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Life Line - The Biology Department Newsletter

Biology and Earth Science

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### Life Line March 2020

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# Life Line

Volume 21

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March 2020

## The Department Welcomes Dr. Sinn

Brandon T. Sinn, Ph.D. joined the department of Biology and Earth Science in the fall of 2019. Dr. Sinn earned his B.S. in Biological Sciences at Youngstown State University, and a Ph.D. in Evolution, Ecology, and Organismal Biology from The Ohio State University. Dr. Sinn's dissertation research focused on the influence of flowering plant morphology on speciation, and the evolution of the plastid genome. After earning his Ph.D., Brandon served as a Postdoctoral Researcher in the Pfizer Plant Research Laboratory at the New York Botanical Garden where he contributed to the Planteome project, an

international collaboration to integrate the Plant Ontology and the Gene Ontology. Dr. Sinn then served as a Postdoctoral Fellow at West Virginia University where he worked on conservation genetics, phylogenetics, genome evolution, and transcriptomics in palms and orchids. Dr. Sinn is excited to establish teaching and research programs at Otterbein and introduce students to the worlds of phylogenetics, systematics, comparative genomics, and conservation genetics. He most looks forward to working with students to further develop their appreciation of the myriad facets of biodiversity.



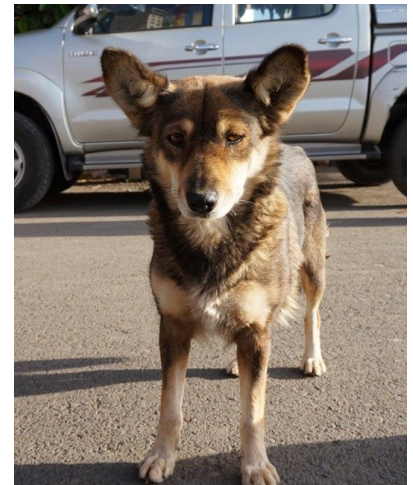
## Modeling to Help with Global Research

What would happen if we accidentally introduced a dangerous pathogen like Foot-and-Mouth Virus into America's food production system? Billions of dollars in damages, millions of culled cattle, sheep, pigs, and/or goats, cessation of trading with our closest international partners, and the absolute destruction of the way of life for thousands of family farms. That's certainly not something we would like to ever see, but with the aid of computer modeling we can plan for these types of disasters before they occur, hopefully minimizing the damage, if they happened. I've

spent many years attempting to answer these challenging issues with modeling.

Using the agent-based modeling program NetLogo, I've been fortunate enough to help aid in research systems around the world without having to do (too) much traveling. It has been an incredibly useful tool for helping others explore their research questions that would otherwise be impossible to answer. How many animals do you need to vaccinate to eliminate a dangerous disease like rabies? How could a cultural system of cattle sharing with your children, like we find in Cameroonian pastoral communities, develop? How might we maximize fish production in an aquatic system as it is altered both by climate change and human management? These are all questions we've tried to tackle and I'm looking forward to helping students become more involved in the future.

Currently, I'm using NetLogo to aid researchers at the University of Florida and the Government of the Galapagos Islands to more efficiently



control free-roaming dog populations in an attempt to save their endangered and endemic wildlife. We've produced models that take aim at reducing the incidence of rabies and canine distemper virus in Indian free-roaming dogs to help protect both people and wildlife, like the Bengal Tiger. If you're interested in computer modeling, be sure to look out for future courses and come talk with me about pursuing research!

*Dr. Calinger-Yoak  
Assistant Professor*



## The Paradise of Bombs Revisited

A few years ago, the Common Book at Otterbein was *The Paradise of Bombs* by Scott Russell Sanders. He writes about growing up on an Army ammunitions plant (Ravenna Arsenal) in northern Ohio. The book contrasts the more natural environments surrounding the arsenal with the arsenal itself. He describes the arsenal with its bomb bunkers (igloos built into the hills, separated so that if one were to explode, the entire group of igloos wouldn't go up in unison), assembly lines, test areas, deployment terminals, and a railroad system designed to access every meter of this war machine. Search for Ravenna Arsenal using Google Earth and you can see each of the igloos still has a staging area at its doorway. Sanders wrote about how the arsenal compared to the more natural areas in the Mahoning River watershed outside the double row of razor wire and extra tall fences.

