished groups. Both LACMA and Sofi Stadium were built in low-income areas. The Sofi Stadium caused the cost of living in the surrounding areas to skyrocket, displacing people whose home values increased faster than they could afford. Similarly, the cost of entry to LACMA is so high that local families, especially the many that are homeless or low income, cannot afford to experience this museum in their hometown.

Each discussion is led by a student, but all the students come away with a broadened understanding of the issues surrounding justice and equality in architecture. “Every discussion reveals more of the picture: there’s an issue between race and architecture. It affects more people than I imagined,” Angie Mendoza, a junior architecture major, says. These discussions impact how the architecture students think about design, not only in class but as it pertains to their future careers.

One case study hit particularly close to home for the Creative Inquiry team. “The Village” proposal in Greenville, SC, aims to rename the historically black neighborhood of West Greenville to match the aesthetic of the Center for Creative Arts. In an interview with a family that has lived in West Greenville for three generations, Melissa Ricaurte Munzo, a senior architecture major, found that this family was unaware of the city’s plans to rename and reconstruct West Greenville. The “necessary evil of gentrification,” as this family calls it, is serving to grow the city’s identity but is neglecting its citizens in the process of development.



The “Wall” displayed in the Clemson Design Center in Charleston.

This spring, the Creative Inquiry team disseminated their work while collaborating with an architecture class, the Invisible Studio. They created an interactive exhibit for the Clemson Chapter of the National Organization of Minority Architecture Students (cNOMAS) Conference (March 17-20, 2022) at Clemson's Design Center in Charleston, SC). The theme of the conference was "Addressing Erasure: Designing our Future" and the exhibit, "W'all," served as a vessel for dialogue about injustices within the built environment. Post-conference, the "W'all" is on exhibit and open for public interactions in the area between the architecture buildings, Lee II and Lee III, on the Clemson campus.

by Malik Sanders

Every discussion reveals more of the picture: there's an issue between race and architecture. It affects more people than I imagined.



Kimberly Dowdell and Julian Owens speak to conference attendees at the cNOMAS conference in March.

PROFESSIONAL ART

The Contemporary Art and Practice Creative Inquiry project, led by Joey Manson in the Department of Art, offers art majors the opportunity to experience the real-life of a professional artist. The team focuses on student development, career preparation for professional artistry, and the nuts and bolts of art galleries—all to help students excel as professionals after college.

Not only do the Creative Inquiry students explore the post-graduation potential of an artist, but they also prepare for it. The team members collaborate and support each other to improve their artist statements, biographies, resumes, websites and interview skills. To enhance their career preparations, the team travels to New York City to visit galleries and museums, for exposure to the real world of professional art.

The Creative Inquiry project travels to New York every year. While in New York City the team tours several prestigious art museums, as well as experiences street art and performers. The students curate an agenda reflective of their particular

areas of expertise in order to visit specific works of art and temporary art showings, known as “pop-ups,” throughout the city. This year during their visit, Sarah Gassman, a senior art major with a painting emphasis, visited a painting by her favorite artist, Lisa Yuskavage. Since inspiration is of central importance to the success and growth of artists, being in New York City, amid some of the United States’ most famous art museums and modern street art, gives these young artists to receive enough inspiration to last a lifetime.

After the trip, students reflect on their experience and often find a change in perspective, a broadened perspective of careers in fine art. Manson ensures that the students leave the Creative Inquiry project with the advice and experience they need to succeed in the art industry. “Getting to know and learn what artists do and what criteria they have to meet is helpful for the business side of art,” Sydney Bruce, a senior art major with a photography emphasis, says. On the creative side, the new inspiration gives students an even deeper passion than they had before.



In Fall 2021 the Contemporary Art and Practice Creative Inquiry team visited New York City.

Pursuing a professional career in art can be difficult in terms of gaining recognition, but these students are equipped to market their niche to its maximum potential. Through the Contemporary Art and Practice Creative Inquiry project students gain all of the tools they need to professionally and creatively thrive in the art world.

by Allie Cheves

Getting to know and learn what artists do and what criteria they have to meet is helpful for the business side of art.



The CI team in front of the Metropolitan Museum of Art.



Sarah Gassman observes a painting by her favorite artist, Lisa Yuskavage.

