

## Notes from the Dean:

What a year! Times like this test the mettle of us all. With the pandemic, colleges went online last spring in response to the outbreak of COVID-19, nationally. I am happy to say that, through patience and resolve, our students and professors had a successful semester at USCB. Summer break was devoted to planning and developing strategies that would enable us to be successful given the USC-system schools' commitment to be back in person this fall. We are now more than a month into the fall semester and our COVID numbers are low; there is also no evidence to date of the spread of COVID through the classroom setting. We look forward to finishing the year strong!

The School of Science and Mathematics managed to have a productive year, accomplishing many goals that served to foster the success of already strong programs. The Biology degree program received state approval from the South Carolina Commission on Higher Education for a new Marine Biology program, and we hired a new Marine teacher/scholar to support that program, Mercer Brugler, Ph.D. (See details on him in this issue). Computer Science hired two new faculty members through the NSF-supported MADEinSC grant to support the Computational Science degree and our recent Information Science and Technology degree. We are delighted to welcome Dean Bushey, Ph.D. and W. John Thrasher, Ph.D. Dr. Bushey forged ahead by putting us on track for a new Cybersecurity program, which we hope to start by fall 2021. We have applied to be a Center of Academic Excellence in Cyber Defense. The first stage of that certification is complete—thanks to the efforts of Brian Canada, Ph.D., and Dr. Bushey.

We are looking forward a great spring 2021 semester.

## New Program: **MARINE BIOLOGY**

In our coastal setting and proximity to the Gulf Stream, USCB's Biology department has attracted nationally recognized scholars to the Lowcountry to be an active part of the sciences. This summer, the S.C. Commission on Higher Education approved USCB's new program in Marine Biology that started in the fall semester 2020. While the marine biology program may be new in name, many of our students have been taking course offerings focused on the marine environment. We will graduate our first marine biologists this spring—including our first Beaufort College

Honors College graduate, Ms. Alyssa Pastore. Several students who are taking our new Marine Policy course this fall are changing to the Marine Biology program, and, in one case, a student is considering a career in environmental law. We are excited about getting this program in place. It does seem long overdue given our location in the midst of a natural living laboratory. We have even received our first major gift from a private Beaufort citizen, in part due to the exciting research of our students and their faculty mentors in Marine Biology.

### New Faculty in Marine Biology: **Mercer Brugler, Ph.D., Hired**



Mercer R. Brugler, Ph.D.

Mercer R. Brugler, Ph.D., is the newest addition to the Biology faculty in the Department of Natural Sciences at the University of South Carolina Beaufort. Prior to joining USCB, Dr. Brugler taught at the City University of New York (CUNY), NYU and Columbia University, where he was active in recruiting under-represented minority students into research internships in his deep-sea molecular lab and providing research cruise opportunities to students early in their academic careers. "At sea," Dr. Brugler says, "students get to deploy and operate remotely operated vehicles to collect a variety of marine animals like the corals, anemones and sponges that I research. Once back in the lab, I teach them how to gather and analyze their DNA sequences to discover potentially new

species. If a new species is discovered, they get to name it and publish a paper describing it."

Much of Dr. Brugler's research revolves around the molecular diversity in the Cnidaria, those soft-bodied invertebrates with stinging cells, called cnidae. This summer, Dr. Brugler joined with several colleagues in addressing the question of the future of the current decline in coral diversity due to ocean acidification in a scholarly article in *Nature Ecology and Evolution*, a prestigious international journal.

The article, *Paleoclimate ocean conditions shaped the evolution of corals and their skeletons through deep time* (published on Aug. 30, 2020), combines genomic analysis and paleontology to understand patterns of adaptations in stony corals and their relatives following previous mass extinctions in Earth's history. The study found that non-carbonate and deep-water anthozoans (corals, anemones and their relatives) filled the gaps left in the wake of extinctions of tropical stony corals caused by paleo-ecologic ocean acidification and warming temperatures. Dr. Brugler noted, "Anthozoans are an ancient group of animals that have experienced strong ocean chemical and temperature shifts during the last approximately 750 million years. The major take-home message from this study is that anthozoans will persist through the impending shifts in global climate."

