THE UNIVERSITY OF VERMONT
COLLEGE OF ARTS AND SCIENCES

# Department of Biology Newsletter Spring 2021

Dear Friends of the Biology Department,

I hope you are all well and still holding up after this long pandemic winter. Hopefully it will not be too much longer before things return to some sense of normalcy! Although it has been a crazy process of setbacks and adjustments, the Biology Department has settled into a routine that may be a lot more socially distanced but is still filled with active research and a whole lot of Biology teaching and learning from the introductory to the graduate level. The transition was surprisingly smooth, and the silver lining is that we are now prepared to deal with any disruption that comes along, with plans for shifting seamlessly from in-person to remote instruction whenever individuals, groups, or the entire university need it. This will undoubtedly be a boon even when COVID-19 is in the rearview, as we think about how best to serve students who might want or need quality distance-learning opportunities in the future.

Our department suffered a heartbreaking loss this past fall, with the unexpected passing of Professor Charles Goodnight, only a year before he was planning to retire and enjoy time with his family and friends. Charles was a brilliant scientist and a kind soul whose laughter and penchant for starting (good-natured) intellectual arguments have been sorely missed by everyone in our department. As the faculty reminisced about him shortly after his passing, we were all surprised to discover that those of us who arrived in our department after Charles had virtually the exact same vivid memory of him: arriving for our job interview and meeting with Charles in his office, where he kept a small whiteboard. When asked about his work, he would turn to the whiteboard and talk excitedly about theoretical evolutionary biology, writing multiple equations in rapid-fire. Needless to say, none of us understood a word of it! While we all worried that we might not get the job, we didn't know that in fact, he was one of the most supportive colleagues we would have in our own careers. You can find a more expansive remembrance of Professor Goodnight on the next page.

There were also a number of notable successes this year. We have embarked on a recent initiative to increase the research opportunities available to students with our teacher-scholar faculty at every stage of their degrees. One way to do this is to convert traditional laboratory courses into inquiry-driven semester projects, where students work as a team on real-life, novel research questions to uncover protein-protein interactions, look for adaptations to a changing climate, or investigate how marine mammals are impacted by ecotourism activities. These courses have dramatically expanded the number of students we can involve in the creative process of scientists, with the publications to prove it! The latest is a new paper published in *Frontiers in Marine Science* with three undergraduate co-authors. The faculty mentor for the course, Prof. Laura May-Collado, has written up a great summary of the work and its findings in this newsletter.

This spring we will be undertaking an important process of self-reflection and reform, in an effort to be an active part of changing the culture and experience of STEM disciplines for traditionally under-represented groups. We have received a curricular-reform grant from the College of Arts and Sciences, matched by funds from our own generous donors, to invite Dr. C. Brandon Ogbunu for a series of workshops on Diversity, Equity and Inclusion in Biology. Dr. Ogbunu was a member of our own department before he moved to Brown University and, most recently, Yale University. He has been a forceful voice advocating for significant cultural change in how we think about, participate in, and teach Biology such that we positively affirm the critical importance of including everyone, fully and equally, in the scientific enterprise. I look forward to sharing with you the fruits of our labors.

Enjoy,
Sara Helms Cahan
Chair, Dept. of Biology

# In Memoriam: Charles J. Goodnight, Professor of Biology (1955-2020)

Charles J. Goodnight, a long-time faculty member in the Department of Biology, passed away unexpectedly in the fall. Dr. Goodnight earned his Ph.D. at one of the most exciting times in the quantitative development of the field of evolutionary biology at the University of Chicago, where cutting edge thinkers debated the nature of quantitative genetics, natural selection, and evolutionary change. He was always attracted to underdog theories. He began his life's work on group selection, the idea that natural selection can promote traits at the level of entire groups in addition to those of individuals, and he contributed significantly to the development of a rigorous theoretical and empirical investigation of this process with research funding from the National Science Foundation. Over the course of his career, he watched as his work contributed to steady and on-going revival of a theory that had been long ignored as "unimportant."

Charles joined the University of Vermont faculty in 1988 as an Assistant Professor, with promotion to Associate Professor in 1994 and Full Professor in 1999. After nomination by colleagues, he was recognized as a University Scholar in 2002-03 for sustained excellence in research, creative, and scholarly activities. He was grateful to UVM for giving him the opportunity to pursue his research interests wherever they led. Through his many years at the university, he taught organismal biology, evolution, biostatistics, philosophy of science, and conservation biology to hundreds of students from the introductory to the graduate level. His quantitative skills were formidable, and he enjoyed both proposing contrarian ideas and delving into the mathematical weeds to ascertain their feasibility and importance.