PAYING IT FORWARD

In 2014, Chalmers Carr III ('90) and Lori Anne Carr ('90, M'92) established the Creative Inquiry program's first endowment to support student research in fruit and vegetable crop production, agriculture industries and rural economic development. As founders of the family-owned and operated Titan Farms, the Carrs are proud to extend their professional work to bolster the Clemson student experience and the Clemson family.

Since its establishment in 1999, Titan Farms has grown to span more than 600 acres of bell pepper, 1,000 acres of broccoli and 6,200 acres of peaches, crowning them the largest peach grower on the East coast. The Carrs aspire to be ahead of the curve when it comes to the many aspects of innovation and sustainability in agriculture and consumerism. After getting to know Dr. Doris Helms, the founder of the Creative Inquiry program and former Clemson University Provost, the Carrs learned all about the program's possibilities and how they could give back to the University. "We were doing a lot of research for our farm, so when they came to us about a program for students, something resonated with me because I didn't have that when I was here—the ability to engage on real-life problems and work with professors to come up with solutions," Chalmers said.

Since the endowment was formed, it has supported several long-running Creative Inquiry projects. The Nutraceutical and Functional Foods Research and Product Development

Creative Inquiry project, led by Dr. Feng Chen from the Department of Food, Nutrition and Packaging Sciences, received the endowment multiple years. Because of the project's exceptional work on the characterization of aromas and health benefiting chemicals of SC peaches, the team was invited to the American Chemical Society National Meeting's student competition. "It's been so fun to see the different things that come out of the projects supported by this endowment and hear the success stories," Lori Anne said. Sharing her excitement, Chalmers added, "With that being one of our first sponsored ones, it's just the icing on the cake!"

What makes undergraduate research at Clemson University so unique is its commitment to encouraging collaboration, curiosity and creativity. The Carr Family Endowment further fosters that goal, giving Creative Inquiry students and mentors the ability to develop their own project ideas as well as receive suggestions from the family that address topics relevant to SC fruit and vegetable agriculture. This year, the Carrs worked with the Peach Package of the Future Creative Inquiry team (for more information see pg. 8) to investigate peach consumer habits and determine if peach package innovations help modern consumers.

The Carrs are excited about new potential project ideas in the future, including food development for child nutrition and school lunch programs. Lori Anne (B.A. Elementary Education '90 and M.E. in administration and supervision

RECIPIENTS:

Dr. Andrew Hurley, *Peach Packaging of the Future*

Dr. Kirby Player, *Rural Health Hubs*

Dr. Douglas Bielenberg, *Breaking Bud: Environmental Control of Bloom Time in Peaches*

Dr. Feng Chen, *Characterization of Aromas and Health Benefiting Chemicals of SC Peaches*

Dr. John McGregor, *Shelf-life Extension of Fresh Peach Slices by Surface Crust Freezing*





'92) is enthusiastic about initiatives that connect students of all ages to the food that is grown around them. Many people see agriculture as simply farming, but agriculture is much more. In the summertime, Lori Anne enjoys inviting the South Carolina Commissioner's School for Agriculture on a Titan Farms exploration. "They are astounded when we start talking about all of the different facets—marketing, management, farming—that agriculture touches, and all of the different support people and industries that help us do what we do. It's always eye-opening for them," Lori Anne said. The supply chain of agriculture, from a farmer's first planted seed up to the product in a consumer's hand, is a long journey, and the Carrs are excited to have Clemson University's Creative Inquiry students join them along the way.

The Carr Family is quick to point out that being involved with other universities and industries is unlike the collaboration with the Creative Inquiry program—it is one of a kind. "This is why we spend as much time and energy

at Clemson as we do. It's about the experiences, giving back, paying it forward and providing opportunities that students wouldn't have automatically had," Lori Anne said. "I would encourage anyone to get involved and give to this program. They don't even have to do an endowment, just sponsor a small project. You can bring a problem to them, and you'd be surprised how students take that and run with it," Chalmers said.

by Piper Monk



Chalmers Carr III ('90) and Lori Anne Carr ('90, M'92) pose for a photo at the 2022 Focus on Creative Inquiry Poster Forum.