"We are absolutely delighted to welcome Dr. Brugler to our department as an Associate Professor of Marine Biology," says Joe Staton, Ph.D., dean of science and mathematics at the university. "I was happy we were able to recruit Dr. Brugler to an already strong faculty focused on marine research. He brings new facets to our diverse faculty that will enhance the new undergraduate program in Marine Biology that started this fall."

# USCB Biology Student Lincoln Fuller Embarked on OCEARCH's Massachusetts Expedition



Lincoln Fuller onboard the OCEARCH vessel, processing samples from skins of live sharks.

In August, Lincoln Fuller, a USCB senior in Biology from Hilton Head Island, embarked on a remarkable research expedition by spending two weeks as a guest investigator collecting bacterial samples from live sharks with the OCEARCH team in Massachusetts. The science nonprofit OCEARCH invited Lincoln to join a team of scientists and master fishermen who are collecting data about the health, reproduction and migratory patterns of North Atlantic White Sharks. Supporting 20 individual research projects, 33 scientists and 21 institutions, the expedition left port Aug. 5 to ply the federal waters around Massachusetts. The expedition ended Aug. 20.

Kimberly Ritchie, Ph.D., helped design OCEARCH's protocol to keep this expedition COVID-safe. All participants were tested and OCEARCH departed with fewer participants to minimize the risk of virus transmission. Lincoln trained on COVID protocols, biological principles, and boat safety all summer to prepare for the experience.

Data and findings collected by OCEARCH are open-source for use in public safety programs. Researchers on the expedition focused on the population genetics of white sharks, antibiotic-producing bacteria associated with white sharks, and other topics.

## Two Faculty Hires in Computer Science

After multiple searches, USCB's Computer Science department succeeded in hiring two professors to enhance the teaching in the Computational Science and new Information Science and Technology degree programs, as well as the Master's Program in Computer Science that just received final accreditation approval from the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). USCB was able to hire two new faculty with the support of funding from the MADEinSC infrastructure improvement grant that brought \$20 million to South Carolina's participating universities from the National Science Foundation.



Dean Bushey, Ph.D.,

**Dean Bushey, Ph.D.**, tenure-track associate professor of Computational Science, joins the department with more than 30 years of experience across academia, the military and industry. A retired colonel in the U.S. Air Force, Dr. Bushey previously served on the faculty at Florida Polytechnic University, the U.S. Air Force Academy, and at Duke University. His research emphasis is on unmanned systems and self-driving vehicle technologies, blending computer programming, software engineering, and electrical engineering.

Dr. Bushey's work in Florida included consulting with the Jacksonville Transportation Authority to develop an autonomous Public Transportation System and developing a 400-acre autonomous vehicle testing center. Dr. Bushey is helping us to develop a program in cybersecurity we hope to launch next fall.



Also joining the department is **William (John) Thrasher III, Ph.D.**, tenure-track assistant professor of Computational Science. Dr. Thrasher recently completed his Ph.D. in Computer Science at Florida State University. His dissertation research focused on random walk-based Monte Carlo methods to create refinements to the solution of the Poisson-Boltzmann equation, which is widely used in materials science and engineering. Additionally, Dr. Thrasher has an interest in exploring random number generators and high-performance computing research.



William (John) Thrasher III, Ph.D.

Dr. Thrasher took an uncommon path to the field of computer science, having previously earned a master's degree in demography. In his studies of demography, he focused on an aspect of the "Hispanic paradox," which describes the epidemiological finding that Hispanic and Latino-Americans often have mortality rates that are comparable to non-Hispanic whites, despite having lower average socioeconomic status indicators.

## USCB Visits May River HS to Share Research in Chick Development

On Friday, March 13, 2020, Jena Chojnowski, Ph.D., Kelley Tollison, a USCB Biology senior, and Liz Iglesias, a senior at May River High School who is interning with Dr. Chojnowski, arrived at May River's AP Biology class to present a video and lead a group activity on fertilized chicken eggs. Kelley and Liz presented their progress on developing chicken embryos without their shells in a 3-D printed incubator they engineered with Dr. Chojnowski's mentorship. The AP Biology students were able to brainstorm in small groups to engineer their own shell-less incubators and provide valuable feedback to the experiment. The highlight for the May River students was dissecting their own fertilized chicken eggs and learning about chicken development firsthand. Hands-on experience is important for young scientists to understand the value science provides to our lives.



