USCB
UNIVERSITY OF SOUTH CAROLINA BEAUFORT

USCB SCHOOL OF
SCIENCE & MATHEMATICS
NEWSLETTER

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Notes from the Dean:

It has been a year since the pandemic forced American colleges to go virtual. With careful planning, we were able to return to classes with modified face-to-face instruction and reduced classroom capacities. This spring, we start on-campus COVID-19 testing. We are also employing exciting new technologies to begin monitoring for possible campus outbreaks (see USCB Wastewater Testing). With less than two months left in the spring semester, our COVID-19 numbers remain low; there is still no evidence of the spread of COVID-19 in the classroom setting. We have seen some decreases in enrollments, but nothing like many of the private and public schools that chose to remain virtual at the start of this academic year. For that, we are grateful. Prior to the pandemic's onset last spring, STEM acceptances were at an all-time high. Since then, enrollments declined slightly in the School of Science and Mathematics. This spring, acceptances are even higher and, with vaccinations moving forward at a faster pace, we can hope for a larger freshman class.

The School of Science and Mathematics is having another record-breaking year with faculty pushing forward on many different fronts. The new Cybersecurity program is on its way, with a major grant to help kick start a fall 2021 inaugural year. We are on track for certification as a Center of Academic Excellence in Cyber Defense, and funds from a Department of Defense (DoD) Office of Economic Adjustment grant (see USCB-led Public/Private Partnership) will help launch a multifaceted strategy to make the program a success. We are hopeful that this exciting new program will help recruit students and attract jobs locally to Beaufort.

Alyssa Pastore: *First Honors College Graduate and first in Marine Biology Program*

Alyssa Pastore

This spring, Alyssa Pastore will graduate from USCB's Beaufort Honors College after only three years with the Marine Biology program. She started in the first Beaufort cohort in the fall of 2018. By combining dual-enrollment credit with additional courses in summer sessions, Ms. Pastore finished her degree in only three years. With pandemic restrictions, many of our majors could not seek internships for the summer, so she took extra online coursework, which facilitated her early completion. Ms. Pastore is applying for a summer internship in marine education funded by Sea Grant through the University of Georgia this summer as part of her longer-term goal of securing a position in marine education working with animals. Congratulations, Alyssa!

New Cybersecurity Program Nears Completion

USCB hire Dean Bushey, Ph.D., who started in the fall of 2020, took on immediate oversight of developing the university's new cybersecurity program, which will launch in the fall semester 2021. Cybersecurity has been at the forefront of the news in the last decade with the occurrence of major compromises to personal data from social media to governmental agencies. Most recently, the water treatment facility for the city of Tampa, Fla., was cyberattacked during the weekend of Super Bowl LV in an attempt to poison the city water supply. With the increasing technology present in our everyday lives, the need for more and better-trained professionals in this field to battle these attacks makes cybersecurity a growing-demand college program.

Under the direction of Dr. Bushey, Computer Science, USCB has started a cyber-defense program in the Computational Science and Information Science and Technology majors. The program consists of a multi-course concentration, including courses in Computer Security, Digital Forensics, Cryptography, Cloud Security, Ethical Hacking, and Network Security. These courses will form the backbone of the Computer Science Department's efforts to seek the designation of "Center for Academic Excellence in Cyber Defense (CAE-CD)" accreditation framed by the National Initiative for Cyber Security Education (NICE) and administered by the National Security Agency (NSA). USCB will offer its program within Computational Science in the Computer Science Department, with a link to the associate degree program offered through the Technical College of the Lowcountry. This partnership will allow multiple paths to gain training in this vital area of computer science. USCB and the Technical College of the Lowcountry will share space in the planned cybersecurity laboratory in Beaufort, with the aim of preparing recent high school graduates, residents, and military personnel for opportunities in the expanding and lucrative field of cybersecurity.