INSIDE THE HELMET

There is nothing like holding a new born baby. It is hard not to admire their tiny fingers and toes, soft skin and the peach fuzz on top of their fragile head. What makes infant heads so fragile are the “soft spots” know as fontanel—areas where the only barrier between the brain and the outside world is a thin layer of skin. Due to the skull’s malleability, childbirth and infancy can cause deformation which must be corrected before the head is finished growing at 18 months old. The Infant Cranial Remodeling Creative Inquiry project, led by Dr. John DesJardins and graduate student Kyle Walker from the Department of Bioengineering, strives to increase the effectiveness of helmet therapy by determining the minimum amount of pressure required to reshape an infant skull.

It is crucial to identify cranial abnormalities during the first few months of a baby’s life. As bones in the skull grow, they fuse, making it much harder to correct deformities. Significant deformities can prevent the brain from developing properly and lead to permanent damage. “I personally had a cranial remodeling process, and had a helmet as a kid. I didn’t see any research in this field when I started in 2019,” Katie Bender, a senior bioengineering major, said. “The way in which cranial remodeling has changed in the last 20 to 30 years has been very minimal, and part of that is because there’s not a lot of data out there showing exactly what’s going on inside the helmet,” Sarah Johnson, a biomedical engineering graduate student and collaborator, said.

The Creative Inquiry project works with physicians at Prisma Health in Greenville, South Carolina to evaluate the effectiveness of the current cranial remodeling process. The current method designs a helmet in accordance with a desired head shape. Visual marks, such as red spots on infant’s head, indicate if the helmet is applying pressure on the correct places. The Creative Inquiry team is integrating quantitative data with the visual cues in hopes to calculate the lowest amount of pressure needed while using the correctional helmets.

Correctional helmets are made with a hard, plastic outer shell and a soft, plaster-based inner shell. This design permits constant pressure to areas of the skull that do not need to expand while other areas are allowed to grow. A model of each patient’s head and their initial helmet are sent to Clemson University’s Laboratory of Orthopaedic Design and Engineering, where the Creative Inquiry students note points with pressure using sensors. Students then accompany the physician to follow-up appointments and use the sensor data to alter the helmet after each appointment throughout the entire treatment. The team hopes their continuous and meticulous work will help physicians improve infant cranial remodeling in medical facilities around the world.

by Allie Cheves

Correctional Helmets

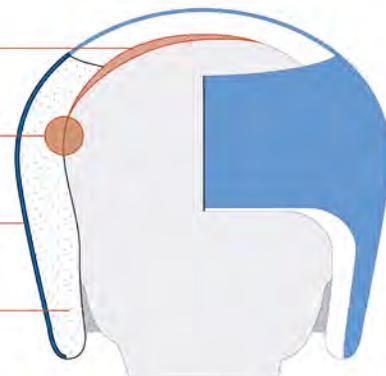
This diagram highlights the important areas of a correctional helmet.

Space into which the skull can grow

Areas of excess pressure

Hard, plastic outer shell

Soft, plaster inner shell



DEBATING RIGHTS IN A PANDEMIC

One of the most significant learning curves first-year law students must overcome is interpreting legal cases and synthesizing the information. The Moot Court Competition Creative Inquiry project, led by Cary Berkeley Kaye from the Department of Philosophy and Religion, was established to prepare undergraduates for these trials and tribulations that lie ahead.

Throughout the year, Kaye mentors the Creative Inquiry students and shapes them into more thorough researchers, confident speakers and critical thinkers. The students prepare arguments and counterarguments for the American Moot Court Association's regional competition. This year it was held on ZOOM™ for the first time, bringing together approximately 500 collegiate teams from across the United States to participate in Supreme Court simulations. From 11 a.m. to 7 p.m., the Clemson team sat at their laptops in Hardin Hall, supporting and refuting claims on a topic very relevant to today's world—vaccines.

Maggie Deas, a senior political science major, explained that this year's competition involved government rights to require vaccines and individual rights to refuse vaccines ahead of a (fictitious) polio pandemic. A coin-toss decided Deas' assignment to argue as the respondent, the United States. "My job was to drive home the simple fact that there are 32.8 million people who are unvaccinated and that they need to be vaccinated so that we can one, protect the economy, and two, protect [ourselves] because polio is highly contagious," Deas said. Jessica Cooper, a senior English major, emphasized that one needs to be quick on their feet and well-prepared to succeed. "Judges will interrupt and ask questions in order to poke holes in what we're trying to say," Cooper said.