We at the Department of Biology, along with his colleagues near and far, will miss Charles's kind nature and optimism, his good humor, infectious laugh, and his strong sense of community and fellowship.

# Jim Vigoreaux One of 18 New Fellows Named to ASCB 2020 Cohort

The American Society for Cell Biology (ASCB) has named the 2020 cohort of Fellows, ASCB members selected for their lifetime achievements in advancing cell biology. Eighteen members were chosen for their outstanding contributions to the field of cell biology and to the community of cell biologists through their service to the Society. The ASCB Fellows program is committed to recognizing the breadth and diversity of the Society's membership. Toward this end, Fellows are nominated by their peers or through self-nomination, followed by evaluation and selection by a Fellows Nomination Review Committee. The list of selected Fellow nominees is reviewed and approved by the ASCB Council. The ASCB Fellows were formally recognized at Cell Bio Virtual 2020—An Online ASCB/EMBO Meeting in December.

Dr. Vigoreaux is the Breazzano Family Green and Gold Professor of Biology and currently serves the university as Vice Provost for Faculty Affairs. In being named an ASCB Fellow, he joins two other UVM Biology faculty members as national fellows: Professor Nicholas Gotelli (Ecological Society of America) and Professor Emerita Judith Van Houten (American Association for the Advancement of Science).

# Alumni News

Biology alumnus **Benjamin Grebber** *(pictured right)* is in his final year of medical school at the Robert Larner College of Medicine. Ben graduated from our program in 2017 and was the recipient of the Paul Moody Award. He conducted his honors thesis work in the Ebert lab, where he focused on the role of Protein Kinase A in zebrafish eye development. His thesis work earned him authorship on a publication as an undergraduate student. Ben has been working on COVID-19 research at the University of Vermont Medical Center this last year and is currently applying to Pediatrics Residency programs.

Alumnus **Jon B. González** (*pictured* above) received his BSc in Integrative Biological Sciences (2013) and MSc in Biology (2014) under the mentorship of Dr. Alison Brody and committee members Dr. Jeanne Harris and Dr. Jim Vigoreaux. He recently received his PhD in Plant Pathology and Plant-Microbe Biology at Cornell University in the lab of Dr. B. Gillian Turgeon in August 2020.

Dr. González is currently a tenure-track Assistant Professor of Biology at Nazareth College in Pittsford, NY, and the manager of the Mary Soons McCarty Greenhouse, the college's small greenhouse dedicated to research and public relations. He teaches Plant Biology and Microbiology, among other biology courses. His research program investigates the role of arbuscular mycorrhizal fungi in agriculture and bioremediation and involves students and collaborators at Nazareth.

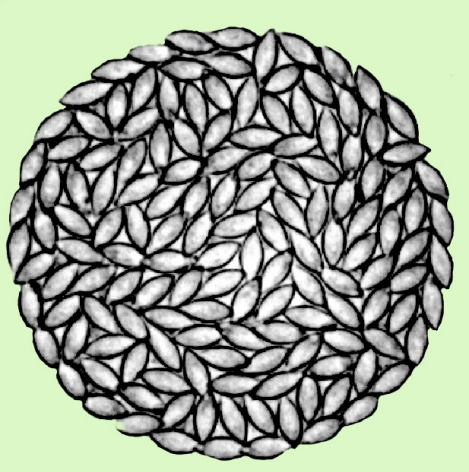
"I am extremely proud of my time at the University of Vermont," he writes. "I cherish the memories and lasting friendships that I have made there." Dr. González can be contacted at jgonzal62@naz.edu and on Twitter @JonFGG.

Recent Biology PhD graduate **Sarah Emerson** published the last chapter of her dissertation in April, "Shootin-1 is required for nervous system development in zebrafish." This paper highlights a role in the developing nervous system for a protein known to be involved in a cell's attachment to a substrate. If this protein is overexpressed, the eyes cannot migrate to the sides of the head and the zebrafish embryos only have one large eye in the center of the face. Other abnormalities are observed in the embryo's peripheral nervous system including motor and sensory neuron patterning defects. Interested parties can find the full text at the following link: https://anatomypubs.onlinelibrary.wiley.com/doi/10.1002/dvdy.194

Dr. Emerson is currently a Postdoctoral Fellow at Yale University in the Colón-Ramos Laboratory where she is working on development of the nervous system in *C. elegans*.