The summer before we read this book as a community, I had the opportunity to scurry around those igloos looking for land snails. I had a crew of students and ODNR personnel collecting fish (with electricity and by seining) in each pond and at every bridge crossing. In addition, we collected aquatic snails, bivalves, and crayfish from nearly every inch of the place. We had to be careful around the igloos and disarticulated railroad cars still filled with ordinance, but

we were given access to the entire site – from burning zones (where bombs were decommissioned) to firing lines (where they were tested – we were told not to touch any undischarged bombs or other projectiles found during our survey work) to igloos, and bridges and their streams. There were other biologists, and their teams, surveying mammals, birds, reptiles, amphibians, insects, and plants. Our combined work resulted in the most extensive bio-survey of an Army facility ever. Since that original survey in 1999, we have had the opportunity to go back every five to ten years to reassess the former arsenal's diversity. You see, the arsenal was decommissioning the year prior to our original survey as it was being considered for sale (maybe as a new airport for Cleveland). And since our original survey, I have been back twice: all the bombs had been removed by my second visit and the place was slowly reverting to nature. By the second return, the railroad tracks had been removed and the buildings had fallen into disrepair. Some of the roads were pitted with deep potholes and many of the bridges were in disrepair. The place was becoming a forest. Today this forest is igloo-dissected, but clearly transformed from what it was 30 years ago. The former arsenal took on a character more like the habitats outside of the fence described by Sanders.

This work was supported each year by grants from the Army to the Division of Natural Areas and Preserves. And, it seems only appropriate, now that the Division is restored to the Department of Natural Resources in Ohio, that their first major project will be a reexamination of the biota of the arsenal. Well, not quite: the Ravenna Arsenal, once it lost its bombs, became the Ravenna Logistics Center and Army National Guard (we were told to vacate a road once just before a squadron of tanks flashed by us going in excess of 60 mph). Today it is called Camp Garfield. No matter the name, the goal will be the same: to determine how the species are changing in the 30 years since the bombs were removed and the land could revert to a more natural condition. My team will consist of a couple students from Otterbein, my friend and fish biologist, Dan Rice, and myself. We will spend 50 days in the Camp starting in April to catch native lampreys mating in the creeks and will continue our work into the summer. In addition, the students will help to complete the mussel survey of the Little Miami River system that was commissioned by the Ohio Scenic Rivers Program in celebration of their 50<sup>th</sup> anniversary. It will be a busy summer break!

*Michael A. Hoggarth, Ph.D.*

## The End of an Era in Conesville Ohio

In September Dr. Svitana led his final field trip to the AEP coal-fired electric generating facility in Conesville Ohio. This facility which was built in 1955 will be officially closing in May 2020. Dr. Svitana has led more than a dozen trips to the facility since he arrived at Otterbein. It was always eye-opening for the students to see where electricity comes from and all of the challenges and issues associated with maintaining a reliable electrical grid. This trip was typically one of the favorites, and it will be missed.



View of the fly ash handling system from the top of the Number 6 unit



## Reports from two recipients of the Melinda Phinney Award for Pre-Med Travel Experiences

### Honduras

Last May I went to Honduras with *Global Medical Brigades* thanks to funding through the Melinda Phinney Award. The entire experience was life changing. We started by helping to build eco-stoves for multiple families, then dug trenches for a clean water system. The following days we assisted the doctors and pharmacists in triage, vision, and intake. Some of the people we helped had never been to a doctor and had no means to travel to do so. It was

eye opening to see what a few days of medical assistance or what a pair of glasses could do for some of these people. I will most definitely take my experience with me when I start PA school this May!

*Sarah Fossett, Senior Biochemistry / Molecular Biology Major from Gettysburg, PA*

*Sarah will be matriculating at Florida's Nova Southeastern University Physician Assistant Program in May.*



### Costa Rica

The Melinda Phinney award helped me serve on a medical mission trip with *International Medical Relief* to Upala, Alajuela, Costa Rica in December 2019. Our team provided medical and dental care to nearly 400 people local to Costa Rica and Nicaragua. Being able to serve in this capacity has opened my eyes and helped me to see this is what I am meant to do.