USCB Wastewater Testing for SARS-CoV-2

Gabriella Woodrum and Lindsey Moon in the Marine Science Field lab

This March, USCB faculty, in collaboration with USC faculty from the Arnold School of Public Health, will begin testing wastewater effluent from the college sewage out flows. Dr. Daniel "Tye" Pettay is implementing test procedures developed in collaboration with Dr. Sean Norman of the Arnold School to extract genetic material from automated samplers positioned around the Bluffton and Beaufort campuses. The CDC in Atlanta, Ga., funds Dr. Norman's research laboratory. Dr. Pettay and honors student Lindsay Moon traveled to Columbia, S.C., to gain firsthand experience with the sampling and experimental protocols. Biweekly samples from each station have been demonstrated on other campuses to predict COVID-19 outbreaks up to six days prior to individual test results using real-time polymerase chain reaction technology to detect and measure amounts of SARS-CoV-2 viruses (which cause COVID-19) in the sewage outflows.

Recently, Dr. Pettay and Dr. Mercer R. Brugler submitted a USC ASPIRE III grant application to purchase an automated DNA genome sequencer, which can isolate and sequence any different strains of SARS-CoV-2 occurring in the general waste stream of samples from the Beaufort-Jasper Water & Sewer Authority treatment facility. By doing so, we can estimate which of the newer strains of the virus are present locally that may be a threat to citizens in this region of South Carolina.

Lindsey Moon and Tye Pettay program the automated field sampler in the Marine Science lab.

As part of this new initiative, Dr. Pettay's group will join a statewide clearinghouse to help develop a central repository for all COVID-19-associated data in S.C. USCB will be part of a team of researchers from USC, Columbia and Clemson University working on this project.

USCB-led Public/Private Partnership Gains Grant Funding for Cybersecurity Success

Dr. Dean Bushey led a team that applied for a Department of Defense (DoD) Office of Economic Adjustment grant and was awarded $1.3 million to help support USCB's path to attain "Center for Academic Excellence in Cyber Defense (CAE-CD)" accreditation by the NSA. This jointly awarded grant will bring together a public/private partnership that involves USCB, the Technical College of the Lowcountry (TCL), the South Coast Cyber Center of Beaufort (SCCC), the Beaufort Digital Corridor, and the Beaufort Economic Development Corporation, with USCB as the grant leader. Funds from the grant will help support the startup of USCB's new cybersecurity program (faculty and infrastructure), establish partnerships with the Naval Information Warfare Center (NIWC) Atlantic and Army Cyber Command, and develop programs to help connect high school and college students, transitioning service members, and veterans to career opportunities in cybersecurity.

Funding to TCL will help develop their two-year program, with the goal of helping their graduates' transition to USCB to complete a bachelor's in Information Science and Technology emphasizing cybersecurity. The SCCC is a board comprised of local elected officials, retired generals, local business owners, members of the Beaufort Regional Chamber, and others who will work to expand relationships from statewide to regional in scope. The Beaufort Digital Corridor will attract, incubate and accelerate cybersecurity startups in the region. The Beaufort Economic Development Corporation will work on attracting existing cybersecurity firms to the area and support the S.C. Department of Veterans Affairs in its efforts to help transition veterans to programs that would train them in cybersecurity and technology. Each of these entities will receive individual sub-awards from the DoD grant.

We are excited and proud to be at the center of this amazing new opportunity that the team will bring to the region. We hope our success in this endeavor will lead to the overall economic success of Beaufort County; that it will bring sustainable, high-paying careers to our region, helping us to fulfill our mission to respond to regional needs, draw upon regional strengths, and prepare graduates to contribute locally, nationally and internationally.

USCB Faculty at Front Lines of COVID-19 Treatment Research

Dr. Edward D'Antonio and his student researchers are collaborating with biochemists in South America to identify compounds that could serve as innovative drug treatments. The international team's goal is to screen 30,000 compounds against "a critically important target protein" in SARS-CoV-2 to see if they can cripple the protein's function. Dr, D'Antonio and his team of student USCB researchers—Shane Carey and Morgan "Skip" Howard—are spending long hours in the lab, growing and purifying the target protein to create higher yields.

Dr. D'Antonio said after initial testing they will send a large batch of the coronavirus protein to collaborators at Laboratório Nacional de Biociências in Campinas, Brazil, for more screening against the compounds as early as late spring. The Brazilian team can perform automated high-throughput screening (HTS), which can process millions of biological/chemical tests in a short time. Brazilian biochemist Dr. Gustavo F. Mercaldi will conduct the HTS experimentation using sophisticated robotics equipment that is not available at USCB. "We expect to find effective anti-SARS-CoV-2 compounds as new starting points that will advance science," says D'Antonio, project lead and USCB associate professor of biochemistry and structural biology.