# Alumni News (continued)

Graduate alum **Erin Keller** (MS 2018) has just published a description of a new species of parasite in the prestigious *Journal of Parasitology*. The parasite, in the genus *Monocystis*, infects an invasive earthworm in Vermont. *Monocystis* was the first protist parasite to be described in detail by Jacob Henle (the loop of Henle in the kidney is named for him). Erin developed a new protocol for accurately describing *Monocystis* species, including a gene sequence "barcode" for others to follow. Thus, after more than 150 years of studies on *Monocystis*, we finally have a detailed method for species descriptions useful for biogeography (*Monocystis* has a worldwide distribution in earthwork hosts) and studies on the parasite's life histories. Because the parasite gave Erin so much trouble during her MS research on its life history, she decided to name it *Monocystis perplexa*! Erin is now in the Ph.D. program in virus ecology and evolution at the Washington State University.



*New parasite species* Monocystis perplexa *cysts packed into a sphere called the gametocyst*

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**Emery Hilliard Bresnick**, '84, wrote recently to keep us up to date on his work. Dr. Bresnick's multidisciplinary research, which has been continuously funded by the NIH since 1997, focuses on normal and malignant hematopoiesis and genetic and epigenetic mechanisms. He joined the University of Wisconsin School of Medicine and Public Health in 1994 and is currently Professor of Cell and Regenerative Biology, Affiliate Professor of Medicine (Hematology/Oncology), Founding Director of the UW-Madison Blood Research Program, and Co-Director of the Cancer Genetics Program of the Carbone Comprehensive Cancer Center. He has provided extensive leadership to the NIH and multiple foundations: Chair of the National Institutes of Health Erythrocyte and Leukocyte Biology Study Section; extensive NIH Study Section service; ASH committees: Scientific Affairs, Precision Medicine Task Force, Government Affairs, Training, PhD Task Force; Director of K2R Program; International Society for Experimental Hematology Committees: Board of Directors, Scientific Program, Finance; Leukemia and Lymphoma Society: Career Development Program Grant Review Committee. He serves or has served on Editorial Boards of *Blood*, *J. Biol. Chem.*, *Mol. Cell. Biol.*, *Nucleic Acids Res.*, *Bioessays* and *Blood Science*. Dr. Bresnick has been honored with multiple awards including the Leukemia and Lymphoma Society Scholar, NIH Research Career Development Award, NIH MERIT R37, Shaw Scholar, Romnes, Kellett Mid-Career, WARF professorship (Gary Felsenfeld Professor of Cell and Regenerative Biology) and Gwendolyn and Lowell Smythe endowed professorship. His trainees have been honored with distinguished awards including Herbert Tabor Young Investigator Award, Leukemia and Lymphoma Society Senior Fellow and ASH Scholar Award. He was recently voted to be co-vice-chair and subsequently co -chair of the Red Cell Gordon Research Conference. Dr. Bresnick has made important contributions as an educator, e.g., he developed a course on Fundamentals of Stem Cell and Regenerative Biology, teaches graduate and undergraduate students in Cellular Signaling Mechanisms and taught endocrine pharmacology to medical students for approximately 10 years. He is passionate about training the next-generation of multidisciplinary research scientists/scholars, especially in the field of experimental hematology, and launching them into independent research careers. This is exemplified by the success of his doctoral and postdoctoral trainees, as well as his faculty mentees. Dr. Bresnick is dedicated to building international alliances with collaborators to develop synergistic scientific advances and enhance opportunities for student/postdoctoral training and junior faculty mentoring. His multi-disciplinary fundamental and translational research program in experimental hematology provides ample opportunity for trainees to develop state-of-the-art expertise in critical thinking skills, rigorous experimental analysis and strategies to succeed in independent biomedical research.

QuEST

An integrative Ph.D. program focused on diversity, communication, and applied internships

QuEST (Quantitative and Evolutionary STEM Training Program) welcomed a third cohort of six new PhD trainees for the fall semester of 2020, who joined 22 peers, now comprising 28 trainees across six academic units of UVM. They continue to engage in community building activities, peer-to-peer mentoring, and developing their Interest Group Networks (IGNs), as well as collaborate on research and coordinate their applied internship opportunities with sponsored organizations worldwide.

*New trainee Bailey Kretzler*

First-year orientation and cohort building activities were held all day, Thursday, August 27th, followed by QuEST's annual retreat, including a Diversity, Equity and Inclusion (DEI) workshop and research poster session, on Friday, August 28, 2020.

Dr. Craig Elliott is the Assistant Vice President for Enrollment and Student Services at Samuel Merritt University and has served as President of ACPA College Student Educators International. Dr. Elliott presented a workshop on interconnectedness of DEI issues to STEM graduate education (i.e., recruitment, retention, persistence, and graduation) with a focus on ways that our social identities influence community, relationships, and participate in larger systems of privilege and oppression.