We saw patients ranging in age from 2 months to 96 years with a wide variety of medical and dental conditions. I was able to see the local hospital when we transported a small child with severe Asthma. We are so fortunate in the United States. We

have the best medical care around regardless of financial ability to pay. Sadly, that is not the case in many places around the world. I also cared for a very elderly lady who had a terminal diagnosis. Instead of sadness, she was so grateful to have someone care and provide emotional support. These are just a small snippet of what kind of care we provided. My life has been forever changed.

*Jared L. Piroška, Junior Nursing Major from Delaware, OH*

*Jared will be matriculating at Ohio University's Heritage College of medicine in 2021.*

## Preparing Skins for Study

Preparing biological specimens has become a lost art form and is not as common in many college and university science programs as it once was. However biological specimens provide hands-on opportunities for students to learn about comparative anatomy, ecological physiology, species identification, systematics, and numerous other topics. In an effort to increase the Otterbein Biology and Earth Science Department bird teaching collection, students, alumni, and faculty began an extracurricular program where volunteers are learn-

ing how to prepare study skins. Additionally, volunteers are learning about museum specimen preservation, curation, and data recording protocols. It is hoped that these specimens will become a valuable teaching asset for a number of biology courses as well as create new research opportunities for students.

The photos were taken by employee, Annette Harting Boose '94. She and her husband have been helping Instructor Casey Tucker with the bird sessions.



## Genomics in the Jungle

Sabbaticals are a chance for faculty to step away from the classroom to focus on special projects. I took full advantage of that this past semester and headed to the Peruvian Amazon to take a “Genomics in the Jungle” field course. This was an ideal experience for me because I love to be in the field, especially in the tropics, but I have very little experience with molecular biology. Molecular tools have become increasingly valuable for ecologists answering a wide variety of questions. In the past, biologists have gone into the field, collected samples, and carried or shipped these samples to distant labs, often crossing international borders in the process. This can be time consuming and can sometimes

involve complicated permitting for getting samples in and out of countries. However, emerging technologies are making it more and more possible for scientists to both collect and analyze their samples in the field, even in remote locations. The goal of this course is to train biologists to do just that.

To reach the Green Lab (world’s first tropical rainforest molecular genetics laboratory), I flew into Puerto Maldonado and took an hour boat ride up the Madre de Dios River to the Inkaterra Guides Field Station. The lab was small, but functional and ran entirely on solar power. We got started immediately, discussing lab and field safety, learning the intricacies of genomic sequencing with Oxford Nanopore MinION technology, and practicing our pipetting. We focused on three main case studies during the course: (1) identifying wild primates, bats and birds using fecal, blood and skin samples, (2) determining where howler monkeys at local rehabilitation centers should be released, and (3) screening captive and wild primate blood samples for Plasmodium and Trypanosoma. The course had ambitious goals, and we spent long hours in the lab, extracting, amplifying, and barcoding DNA. Even with the busy schedule, we still found time for exploring the area.

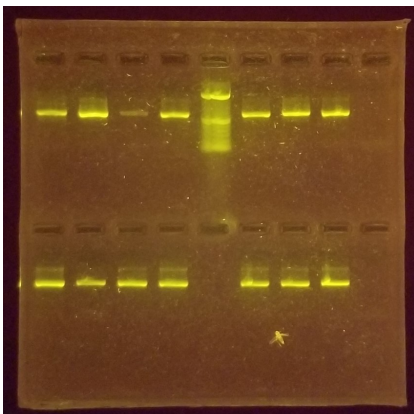


Loading DNA into MinION

Whenever samples had to incubate, or an extended PCR was left to run, we threw on our boots and trekked through the forest to the elevated canopy walkway. If the day’s work didn’t permit time in the field, we made up for it with long night hikes to see the nocturnal side of the Amazon. The forest never disappointed, as everywhere we went, we saw a remarkable variety of tropical wildlife. The course also provided field trips to a local rehabilitation center, where some of our samples were collected, and to Lake Sandoval where we observed giant river otters.

Overall, the experience was amazing. I learned so much and made great connections for myself and our students. Already, I have students in my lab using genomics to understand the effects of diet on gut microbiomes. Stay tuned for the results of those new endeavors in future newsletters!