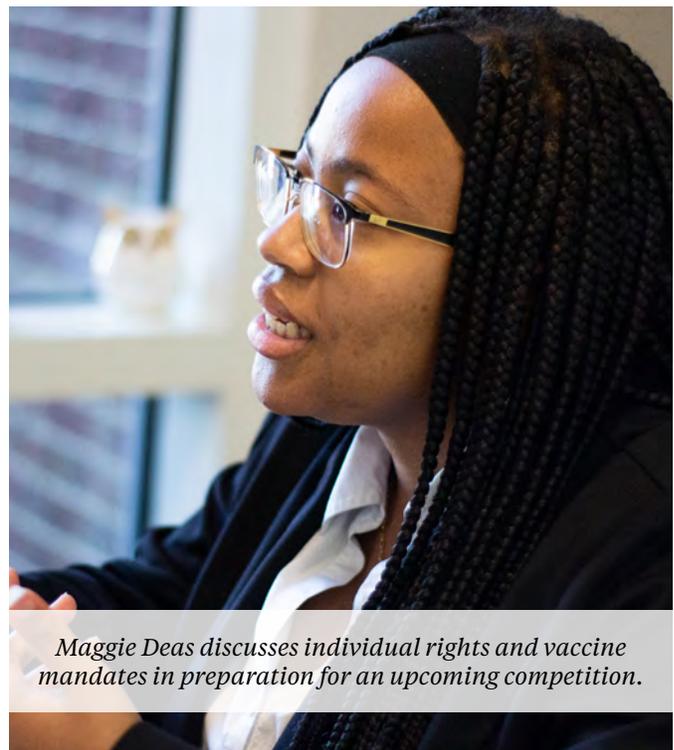
This type of high-pressure situation can be overwhelming to undergraduates but Jason Teets, a senior computer science major, learned that there is more to gain from this experience than winning or losing. "It's about smart decision-making. You don't have to win on every single legal issue because there are some grounds that it makes more sense to concede. Otherwise, it looks like your argument is ridiculous and incompetent," Teets said. Katy Bortz, a junior women's leadership and political science double major, echoed his point. "One of the most valuable lessons from this Creative Inquiry experience is learning to disagree with people and

both parties being able to walk away respecting each other. This is something that's really important for working in the legal field and just life in general," Bortz said.

Following the regional competitions, Teets and Cooper qualified for the American Moot Court Association national competition held in January 2022. Since Cooper graduated in December 2021, Deas competed with Teets in the nationals.

Historically, Kaye takes the Creative Inquiry team to Richmond, Virginia, to attend the American Moot Court Competition and watch federal arguments in person. She looks forward to future in-person competitions which innately show students more career possibilities in the legal field. Knowing the law and holding a Juris Doctor degree can open up a multitude of career paths from consultation to education to government officiation. By introducing students to Moot court prior to pursuing law school, Kaye intends to continue encouraging her students and help them take advantage of these legal studies opportunities.

by Piper Starnes



Maggie Deas discusses individual rights and vaccine mandates in preparation for an upcoming competition.

DANGERS DOWNSTREAM

Controlled burns are critical for healthy forests as they eliminate leaf litter that can contribute to large wildfires, reduce the abundance of invasive species and rejuvenate the forest ecosystem. However, controlled burns, like all forest fires, may also have unanticipated consequences. One such consequence is the release of mercury into the environment. Mercury is a highly toxic heavy metal that is released into the atmosphere largely through the burning of fossil fuels. Once released, gaseous mercury is absorbed by plants, meaning forests store mercury that can be released into the surrounding soil, air and water during a forest fire. However, the amount and ultimate fate of mercury released during controlled burns is still largely unknown, including the degree to which released mercury may bioaccumulate in fish and aquatic insects living in streams that drain burned areas.

Students in the Stream Fish Mercury Dynamics in Managed Forests Creative Inquiry project, led by Dr. Troy Farmer and working closely with Dr. Alex Chow, both in the Department of Forestry and Environmental Conservation, are working at the U.S. Forest Service Santee Experimental Forest north of Charleston, SC to study mercury in fish and aquatic insects following controlled burns. As students trudged through small streams and swamps to collect fish and aquatic insects for the mercury study, they discovered another threat to

the fish—a deadly pathogen moving from fish to fish like wildfire.