In preparation, all trainees, QuEST leadership, and participating faculty members were asked to watch the following two videos and read the article: Neil Degrasse Tyson – Racism & Sexism in Science, Ibram X. Kendi – Ted Talk on the difference between being "not-racist" and "anti-racist", and White Supremacy Culture by Okun and Jones. Small group sessions for discussion took place in the DEI workshop.

*New trainee George Ni*

Other activities involved trainees thinking about their research, hobby or personal journey through creating a design or 'mandala' that speaks to them prior to the community building session. Research shows activities such as nature mandalas support and provide health benefits when spending time outside in nature. Andy Goldsworthy's work shows us how art can connect us to our inner creativity. By engaging in their own personal expression, trainees took pictures to then share their thoughts and insight about the experience. Many learned how nature influences not only their research but also is a method of self-care, providing an outlet for relieving stress and connecting with others.

*New trainee Gavin Briske*

Additionally, second and third year trainees were given time to each present their research posters and answer questions from peers and faculty members. Several trainees shared the parallels in which their nature mandala connects with their research methods, the journey along the way, and how fluid specific decisions they make directly align with and through their interdisciplinary collaborations of QuEST.

Our weekly QuEST seminar was held during the fall 2020 semester on Fridays from 3:30 – 5:00 p.m. All trainees participated in co-generative learning that strategically combined training elements, built community, and advanced professional development in areas such as IGN meetings, communication workshops, and discussions around interconnectedness between diversity, equity, and inclusion efforts and STEM disciplines.

The overall goal of the seminar is to successfully socialize QuEST trainees to graduate work at the University of Vermont by introducing students to an active and engaged scientific community through guest lectures and discussions. Each semester, the QuEST seminar strives to deliver the learning outcomes that include: 1) Strengthening synthesis and communication skills while focusing on issues and ideas pertinent to quantitative and evolutionary STEM training; 2) Developing an understanding of the interconnectedness of diversity and inclusion issues in STEM disciplines; 3) Forming new IGNs to

# QuEST Program Updates (continued)

incubate and promote peer mentoring; and 4) Fostering a vibrant and supportive community of QuESTees!

We have also enjoyed hosting and interacting with the following guest speakers from outside the University of Vermont:

Dr. Sarah E. Myhre is the founder and Executive Director of the Rowan Institute. Dr. Myhre joined us on October 9, 2020 to discuss justice, equity, diversity and inclusion in STEM, particularly as we faced cultural shifts initiated by the murders of George Floyd, Breonna Taylor, Ahmaud Arbery, among too many more. Sarah also addressed the responses of universities to COVID-19, as well as racism and sexism in STEM.

Dr. Craig Elliott attended the seminar session on October 23, 2020 as a follow up from the annual DEI workshop he led with us in August. Continued discussions were held, emphasizing the actionable and ongoing DEI work we each have, the ways in which we each must implement and dismantle systemic racism in STEM, and how this work is ongoing throughout our education, research and professional collaborations.

Dr. Lorraine Cordeiro is an Associate Professor in the School of Public Health & Health Sciences at University of Massachusetts Amherst. Dr. Cordeiro presented on November 6, 2020 opportunities, challenges and best practices in community-engaged research based on experiences she's gathered throughout her career. More specifically, she shared with us how to promote the development of human capital in multiple communities – university, training programs, and professional and research communities. Key to this effort is recognizing the health, food security, and education disparities in immigrant populations in the US. She also shared the life lessons as a cancer survivor, mother, woman, and faculty of color in STEM, honoring her intersectional identities as super powers.

*New Trainee Liza Morse*

Dr. Lisette E. Torres-Gerald is the Director of the Cooper Center, S-STEM Team member and M.O.S.A.I.C. Advisor at Nebraska Wesleyan University. Dr. Torres-Gerald visited on November 20th and shared her research, approach to advocacy, and expertise in disability issues in higher education as well as the interplay between DEI efforts and science culture in STEM disciplines. Some key areas of focus were the consideration of how disability and its intersections impact representation in STEM and disciplinary research topics/design/impact. Also, she called for increasing awareness of how to advocate for the disability community, oneself and awareness of surroundings as well as how disability impacts one's scholarly identity and career trajectory.