Kelley Tollison with May River students.



Liz Iglesias leading fellow May River students.



L to R: Dr. Jena Chojnowski, Ms. Elizabeth Rockwell (May River teacher), Kelley Tollison (USCB student), and Liz Iglesias (May River student).

## USCB Students Lead Beaufort Middle Students in Spartina Project.

Dillon Hall and Drew Boutlier participated in an outreach and education experience with Beaufort Middle School's seventh graders this past spring (pre-COVID) with Ms. Kathryn Madden, the faculty mentor. In partnership with South Carolina Sea Grant and the South Carolina Department of Natural Resources National Estuarine Research Reserve (DNR NEER) Seeds to Shoreline program, our two



Emily Welles and Dillon Hall collecting *Spartina* seed around Open Land Trust, Lemon Island.

USCB Secondary Teacher Education Biology majors germinated hundreds of *Spartina cordgrass* (now named *Sporobolus alterniflorus*) seed in the USCB greenhouse. The germination project was part of their own independent research exploring stormwater impact on germination of saltmarsh plants. After the germination process, the entire seventh grade at BMS helped the USCB team transplant the new spouts into larger individual containers. Dillon and Drew explained to the students the importance of saltmarsh plant species and restoration efforts to conserve our beautiful waterways. As part of their seventh-grade science class, the Beaufort Middle schoolers monitored plant growth over time. The Seeds to Shoreline program encourages classrooms of students all over South Carolina to germinate and plant marsh grass, which dominates our saltmarshes, to aid in restoration efforts.



Drew and Dillon with BMS seventh grade, transplanting germinates of *Spartina* into large pots for long-term growth studies.

Also, a huge thanks to Ms. Debra Staub, the teacher, and her amazing seventh-grade students for collaborating with the USCB team.

Thanks to Emily Welles, USCB Biology Honors, who helped collect seed and to Beaufort Open Land Trust and Spring Island Trust for allowing us access into areas for seed collection.



Ms. Kathryn Madden collecting seed via boat in the saltmarsh around Chechessee Creek.

# Alex Jonguitud at Johns Hopkins



Mr. Alex Jonguitud (USCB Biology 2020) worked as Dr. Kim Ritchie's research assistant to isolate novel microbes with antibiotic properties from the skin of great white sharks. This fall, Alex joined a Mentor-funded PREP Scholar program at **Johns Hopkins School of Medicine** in Baltimore, Md., where he works with program director Kathy Wilson in the university's Cell Biology department. Alex plans to pursue an M.D.-Ph.D. His biomedical research experience at Johns Hopkins will help him construct the foundation he needs to gain acceptance into a M.D.-Ph.D. program.

"I chose to apply to Johns Hopkins NIH PREP because Johns Hopkins is known for its cutting-edge research and major contributions to science," he said. His time with Dr. Ritchie influenced him greatly. "I was taught to have patience with science because no amount of time can promise positive results."

Alex wants to become a doctor and research scientist to improve treatments for diseases that disproportionately affect patients in underserved communities. When he's not busy in the lab at Johns Hopkins, Alex is studying for the MCAT and enjoying exploring Baltimore.

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## Recent publications from the **SCHOOL of SCIENCE and MATHEMATICS:**

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### **PUBLICATIONS:**

**D'Antonio, EL** and Pierce, JG. 2020. One-step synthesis of phosphate-based inhibitors and applications thereof. U.S. Patent Application No. US 17/005,917.

Horowitz, J, **Brugler, MR**, BRIDGE, T and Cowman, PF. 2020. Morphological and molecular description of a new genus and species of black coral (Cnidaria: Anthozoa: Hexacorallia: Antipatharia: Antipathidae: Blastopathes) from Papua New Guinea. *Zootaxa*, 4821(3), pp.553-569.

**Monczak, A, McKinney, B, Mueller, C and Montie, EW**. 2020. What's all that racket! Soundscapes, phenology, and biodiversity in estuaries. *PLoS one*, 15(9), p.e0236874.