A really cool part of this [Creative Inquiry Project] is seeing how interconnected everything is and communicating to people who are not in our major how this can affect everyone's lives.

In the fall of 2021, the team collected fish and aquatic insects to sample for mercury contamination in both control watersheds and those treated with controlled burns. Students collected fish by backpack electrofishing, a process that stuns fish by sending small pulses of electricity through the water. The samples were sent to the University of North Carolina at Greensboro to be analyzed for mercury. While collecting fish, the team noticed sick and dying fish in the treatment watershed that had recently experienced a controlled burn and timber harvesting. Students preserved diseased fish and shipped them to Auburn University where fish pathologist Dr. Tim Bruce confirmed the pathogen was *Aphanomyces invadans*, which threatens fish health in freshwaters along the eastern coast of the United States. This discovery caused the team to pivot their focus to address the presence of this newfound pathogen. Students collected water samples for nutrient analysis and investigated long-term changes in water quality to try and understand how forest management practices may have affected water quality and, subsequently, fish health. Before the next sampling session during spring 2022 the team learned everything they could about *A. invadans*.

During the spring 2022 sampling event, the team returned to sample both treatment and control watersheds. They found no evidence of *A. invadans* during their sampling, but will continue monitoring the sites as they collect samples for the mercury study during 2022 and 2023. Even in a year's time the students have gained a much deeper understanding of how quickly aquatic systems can be affected by disturbances. "A really cool part of this [Creative Inquiry project] is seeing how interconnected everything is and communicating to people who are not in our major how this can affect



The team caught a bluespotted sunfish while sampling.
Photo by Troy Farmer.

everyone's lives," Emily Davidson, a junior biological sciences major, said.

While diseased fish in a low country watershed 242 miles away from Clemson may seem insignificant, the events that occurred in the Santee Experimental Forest provide a chance to better understand linkages between forest management, water quality and fish health. The Creative Inquiry students'

prompt attention to this unexpected development allowed for valuable data to be collected that will advance this goal. Ultimately, knowledge gained from this study may improve the health of fish in watersheds managed for forest products and lead to better quality of water in all of South Carolina, keeping both people and fish healthy and worry-free.

by Allie Cheves



Students use dip nets and an electrofishing backpack to sample for aquatic insects and fish in the U.S. Forest Service Santee Experimental Forest. Photo by Troy Farmer.

TUPPERWARE® OPTIMIZATION

Since the company's inception in 1946, Tupperware® has been renowned for its innovative plastic kitchenware design and production. Their signature products come in all shapes and sizes, allowing food to be stored, stacked and kept fresh within lightweight, seal-tight containers. Today, Tupperware® is continuing to revolutionize houseware with the help of Clemson students in the Tupperware® Corporate Creative Inquiry project. Led by Dr. Mark Krystofik, from the Watt Family Innovation Center, the team identified three focus areas within Tupperware® factories to optimize the current production and operations models.

In order to introduce the team to the company and to the project, they visited the Tupperware® U.S., Inc. facility located in Hemingway, South Carolina. Since 1976, this tiny rural town has been the site of the only Tupperware® manufacturing and distribution center in the United States. During the visit, they toured the factory and spoke with the plant's leadership about goals for the year. Krystofik, with more than 20 years of experience in the manufacturing and sustainability sectors, has been to numerous factories, and still, Tupperware® stands out. "No one is as advanced as Tupperware® for the molding of products. However, like all companies looking to grow, they realize there are

opportunities to improve other aspects of their operations" he said.

After their visit, the students defined three projects to optimize production and operation models at the Tupperware® factory. The first focused on the workstation design. The model allowed for easier and more efficient assembly production. "I don't want [the assembly workers] to bend over and pick up heavy stuff a bunch of times, so this project is looking to improve material handling, placement of the items that are used, process steps, [workstation] lighting, anti-fatigue matting for reducing injuries and reach positioning," Chase Harrison, a senior industrial engineering major, said. The second developed an automatic process to weigh products which will identify potential defects earlier in the production process and therefore save product material. The third project focused on the elimination of unnecessary transportation and a decrease in movement to complete tasks within the factory which can potentially save the company materials and money.