*New Trainee Sarah Morris*

Dr. Heather Tallis is a Lead Scientist at The Nature Conservancy in Yale's Center for Business and the Environment, was hosted by the Actionable Science in Agriculture and Conservation (ASAC) IGN on December 18, 2020. She is the first female lead scientist in the history of The Nature Conservancy to bring human well-being considerations into conservation. QuEST trainees in the ASAC IGN led a wonderful conversation with Dr. Tallis, in which they explored her perspective on making science and research more actionable. The conversation was highly stimulating, and all came away with valuable new context on translating research into action.

Lastly, as we began the 2021 spring semester, the Evolutionary Biology and Genomics IGN hosted Dr. Jeremy Yoder, Assistant Professor in the Department of Biology at California State University Northridge, on February 12, 2021. Dr. Yoder presented a seminar in which he examined the co-evolution of interacting species, particularly mutualists, and present some of his recent research examining the strength of diversifying selection created by species interactions, the ways in which mutualism can promote diversification, and the nature of specialization in a keystone mutualism.

Finally, ten trainees have been working towards initiating applied internship opportunities with non-academic sponsors for the past year. Trainees identified three potential research interests that align as well as complement their dissertation proposal. In working with their participating faculty, the trainees have begun networking

# QuEST Program Update (continued)

*New trainee Paulina Murray*

with potential sponsors to determine availability and the best possible fit to their graduate studies and program timeline. Throughout this process, the trainees have been learning how to navigate university requirements, time management and goal setting, and assessment of potential career opportunities outside of academia.

These ten trainees are now entering the final stages of preparation for their 8-10 week projects which will occur during spring and summer of 2021. Some of the sponsored organizations trainees are considering include: USDA Economic Research Service (ERS), CoopeTarrazú, Costa Rica, USDA National Wildlife Research, The Nature Conservancy, Oak Ridge National Laboratory, Buffalo Red River Watershed District, and others. Expected completion of the internship project is set for August 31, 2021, and the trainees' final presentations will occur during the fall semester of 2021.

For questions, please contact April Berteau, QuEST Program Coordinator, via email at aberteau@uvm.edu.

## PhD Spotlight: Raquel Lima-Cordon

Raquel Lima Cordon recently earned her Biology PhD in Dr. Lori Stevens' lab. Her dissertation addressed studies of the three players of Chagas disease in Central America. The first study highlights the importance of considering local conditions for vector control success. The second study reports a new species of the Chagas vector, named *Triatoma huehuetenanguensis*, and highlights that undescribed vector species represent a challenge to vector and thus disease control strategies. The third study addresses the lack of genetic data on the Chagas parasite in Central and North America, as over 90% of genetic studies focus on South America. Raquel found three major genetic lineages circulating across North and Central America that are distinct from South America, a finding that is fundamental not only for drug development, but to develop accurate diagnostic tools and to understand clinical outcomes of the disease in the region. Two of her dissertation chapters have already been published. The first, entitled "Implementation science: Epidemiology and feeding profiles of the Chagas vector *Triatoma dimidiata* prior to Ecohealth intervention for three locations in Central America," was published in *PLOS Neglected Tropical Diseases* in 2018, and the second, entitled "Description of *Triatoma huehuetenanguensis* sp. n., a potential Chagas disease vector (Hemiptera, Reduviidae, Triatominae)," was published in *Zookeys* in 2019. She recently participated (virtually of course) in an international symposium organized by the National University of Honduras to provide an update of vector borne diseases in Central America focusing in Chagas disease (Image below). Raquel started her postdoctoral fellowship in the lab of Dr. Lori Stevens in January 2021 to keep studying Chagas disease using genome wide technology.

## New Publication: Patrick Mullen

Current Neuroscience graduate student Patrick Mullen recently published another manuscript titled "Neuropathy-associated histidyl-tRNA synthetase variants attenuate protein synthesis *in vitro* and disrupt axon outgrowth in developing zebrafish." This publication highlights human mutations in a gene essential for protein synthesis and their role in Charcot-Marie Tooth peripheral neuropathy. Patrick further explored the role of these mutant variants in the developing zebrafish nervous system. This paper laid the groundwork for further investigation into a zebrafish model of CMT peripheral neuropathy. You can find the full text at this link: https://febs.onlinelibrary.wiley.com/doi/10.1111/febs.15449.

# Grad Jessica Cole Recounts Experience with Teen Science Café

In August 2020, I had the wonderful opportunity to present at UVM's virtual Teen Science Café. The cafés are a way to expose teens and children to some of the research happening in STEM. My presentation focused on my research and highlighted the importance of pollinators, their recent decline and what I am doing to aid pollinator research. The students tuned in and were very engaged with the presentation and questions I posed. I really enjoyed getting to talk to them about the many different species of bees, their foraging behavior, floral preference and pesticide information.