**Mueller, C, Monczak, A, Soueidan, J, McKinney, B, Smott, S, Mills, T, Ji, Y and Montie, EW**. 2020. Sound characterization and fine-scale spatial mapping of an estuarine soundscape in the southeastern USA. *Marine Ecology Progress Series*, 645, pp.1-23.

Opresko, DM, Goldman, SL, Johnson, R, Parra, K, Nuttall, M, Schmahl, GP and **Brugler, MR**. 2020. Morphological and molecular characterization of a new species of black coral from Elvers Bank, north-western Gulf of Mexico (Cnidaria: Anthozoa: Hexacorallia: Antipatharia: Aphanipathidae: Distichopathes). *Journal of the Marine Biological Association of the United Kingdom*, 100(4), pp.559-566.

Quattrini, AM, Rodríguez, E, Faircloth, BC, Cowman, PF, **Brugler, MR**, Farfan, GA, Hellberg, ME, Kitahara, MV, Morrison, CL, Paz-García, DA, Reimer, JD & McFadden, CS. Palaeoclimate ocean conditions shaped the evolution of corals and their skeletons through deep time. *Nature Ecology & Evolution* (2020). <https://doi.org/10.1038/s41559-020-01291-1>

**Ritchie, KB**. 2020. Review of "Ocean Outbreak: Confronting the Rising Tide of Marine Disease" *The Quarterly Review of Biology* Vol. 95, PP260-261.

Roitman, S, Lopez-Londono, T, Pollock, FJ, **Ritchie, KB**, Galindo-Martínez, CT, Gómez-Campo, K, González-Guerrero, LA, Pizarro, V, López-Victoria, M, Iglesias-Prieto, R, Medina, M. 2020. Surviving marginalized reefs: assessing the implications of the microbiome on coral physiology and survivorship. *Coral Reefs*, 39(3), pp.795-807.

**Staton JL, Canada BA, Borgianini SA**, Barkel KL. 2020. "Colonization of coastal and estuarine environments," in G. Poole & M. Thiel, eds., *The Natural History of Crustacea*, New York: Oxford University Press 2020.

**Thrasher, W. J.**, & Mascagni, M. 2020. Examining sharp restart in a Monte Carlo method for the linearized Poisson-Boltzmann equation. *Monte Carlo Methods and Applications*, 26(3), 223-244.

Thomas, D.M., Sturdivant, R., Dhurandhar, N.V., **Debroy, S.** and Clark, N. 2020. A Primer on COVID-19 Mathematical Models. *Obesity*, 28: 1375-1377. doi:10.1002/oby.22881

**Zhang, X**, Wu Y, Huang L, Ji H and Cao G. 1999. "Expertise-Aware Truth Analysis and Task Allocation in Mobile Crowdsourcing," in *IEEE Transactions on Mobile Computing*, doi: 10.1109/TMC.2019.2955688.

### **PRESENTATIONS:**

**Ahmed, K.** "Simulation of Auction Mechanism Model for Energy-Efficient High Performance Computing", 2020 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation (PADS), Miami, FL, June 15-17, 2020

**Brugler, MR.** "Molecular & morphological mysteries of black corals." Department of Ecology, Evolution & Environmental Biology (E3B), Columbia University; October 6, 2020

**Zhang, X.** "PeerCloud: Enhancing Mobile Cloud with Social-Aware Device-to-Device Offloading" at The 1st IEEE International Workshop on Advances in Fog/Edge Computing at the 29th International Conference on Computer Communications and Networks, 2020.

### **GRANTS:**

**Ahmed, K.** 2020. Advanced Support for Innovative Research Excellence (ASPIRE) award, "Power Capping Allocation for Energy-Efficient High Performance Computing."

**Montie, E.** 2020. Spring Island Trust grant for "Investigating Historical Trends of Salinity and Fecal Coliform Levels in Beaufort County from SCDHEC Datasets."

**Montie, E.** 2020. NOAA IOOS grant for "Demonstrating an Estuarine Soundscape Observatory Network in the Southeast: Understanding baseline rhythms of biological sounds and correlations to traditional biodiversity measurements to support long-term sustainable monitoring."

(**bold** indicates USCB author)