To ensure that the best interests of Tupperware® were met, Josh Burgess, a junior finance major, worked to ensure that the models met the financial needs of the company.



The Tupperware® Corporate Creative Inquiry team at the Tupperware® U.S., Inc. facility in Hemingway, South Carolina. Photo by Rey Biaco.

“We’re determining how long it takes to get a potential investment paid back to [the company] in terms of sales, product, inventory, or whatever else it may be. The biggest question is to what degree is that decision worth,” Burgess said. Given that much of this Corporate Creative Inquiry project’s details are confidential, he emphasized that communication between all parties was critical. “The flow of information can be tricky sometimes. When you receive one piece of information, it ends up being a little bit different somewhere down the road, [and that changes] the way you need to approach the overall problem,” Burgess said.

The concept of this project is to start small. If our solutions work here, then they could be implemented at other Tupperware® locations.

The team visited the Hemingway plant again in February and they were proud to see some of their ideas already applied to the facility operations. “The concept of this project is to start small. If our solutions work here [in Hemingway], then they could be implemented at other Tupperware® locations,” James ‘Ben’ Case, a senior industrial engineering major, said. The team hopes the small start will build to be a large benefit to Tupperware®.

by Piper Starnes



Tupperware®

Cascading Containers

One model of container tested by the Creative Inquiry team.

RECIPE ROAD TRIP

Food is a big part of a region's culture and identity. It even has the power to bring people together. The Bundling Food, Nutrition and Packaging Sciences Creative Inquiry project, led by Dr. Margaret Condrasky does just that by focusing on community nutrition and recipe development in order to build a healthier future for the youth of South Carolina.

For six years, the Creative Inquiry team has worked closely with the Clemson Free Clinic Rx and Supplemental Nutrition Assistance Program Education (SNAP-Ed) partners to host the Healthy Habits Cooking Camp, serving K-12 students within the Clemson University Cooperative Extension 4-H Youth Development program. This year, the team developed recipes from five geographic regions of the United States to be featured in this summer's recipe book. "We're trying to find healthier takes on classic recipes to give the kids a culture lesson, and show them what local recipes they would find if they lived there," Olivia Towey, a junior food science major, said.

It takes several weeks to revamp a recipe that not only tastes good, but also meets nutrition criteria. The Creative Inquiry team's goal is to reduce sugar, fat and salt while incorporating

lesser-known vegetables such as whippoorwill peas, heirloom lettuce and Hayman sweet potatoes. "Hopefully, if the kids make [our recipes], they'll eat it, go home and tell their parents about it, and maybe slowly change some of the ingredients and the menus of the home in the south," Condrasky said. Meal by meal, the Creative Inquiry team encourages and empowers young students to cook and eat healthy while exploring the great flavors and traditions of food across the United States.

by Piper Starnes

We're trying to find healthier takes on classic recipes to give the kids a culture lesson, and also show them what local recipes they would find if they lived there.



Meghan McClanahan bakes whitefish as a cheaper, healthier substitute for crab in crab cakes.

SMALL BUSINESS DEVELOPMENT

In the fast-paced business world, many opportunities capitalize on speed. The Small Business Development Center (SBDC) supports economic development by delivering professional, high quality, individualized business advising and technical assistance to existing small businesses and pre-venture entrepreneurs. The Promoting Economic Development through Growing Small Businesses Creative Inquiry project, led by Drs. Jennifer Siemens and Peter Weathers from the Department of Marketing, and Ezgi Akpinar Ferrand, Director of the SBDC, gives students the chance to work with SBDC clientele in upstate South Carolina to quickly address their business needs.

This Creative Inquiry project departs from the typical academic course paradigm—that you have an entire semester to solve a problem and complete a project. Business does not work on a semester timeline. “One of the goals of CI is to expose students to as many different types of businesses and industries as possible,” Weathers said. In the real world, business involves quick thinking, multi-tasking and decision-making skills. Therefore, every 10 to 14 days, the students rotate to collaborate with a different set of business clients. This exposes students to a variety of small business styles and challenges, while acclimating them to the rapid pace of the business environment.

In today’s data-driven world, companies also expect their employees to understand how to interpret and analyze data; thus, this Creative Inquiry team uses current marketing databases to inform product development.