"I wanted to use my skills and my talents to take a look at this virus and see if we could find any potential inhibitors that would stop the virus by stopping infection," he added.

D'Antonio raised $25,000 through crowdsourcing and a matching grant from The University of South Carolina, which pledged support at 50 percent. His research outline, titled "Target-Based Drug Discovery for Coronavirus Disease 2019," caught the eye of the Community Foundation of the Lowcountry, which provided an additional $10,000 grant from its Shirley E. Caputo Memorial Fund. "This cutting-edge research could be instrumental in the development of lifesaving COVID-19 treatments," says Dr. Jackie Rosswurm, interim president and CEO of the Community Foundation of the Lowcountry. "We applaud USCB for their work and are thrilled to offer this support."

Dr. Ed D'Antonio and Shane Carey working at USCB to develop new treatments for SARS-CoV-2

Recent publications from the

SCHOOL of SCIENCE and MATHEMATICS:

PUBLICATIONS:

Marian AD, Monczak A, Montie EW. 2021. Long-term passive acoustics to assess spatial and temporal vocalization patterns of Atlantic common bottlenose dolphins (*Tursiops truncatus*) in the May River estuary, South Carolina. Marine Mammal Science (In Press).

Song Z, Salas AK, **Montie E**, Zhang Y, Mooney TA. (2020). Source levels and near-field propagation of snaps emitted by the snapping shrimp *Alpheus heterochaelis* and *Alpheus angulosus* in sound pressure and particle motion. Submitted to ICES *Journal of Marine Science* on 1/15/2021.

Soueidan J, Warren A, Pearson M, **Montie EW**. (2020). A changing estuary: understanding historical patterns of salinity and fecal coliform levels in the May River, SC. Submitted to *Marine Pollution Bulletin* on 11/9/2020.

Green SB, Lanier RJ, Morgan DR, Gracz H, Sherman J, Rodriguez A, and **D'Antonio**, **EL**. Synthesis, biochemical, and biological evaluation of C2 linkage derivatives of amino sugars, inhibitors of glucokinase from *Trypanosoma cruzi (Submitted to Mol. Biochem. Parasitol.)*.

Gonzalez SN, Mills JJ, Maugeri D, Olaya C, Laguera BL, Enders JR, Sherman J, Rodriguez A, Pierce JG, Cazzulo JJ, **D'Antonio EL**.* Design, synthesis, and evaluation of substrate – analogue inhibitors of *Trypanosoma cruzi* ribose 5-phosphate isomerase type B (Submitted to Bioorg. Med. Chem. Lett.).

Lansac-Tôha FM, Bini LM, Heino J, Meira BR, Segovia BT, Pavanelli CS, Bonecker CC, de Deus CP, Benedito E, Alves GM, Manetta GI, Dias JD, Vieira LCG, Rodrigues LC, do Carmo Roberto M, **Brugler MR**, Lemke MJ, Tessler M, DeSalle R, Mormul RP, Amadio S, Lolis SF, Jati S, Siqueira T, Silva WM, Higuti J, Lansac-Tôha FA, Martens K, Velho LFM. 2020. Scale-dependent patterns of metacommunity structuring in aquatic organisms across floodplain systems. *Journal of Biogeography*. https://doi.org/10.1111/jbi.14044.

Gress E, Opresko DM, **Brugler MR**, Wagner D, Eeckhaut, Terrana L. 2020. Widest geographic distribution of a shallow and mesophotic antipatharian coral (Anthozoa: Hexacorallia): Antipathes grandis VERRILL, 1928–confirmed by morphometric and molecular analyses. *Marine Biodiversity Records, 13*(12), pp.1-7.

Quattrini A, DeLeo D, **Brugler MR**. Chapter 11: The Anthozoa, in The Invertebrate Tree of Life, to be published by CRC Taylor & Francis. Editors: Bernd Schierwater & Rob DeSalle. final revisions.