*Sarah Bouchard, Ph.D.*



My first gel complete with local wildlife

## Zoo Program Gets New T-Shirt and Sweatshirt Designs

Once the Zoo and Conservation Science Program started the Aquarium Track it only seemed appropriate to move on from the terrestrial-animal-only motifs that have adorned the official grey t-shirts and hoodies that Otterbein students wear to the zoo and meetings. The goal was to add an aquatic balance to the shirts. A contest was held this fall to decide on new designs and winning entries were submitted by students Payton Chatfield and Ethan Fulkerson. Payton’s design for the Hoodie took our original savanna tree and split it in half: replacing one half with a seafan. Ethan added a swath of marine animals including a shark, turtle and jellyfish in blue below the land animals. His design will be used on a new choice in shirt: a crewneck sweatshirt.

The T-shirt was a group effort by our printing house and others and combines marine creatures in the sea below, and on the back, the trackway of paw prints was partially swapped out for fiddler crab tracks. Congratulation to our winners and thanks to all students who voted on the designs



Winning new designs for Zoo t-shirts and sweatshirts



## Aquarium Track Dives Right In

The Aquarium Track in the Zoo and Conservation Program admitted its first class of students last spring and is now in full swing. Ten new reef aquariums came on line in room 112 lab over the summer and were immediately put to use for Dr. Lescinsky's Coral Reef Ecology class. During the fall, students completed research projects with over 200 small coral pieces harvested (fragged) from our existing tank. They grew the coral under conditions that varied in wavelengths of light, water current, and feeding to learn about coral morphology, ecology and nutrition. Other corals were placed near each other to investigate their competitive abilities (see photos).

Students are primarily in charge of the aquarium up-keep, and they have lots of great ideas for projects to come. One focus right now is a new 125-gallon tank that will house primarily reef fish in the entrance area of the stockroom. If you are interested in their projects, you can follow them on Instagram at OtterReef where they promise to keep you up to date on their progress and to even offer contests for choosing fish species to add and the naming of charismatic individual fish. Now all we have to do is get the tank leveled and filled and ready to go. Many thanks

to Maggie Ng ('20) for suggesting the idea of the donation to her uncle!

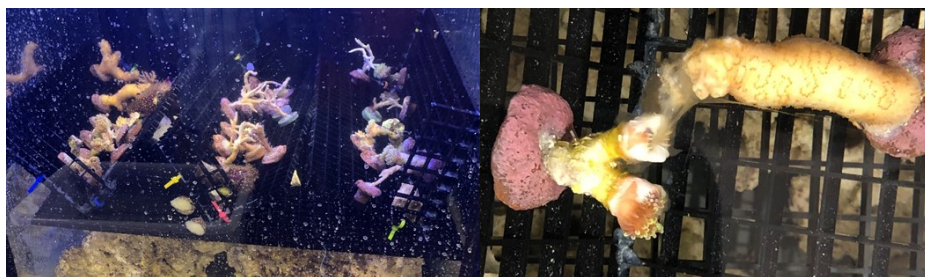
Another project in the works is that Otterbein is just one of three educational institutions asked to help in the up-keep of corals rescued from the Florida Reef Tract in front of a wave of death attributed to SCLTD (Stony Coral Tissue Loss Disease, a generic name pending a better understanding of this previously unknown disease). While accredited public Institutions such as the Columbus Zoo and Aquarium will actually be aquaculturing the rescued corals, Otterbein will raise the much-needed snails and peppermint shrimp for the Aquariums to keep their charges clear of algae. Head Aquarist at the Columbus Zoo, Ramon Villaverde, will be helping us in this endeavor.

If you haven't seen the reef tanks in a while stop by and take a look.



BIO 3340 Coral Reef Ecology students at work weighing and measuring coral specimens prior to starting their experiments.

Derek Bowers ('20) is the Aquarium Supervisor and is doing a great job keeping the tanks thriving when he is not working at Reef Systems Coral Farm or interning at the Columbus Zoo and Aquarium. Of course, he gets plenty of help from the rest of the enthusiastic group of budding aquarists who pick algae, feed, and frag as needed. By year's end they are promising not only the thriving reef fish tank but also an anemone tank, a Caribbean biotope tank, and a predator fish tank (but Dr. Lescinsky will probably veto that one!).