By the end of the Creative Inquiry project, the students become experts at developing various types of reports for clients, such as Custom Market and Business Intelligence Reports, In-Depth Location Analysis and Business Online Presence Audit. Zach Fahnle, a senior marketing major, particularly enjoyed using *Esri* GIS software for mapping and spatial analysis. “You can create a point and then look at various distances around it to get information about the different areas, like demographics, income levels, race, gender, etc. It’s really helpful when you’re trying to go after specific target markets, especially because a lot of these companies are really specialized,” Fahnle said.

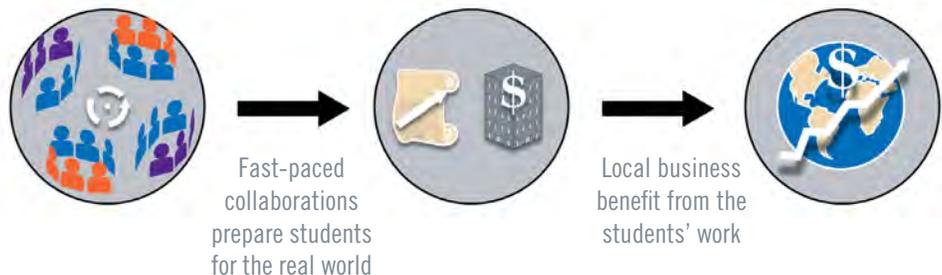
To provide advice and assistance to small businesses, the students must learn about each company, work with them on current projects and observe how each business markets itself and runs operations. Students then access each company’s business plans and competitive intelligence studies to finalize the business analysis that they will present to the company.

While developing this Creative Inquiry project, Weathers recognized the potential value of this experience to graduate students. Future plans are to incorporate this experiential learning into the Department of Marketing’s master’s degree program. This Creative Inquiry project has not only benefitted students, but also local businesses and the university curriculum—it is a win-win-win.

by Rebecca Keneally

Economic Impact

The Promoting Economic Development through Growing Small Businesses Creative Inquiry projects’ structure gives students a glimpse at the real-world marketplace.



ZERO WASTE



Each year, Clemson University’s recycling services team recycles thousands of tons of paper, plastic, glass, metal and cardboard, yet despite these efforts, approximately 3,000 tons of trash are sent to the landfill. The Zero Waste Event Planning for the Sonoco FRESH Summit Creative Inquiry project, led by Dave VanDeventer, Clemson University’s Solid Waste and Recycling Manager, and Dr. Deborah Falta from the Department of Public Health Sciences, is planning and implementing strategies to make the FRESH 2022 Food, Packaging & Sustainability Summit a zero waste event. The team is collaborating with Kristy Pickurel, Marketing and Events Manager for Sonoco FRESH, and Ted Langlois, a sustainability and environmental solutions specialist from WM (previously known as Waste Management) and will execute their plans this fall.

To prepare for the event, the Creative Inquiry team brought together experts from global corporations, Clemson Facilities and Sonoco FRESH to discuss the waste stream and ways to divert waste from landfills. During these discussions, Sonoco FRESH introduced two goals: 1) the

goal of achieving a zero waste event, defined as at least 85% diversion from landfill, and 2) to engage Summit attendees in achieving this goal while also modeling best practices.

Through these conversations and the team’s research, they decided to use Eco Stations at the upcoming FRESH Summit to educate attendees and help them sort their waste. “The Eco Stations will have bins for three waste streams: recycling, compost and landfill. We think it’s very important to also have an educational aspect to encourage people to be mindful of the waste they’re creating and how to best dispose of it,” Mary Werner, a junior packaging sciences major with a sustainability minor, said.

Meeting for the first time in person, the FRESH 2022 Food, Packaging & Sustainability Summit will be held on September 19-21, 2022 at Clemson University. The goal of the conference and the Creative Inquiry team is to pave the way for a safe, secure and sustainable future across the food value chain, with special attention paid to packaging.

by Rebecca Keneally



Students break from planning how to make the Sonoco FRESH Summit a zero waste event.

For more information on the FRESH Food, Packaging & Sustainability Summit, visit www.SonocoFRESHSummit.com

CORPORATE CI



There is no 'typical' Creative Inquiry (CI) project. From the start of the CI program, projects have originated from many diverse sources—including from a professor's research, students' ideas or observations of community or campus needs.