Pettay DT, Gonski SF, Cai WJ, Sommerfield CK, Ullman WJ. 2020. The ebb and flow of protons: A novel approach for the assessment of estuarine and coastal acidification. *Estuarine, Coastal and Shelf Science* 236: 106627.

Osman EO, Suggett DJ, Voolstra CR, **Pettay DT**, Clark DR, Pogoreutz C, Sampayo EM, Warner ME, Smith, DJ. 2020. Coral microbiome composition along the northern Red Sea suggests high plasticity of bacterial and specificity of endosymbiotic dinoflagellate communities. *Microbiome 8*: https://doi.org/10.1186/s40168-019-0776-5.

Banister RB, Schwarz M, Fine M, Muller EM, **Ritchie KB**. (In Revision) Variations in stability among the microbiome of seagrass leaves, roots, and nearby sediments within a natural pH gradient. *Microbial Ecology*

Pollack FJ, Prada C, Lopez-Londono T, Roitman S, Levitan D, Knowlton N, **Ritchie KB**, Iglesias-Preieto R, Medina M. (Submitted) *Orbicella* microbes in an ecological speciation framework: Tradeoffs between performance and robustness in the *Orbicella* species complex. *Proceedings of the Royal Society B*

Tasnim S, Ferguson A, Gordon B, Gordon C, **Ahmed K**, and Mkpong-Ruffin I. A Smart Environment Monitoring Application for Mobile Internet of Things. Lecture Notes in Networks and Systems, vol 182. Springer, Cham. https://doi.org/10.1007/978-3-030-65796-3_21

Zhang X. 2021. Enhancing mobile cloud with social-aware device-to-device offloading. Computer Communications, Volume 168, 15 February 2021, page 1-11, Elsevier. https://www.sciencedirect.com/science/article/abs/pii/S0140366420320260

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PRESENTATIONS:

Ahmed K., "Energy-Efficient Heterogeneous Computing of Parallel Applications via Power Capping," at the 7th International Conference on Computational Science & Computational Intelligence, 2020.

Montie EW. "What's All that Racket! Estuarine Soundscapes in South Carolina" as a Webinar, hosted by the Southeast Coastal Ocean Observing Regional Association (SECOORA). https://secoora.org/webinar-whats-all-that-racket-estuarine-soundscapes-in-south-carolina/; November 2020.

Montie EW. "Diversity and Abundance of Fish Species Occupying Tidal Pools and Creeks in the May River Estuary, South Carolina", hosted by the Port Royal Sound Research Task Force. https://www.portroyalsoundfoundation.org/; November 2020.

Montie EW. "Tracking courtship behavior of estuarine fishes with passive acoustic recorders to estimate reproductive potential and comparisons to young-of-the-year abundance" highlighted by Atlantic State Marine Fisheries Commission; October 2020.

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GRANTS:

D'Antonio EL. (PI), Mercaldi GF (Co-PI). Target-based drug discovery for coronavirus disease 2019. Experiment.com Crowdfunding Campaign Fundraiser, October 2020. (Awarded: $25K).

Montie, EW. NOAA-NERRS Science Collaborative. 2020. ($148,013; Subaward to Montie $20,212). "Listen In: Acoustic Monitoring of Estuarine Communities Facing Ecosystem Change". PI – C. Biggs (UTexas at Austin); CoPI – K. Boswell (FIU), EW Montie (USCB), M Kimball (USC Baruch), R Dunn (USC Baruch), et al. Awarded.

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,"

Ritchie KB. Port Royal Sound Foundation "Beneficial Microbes and Drug Discovery in the Port Royal Sound" $30K

Ritchie KB. Town of Bluffton "Development of a Rapid DNA-based Detection Device to Differentiate Human and Animal Fecal Coliforms. Grant II." $25K

Ritchie KB. EPA/FWC Sub Award "Characterization of the microbiome of corals with Stony Coral Tissue Loss Disease through space and time: antimicrobial activity. $33K of $285K total awarded

Ritchie KB. Private Donor Gift. Antibiotics from Shark Bacteria. 2020-2021. $14K.

Ritchie KB. The Lin and Joe Mix Endowment. Summer Internships in Marine Biology. $50K

USCB authors in **bold.**