Corals on racks competing for space. Right: Close up of *Hydronophora* (right) exuding digestive filaments to kill adjacent hammer coral (*Euphyllia*) (photo courtesy of Lindsey Johnson '22).

## Dr. Svitana's Sabbatical Accomplishments

I had a productive sabbatical during the spring of 2019. One of my colleagues, Doug Hunter and I were invited by the National Groundwater Association to conduct a training for Ohio EPA on April 3-4, 2019. We completed the training for the Ohio EPA hydrogeologists on methods for conducting groundwater pumping tests and analyzing aquifer hydraulics, there were 22 hydrogeologists in attendance. I also had the opportunity to work with Ohio EPA regarding the revisions to the Ohio Administrative Code relative to the pumping test analysis rules. Data from the well field behind The Point was used for in-the-field demonstrations.

During my sabbatical, I was selected by the National Groundwater Association to serve on the "Per-and Polyfluoroalkyl Substances (PFAS)" conference advisory committee. PFAS have been identified by USEPA as emerging contaminants that are likely to have widespread impacts on workers' health and water supplies. PFAS contamination is associated with the manufacture of Teflon, food container packaging materials, waterproofing materials, etc. As part of this activity I served as a moderator for NGWA's two-day national conference on PFAS that was held in June 2019 at The Point. I also had the privilege of meeting and having dinner with Rob Bilot,



the attorney who broke the case against DuPont and 3M that led to the national awareness of health issues associated with PFAS. In December 2019 the movie *Dark Waters*, which is based on Bilot's story of the DuPont case was released with Mark Ruffalo playing the role of Bilot.

Kevin Svitana, Ph.D.

## Biology Behind Bars

Anna Young & Simon Lawrance spent a substantial part of their summer designing and teaching a college credit Summer Seminar for incarcerated students at Marion Correctional Institute. The seminar was organized by Shannon Lakenan (English) and Katherine Plank (Center for Teaching & Learning) and also involved faculty from History & Political Science, Religion & Philosophy and Nursing. Piper Kerman, the author of "Orange is the New Black," also participated. In Anna & Simon's portion of the seminar we sampled cellular biology with microscopes, conducted animal observation & behavior with rescue dogs, built an evolutionary timeline with our bodies and created animal-inspired art! We read "Being a Beast" by Charles Foster, a profes-

sor at Oxford with degrees in medical ethics and veterinary medicine, whose writing "mingles neuroscience, psychology, nature writing and memoir to cross the boundaries separating species, taking on questions of animal consciousness, cognition, emotion and theory of mind." A rich and unequivocally hungry, seasoned and appreciative group of students; teaching



The class, including Dr. Lawrance (upper left) and Piper Kerman (upper right), observed the behavior of rescue dogs rehabilitated in the prison.



The class took an interdisciplinary approach mixing science, music and art.

"unplugged," the transformative power of education and peace building were amongst the many elements that made the experience authentic and rich. As President Comerford summed it up when he visited our last class: "We were physically constrained, but our minds had been liberated."

*Simon K. Lawrance, Ph.D.*

## Grossology: The Science of Icky, Sticky, Disgusting Things

We had the honor of participating in the first-ever COSI Festival Big Science Celebration on May 4, 2019. Six faculty, representing the departments of Biology and Earth Science, Chemistry, and BMB, ran stations designed to engage the public with fun science activities. This first year, there were 25,000 people in attendance with 130 exhibitors and 760 STEM professionals; an

overwhelming success! The theme of our exhibit was "Grossology: The Science of Icky, Sticky, Disgusting Things". The stations consisted of a table for weird smells, an activity that used a chocolate oatmeal mix to model wildlife scat, the dissection of cow eyeballs and sheep brains, and a row of microscopes for examining fascinating, motile microbes. Several students assisted at the stations,



which supported a steady stream of interested families.

A visit from Cardy, Otterbein's lovable mascot, added to the excitement of the day! We had the opportunity to teach countless children and their families about the science that we are so passionate about. The second annual COSI Science Festival Big Science Celebration is scheduled for May 9, 2020. We cannot wait to volunteer again!



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