In recent years, businesses have discovered the power of CI to develop talent, to attract interns and employees and to familiarize college students with the workings of their industries.

The Corporate CI program allows industries to engage Clemson's creative, talented undergraduates in industry-relevant research projects. The corporate partner proposes a topic, identifies representatives to work with the student team and supports project expenses.

The results benefit all. Students gain understanding of real-world work topics and opportunities to network with potential future employers. Companies gain visibility on campus, insights into selected project topics and relationships that help recruit interns and employees.

The ideal Corporate CI project involves open-ended topics that can be addressed over two or more semesters of iterative exploration, design, implementation and evaluation cycles. A Clemson faculty member mentors the team. The needs of the project will determine the composition of the student team. Students may be recruited from one or several disciplines.

CI and industry—a natural expansion for the inquisitive minds of Clemson students and a contribution to building the workforce of the future

Read about this year's CCI projects: Tupperware® on page 40, and Sonoco FRESH on page 44.



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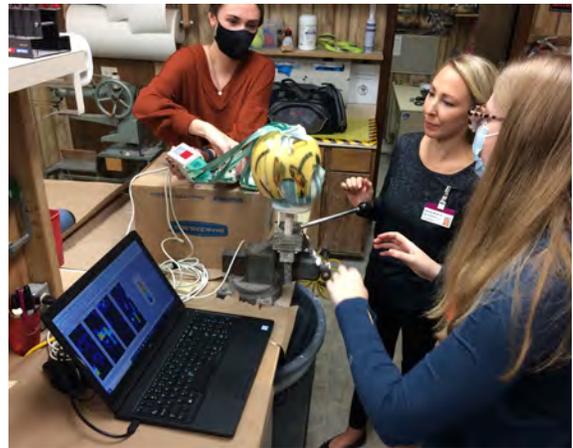
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THE BRADLEY AWARDS FOR MENTORING

The Phil and Mary Bradley Awards for Mentoring in Creative Inquiry are presented each spring in recognition of outstanding work with undergraduate students. Nominations are accepted from undergraduate participants in Creative Inquiry projects. The awards are made possible by an endowment from Phil and Mary Bradley, and consist of a plaque and a salary supplement. Always supporting Clemson, this year the Bradleys endowed the new early childhood education center.



FACULTY AWARD RECIPIENTS:



2022 Faculty Recipient:
Dr. Angela Naimou

- 2022 **Dr. Angela Naimou**, *English*
- 2021 **Dr. Mark Schlautman**, *Environmental Engineering & Earth Sciences*
- 2020 **Dr. Jessica Larsen**, *Chemical & Biomolecular Engineering*
- 2019 **Dr. Anastasia Thyroff**, *Marketing*
- 2018 **Dr. Arelis Moore de Peralta**, *Languages; Youth, Family & Community Studies*
- 2017 **Dr. Vladimir Reukov**, *Bioengineering*
- 2016 **Dr. Michael Sehorn**, *Genetics & Biochemistry*
- 2015 **Dr. Michael Childress**, *Biological Sciences*
- 2014 **Dr. Heather Dunn**, *Animal & Veterinary Sciences*
- 2013 **Dr. Marian Kennedy**, *Materials Science & Engineering*
- 2012 **Dr. John DesJardins**, *Bioengineering*
- 2011 **Dr. Delphine Dean**, *Bioengineering*
- 2010 **Dr. June Pilcher**, *Psychology*
- 2009 **Dr. Karen Kemper**, *Public Health Services*
- 2008 **Dr. Susanna Ashton**, *English*
- 2007 **Dr. Mark Charney**, *Performing Arts*



2022 Graduate Student Recipient:
Lauren Stoczynski

GRADUATE STUDENT AWARD RECIPIENTS:

- 2022 **Lauren Stoczynski**, *Biological Sciences*
- 2021 **Kea Payton**, *Biological Sciences*
- 2020 **John Cannaday**, *Wildlife & Fisheries Biology*
- 2019 **Kylie Smith**, *Biological Sciences*
- 2018 **Christopher Mayerl**, *Biological Sciences*
- 2018 **Drew Morris**, *Psychology*
- 2017 **Dotan Shvorin**, *Industrial Engineering*
- 2016 **Alice Brawley**, *Psychology*



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