Most of the kids were very aware of how important bees are, as well as the fact that they have been declining for some time. Because of this, they asked very good questions, and I talked a bit more about the specifics of bee decline. I really enjoyed this experience, and I feel that the visiting children did as well. In the future, I plan to continue presenting at these cafés to keep them up to date on my research and hopefully inspire young minds to go into pollinator research as well.

*-Jessica Cole*

# BioCore 195: *Biology in Practice* Reports - Fall 2020

*Life science departments across UVM's campus and medical school maintain weekly or monthly seminar programs that present talks from invited visiting speakers as well as UVM faculty. Through this 1-credit course, undergraduate students choose one of three seminars to attend per week, find and read a journal article by the speaker, and write a short paper of the seminar in the context of the speaker's work.*

My experience in BCOR 195: Biology in Practice during the fall 2020 semester was exceptional. Despite its primarily virtual nature due to pandemic-induced constraints, the allure of this course was not lost. Some of the most fascinating seminars that I attended ranged from the development of computational models for prediction of COVID-19 mutations, to potential links between the microbiome and multiple sclerosis, to experimental conservation practices being employed to mitigate excessive moisture eroding Vermont soils. One lecture on host-switching malaria parasites even helped me realize that the study of zoonotic infectious diseases is an area I would love to pursue post-graduation! Exposure to these seminars provided us with a glimpse into the world of scientific research, elucidating what happens behind the scenes to solve science's most pressing issues. BCOR 195 drastically improved my scientific literacy skills when reading scientific articles written by the presenter prior to the seminar, summarizing key points and sometimes challenging methodologies into one page write-ups, and discussing the research with classmates. My enthusiasm for scientific investigation was strengthened by this course; while research had always been interesting to me, BCOR 195 made me recognize that it is truly an exciting discipline filled with vast opportunities available for any inquisitive mind. Undoubtedly, this is a course I would highly recommend to any biology student looking for an immensely informative and captivating elective!

*-Jackie Johnson*

BCOR 195 was one of my favorite courses last semester. I chose a lot of seminars in neuroscience and psychology. I had always assumed I would find a career in biological research, but after taking this course, I am beginning to consider a career in scientific journalism, which would perfectly combine my love for writing with my interest in all things science. Biology in Practice was offered remotely this fall, but with the regular seminar attendance and the peer-led discussions, this course was a great way to stay connected in an otherwise isolating time. In all, this was an incredibly fun upper-level elective that highlights the general scientific process and encourages an exploration of research outside of one's particular field.

*-Jessica Wright*

# Undergraduate Research Highlight: Jessica Wright

I have been working in the Helms Cahan lab since my sophomore year on a variety of genetics-based experiments. I am now finishing up my senior year, working on my own thesis project analyzing epigenetic inheritance in *Drosophila* after dietary manipulation. My goal is to explore the role epigenetic responses to stress may carry down to unstressed flies. In other words, environmental conditions faced exclusively by a parent might have consequences for subsequent generations that never faced a given stressor themselves. This year, I have done a phenotypic analysis of three generations of *Drosophila* after rearing only the initial generation on a low protein, low sugar diet. There is evidence supporting epigenetic inheritance even after a relatively minor dietary stress, which is a very promising finding (though I have more to analyze before I can share anything conclusive). I hope to get back into lab this spring to investigate gene expression in the three generations of flies to uncover potential pathways guiding this transgenerational inheritance. While the pandemic definitely introduced unexpected obstacles, and greatly decreased the amount of time I could spend in lab, the members of my lab and the Biology Department as a whole were a great help to ensuring my experiment was completed this fall. The cooperation within the Biology Department made my thesis project possible despite the pandemic, and for that I am very grateful.

# CURE News: Course-Based Undergraduate Research Experience

We are very excited that our manuscript on how the impact of boat traffic on dolphin communication was published in February! Bottlenose dolphins' signature whistles are key in social communication, conveying information about conspecifics and the environment. Their study can help to infer habitat use and identify areas of concern due to human activities. In this study, UVM students Rebecca Daw, Brennan Paradee, and Emma Gimbrere, along with Panamanian graduate student Bertzi Perez and myself analyzed 148 hours of recordings to study the whistles of bottlenose dolphins in two sites of the archipelago of Bocas del Toro, Panama, that contrast in boat traffic.

The backbone of this manuscript is built from a collection of CURE projects developed independently by these UVM students and Betzi's Ph.D. research project. In this study, we found that dolphin signature whistle modulation increased significantly with boat presence in both sites, but changes in modulation were greater in Dolphin Bay, where tour-boats directly and sometimes aggressively interact with the animals. These results support a potential association between whistle modulation and stress (or alertness). Our results also highlight mitigation strategies that can be taken to minimize the impact of tour boats.

Original research article: Betzi Perez-Ortega, Rebecca Daw, Brennan Paradee, Emma Gimbrere, and Laura J. May-Collado. 2021. Dolphin-Watching Boats Affect Whistle Frequency Modulation in Bottlenose Dolphins Front. Mar. Sci., 17 February 2021. https://doi.org/10.3389/fmars.2021.618420

*-Laura May-Collado*

# Lab Classes Adjust to COVID Protocols

Wondering how laboratory classes in the Biology Department have been conducted in "The Time of COVID?" For Principles of Biology (BIOL 001 and 002), this is what we did:

The first issue to be addressed was the need to have less than a full class (typically 20 students) in the lab rooms at a time. Since we already conduct approximately 20 lab sections a week, there was no room in the schedule to insert more sections with fewer students. Our lab classes have traditionally been 3-hour blocks, so to accommodate, each lab section was split into two 1.5-hour long classes, with half as many students in each. This meant that we had plenty of room in the labs to accommodate social distancing rules. Additionally, we installed some Plexiglas barriers on the lab benches, of course!

Shortened lab times meant that changes in the lab activities was required as well. Typically, we would have had graduate teaching assistants (GTAs) spend upwards of 30-45 minutes introducing the lab topic, materials, and methods for that week's activities. Instead, videos were made for each lab week that covered this introductory information in detail. Students were expected to review the documents and videos provided for each week ahead of time so that they could be expected to come into the lab knowing what to do without much lecturing from the GTAs. In lab, GTAs would only cover a few important details, and then let the students dive right into the hands-on activities while providing individual support.

While we were able to conduct essentially the same experiments as before, the actual activities were streamlined as needed to ensure that everything could be completed (at least, we hoped) in the time allowed.

These changes did mean that there were no lab groups, as everyone worked individually. It also meant students spent more time in self-directed learning, reading and watching videos. As you might expect, these changes worked quite well for some students, and less so for others.

Another change we implemented was a near-complete transition to paperless: all assignments and quizzes were turned in electronically via BlackBoard. While this makes for very good record keeping, many GTAs remarked that they missed the ability to use "The Red Pen" and quickly comment on papers.

I think it is possible that some of the changes that were forced into existence last semester may find a lasting place in the laboratory experience. For instance, the informational videos provided an easy way for students to revisit materials both during lab (review procedures) and at home while completing assignments. However, the teaching experience for GTAs was significantly reduced with less time devoted to lecturing and leading discussions. As you might expect, that was a disappointment for some, and just fine for others!

*-Nathaniel Merrill*

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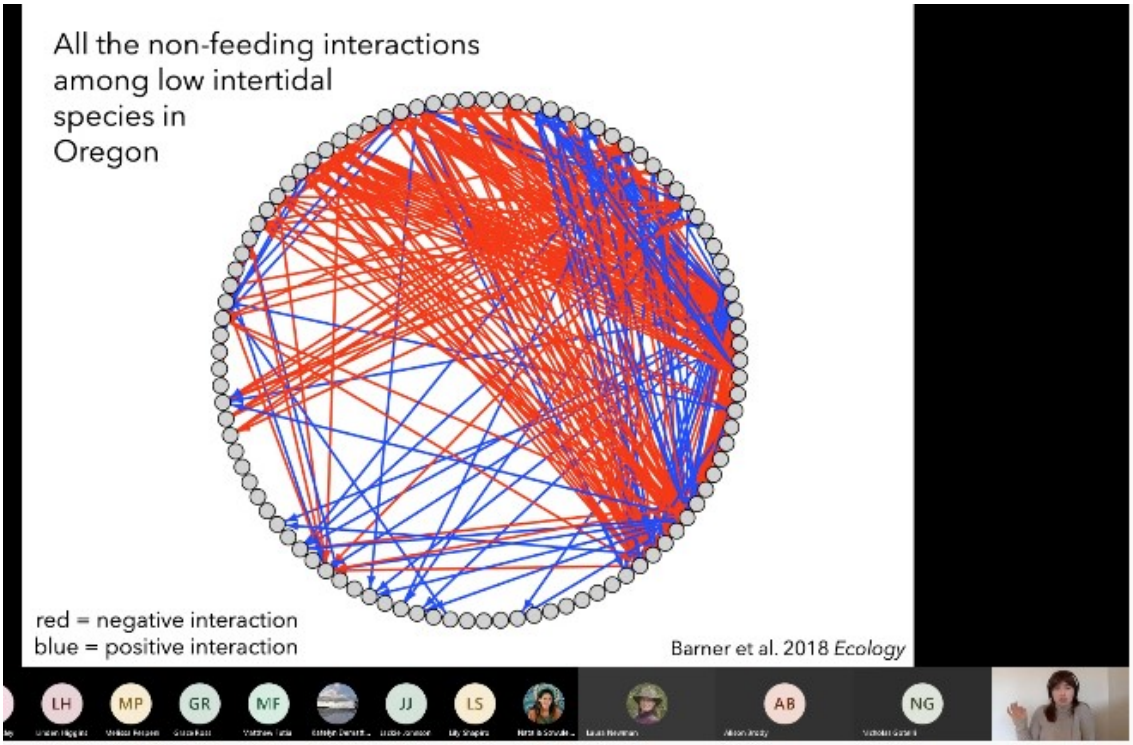


*Dr. Allison Barner (lower right) of Colby College gives her virtual seminar "Combining experimental and computational approaches to species interactions" in October 2020.*

*Our seminar series has proceeded as usual this year but has moved all-virtual, ensuring that our students can continue to learn from a variety of scientists both within and outside of the university community in a safe, socially distanced manner.*

# Grad Students Organize Social Events Aimed at Keeping Connected

There's no doubt 2020 brought many struggles that impacted all of us. Fortunately, we can reflect and grow from these challenges to improve ourselves and the relationships we have with those around us. Following a discussion on how we can improve our department by promoting diversity and inclusion, an eager group of graduate students started a committee to organize social events with the goal of strengthening our sense of community. This has been a challenge given restrictions imposed for COVID-19, but the committee came up with clever ways to keep the department (virtually) connected.

*Pumpkin carving submitted by Dr. Laura May-Collado's lab (Emma Gagne)*

The first event was a virtual pumpkin carving contest. There were many great submissions, but the winner for the best carving was a fish cut-out done by 2nd year PhD student Matt Futia. Voting was open to all grad students, faculty, and staff, and the winner was awarded a $20 gift card to a local business.


*Thanksgiving tree on display in Marsh Life Science Building (Caroline Dumas)*

The second event acknowledged gratitude in science. Even in the craziest of years, there is still so much to be thankful for. For this event, members of the department reflected on the year and shared what they are thankful for. Responses were visually displayed in the Marsh Life Science Building as a Thanksgiving Tree. For those staying at home, a virtual video was made to share the tree in a safe and socially distant way (https://streaming.uvm.edu/media/videos/29586/university-of-vermont-biology-thanksgiving-gratitude-in-science/).

*Pumpkin carving submitted by Matt Futia (Matt Futia)*

Lastly, while we were sad to miss our usual holiday potluck, the first-ever virtual holiday cookbook was put together for everyone to share their favorite holiday recipes (https://tsoleary.github.io/bio_cookbookdown/). The cookbook provided an opportunity for members of the department to get to know each other a little better by including meaningful stories behind our favorite recipes and also try delicious new dishes.

*Pumpkin carvings submitted by Steve Fortucci & Helaina Stergas (Helaina Stergas)*

Thank you to everyone who participated in these events!

*-Matt Futia*

*Members of the Biology Social Committee:*
*Hannah Boyd*
*Caroline Dumas*
*Matt Futia*
*Jackie Guillemin*
*Thomas O'Leary*
*Helaina Stergas*

# Karen Duncan Awarded CAS Award for Superior Staff Performance

At a recent College of Arts and Sciences staff meeting, Biology Business Manager Karen Duncan was named the 2020 recipient of the CAS Award for Superior Administrative Performance. With the support of many faculty and staff members, Chair Sara Helms Cahan nominated Karen for this honor, writing, "Karen has been an unfailing leader, as our department has navigated the many unprecedented challenges we have faced this year. I honestly do not know how we would have survived without her knowledge, unflappable resilience, and problem-solving attitude."

Karen joined the Department of Biology in 2014, where she oversees the general department budget, manages over $7M in research grant dollars, oversees most of the administrative and laboratory staff, and serves as the primary liaison to the CAS Business Office. In addition, many of the building coordination and front office duties have fallen to her in the wake of the university's COVID-related hiring freeze.

"Karen exemplifies the level of professionalism and service that UVM wants to see in all staff," one faculty member commented. "She manages a multitude of very different types of tasks that occur at a range of time scales, and she is ready and willing to help with a smile on her face and good attitude all while steering the ship to keep us afloat in the Biology Department. We are indebted to her service and are successful in large part to her unwavering commitment and supreme work ethic."

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