



University of Vermont, College of Arts and Sciences
Department of Biology Newsletter
Spring 2016

FACULTY NEWS

Sara Helms Cahan New Chair of the Department of Biology



With the departure of Dr. Jim Vigoreaux to his new position in the Provost's office, the Biology Department is pleased to usher in a new Chair of Biology, Sara Helms Cahan. Dr. Helms Cahan joined the department as an Assistant Professor in 2004, and became an Associate Professor in 2010. She is an evolutionary ecologist and geneticist interested in how insect societies evolve, function, and interact with their environment. Her lab focuses on an incredibly successful and ecologically important group of social insects, the ants. She and her students use a combination of behavioral experiments, field ecology, molecular ecology and genomics to address how and why social structures change over time, how social conflicts are resolved, and how ant populations are likely to respond to projected shifts in climate. Dr. Helms Cahan teaches courses in animal behavior and evolution, including a course in sociobiology. She has also served as BCOR Co-Director and has been very active in Department affairs. Welcome! Dr. Helms Cahan's [WEBSITE](#)

Dr. Jim Vigoreaux Steps Down as Chair of the Department of Biology



“It is with a heavy heart that I announce I will be stepping down as Chair of Biology, effective August 31. It goes without saying the past ten years have been the most exciting and rewarding of my UVM career. I am indebted to all of you (and past members of the department) for your unflinching support through good times and hard times, your trust in me, your camaraderie and above all, your unwavering commitment to making our department one of the crown jewels of UVM. Together we have accomplished much that we can be proud of. Our best years are still ahead and I very much look forward to contributing to our collective aspirations. This is not a good-bye! I will be working under Provost Rosowsky, as Associate Provost for Faculty Affairs.” For more information, click [HERE](#)

Rona Delay and Gene Delay Head West



Dr. Rona Delay and Dr. Eugene Delay, Associate Professors with over 10 years of teaching and research experience in the Department of Biology have retired.

They will continue to do research and will spend time with family and friends in Idaho and Colorado. The Delay's want you to know that everyone in the Department and all of UVM have been wonderful!

The Department would like to thank the Delay's for everything they've given to this Department as Professors and friends...Happy Trails!



Dr. Amanda Yonan on “Across the Fence”

Focus on Forensics: Dr. Amanda Yonan discusses her course, Introduction to Forensic Biology, on “Across the Fence” on WCAX-TV. Watch her interview [HERE](#)

UVM Receives \$20 Million to Study Lake Champlain

[Zach Despart](#), Free Press Staff Writer 12:53 p.m. EDT April 18, 2016

The University of Vermont on Monday announced a \$20 million award from the National Science Foundation to study the Lake Champlain basin.

"All of us in Vermont benefit directly from this impactful research — past, present and future," said UVM President Tom Sullivan at a news conference on the second floor of the ECHO Leahy Center for Lake Champlain.

The award will examine the effects of extreme weather events made more regular by climate change. A research team lead by UVM Professor Judith Van Houten will spend five years collecting data to help state and federal officials craft policy to protect the Lake Champlain watershed.

"Our research goal is to make it possible to identify, understand and predict what makes parts of the Lake Champlain more resilient to extreme weather events, and why other parts are not so resilient," Van Houten said.

Burlington Free Press [STORY](#) & PHYS.ORG [LINK](#)

Senator Patrick Leahy, UVM and Vermont College Leaders Announce \$17.8 Million Grant to Vermont Genetics Network

Sen. Patrick Leahy, University of Vermont president Tom Sullivan, and representatives from seven Vermont colleges and universities gathered in Burlington on June 12, 2015 to announce that the Vermont Genetics Network (VGN) will receive a five-year \$17.8 million grant from the National Institutes of Health (NIH) for cutting-edge biomedical research.

The grant comes from NIH's Institutional Development Award (IDeA) Networks of Biomedical Research Excellence (INBRE) program. Since 2005, Leahy has helped the Vermont Genetics Network to secure \$56.3M in federal funding. [FULL STORY](#)
Associated Press story by Wilson Ring click [HERE](#)

C. Brandon Ogbunugafor, Henderson Fellow



C. Brandon Ogbunugafor is a Henderson Fellow in the Biology Department. His research draws upon a broad set of perspectives, ranging from clinical medicine to biophysics, all towards the goal of a richer understanding of evolution. To accomplish this, he utilizes evolutionary theory, mathematical modeling, experimental evolution and genomic approaches. At the most basic level, he is interested in the relationship between genotype and phenotype and factors that influence evolvability. He studies the effects of the environment on epistasis and the structure/topology of fitness landscapes, often using microbial systems. Brandon studies an array of microbes and epidemiological phenomena, ranging from bacteriophage to malaria, tuberculosis and human viruses like HIV and HCV. “The more applied sphere of my interests attempts to draw on evolutionary theory and systems biology towards a better understanding of infectious disease ecology.” [INFO ON THE PROGRAM](#)

Vigoreaux and Dupigny-Giroux Inducted into the Vermont Academy of Science and Engineering



**Professors Jim Vigoreaux and
Lesley-Ann Dupigny-Giroux**

By Craig E Wells

Professors Lesley-Ann Dupigny-Giroux (Geography) and Jim Vigoreaux (Biology) were named Fellows of the Vermont Academy of Science and Engineering (VASE) at a ceremony held on September 25, 2015. Dr. Dupigny-Giroux is the current Chair of the Geography Department as well as the Vermont State Climatologist. Dr. Dupigny-Giroux's research interests intersect a number of interdisciplinary fields, including hydroclimatic natural hazards and climate literacy as well as the use of remote sensing and GIS (Geographic Information Systems) in the fields of spatial climate and land-surface processes. Dr. Vigoreaux is the Breazzano Family Green and Gold Professor in the College of Arts and Sciences and was recently appointed Associate Provost for Faculty Affairs. His laboratory research focuses on the structural and functional properties of muscles that power oscillatory systems, namely the insect flight muscle and the vertebrate cardiac muscle. [READ MORE](#)



At home with naturalist Bernd Heinrich

*Photography and story by
Joshua Brown*

It's night in the Maine woods, and Bernd Heinrich is considering what to do tomorrow. "I'd like to go check on my spiders," he says. Then he stands up and steps over to a large wood-burning stove in the middle of his cabin. He eases open one of the cast-iron burners and pushes a log down into the fire. A molten light plays across his face, making him look, for a moment, like a boy, and then casts black shadows on his deeply lined skin. "I don't think we'll see any," he says, almost to himself.

"I had about thirty spiders located. The last time I checked was last week, and I still found three," he says with his distinctive hint of a lisp mixed with the trace of a German accent. It's now mid-October and the nights are getting cold. "They're going into hibernation," he adds.

The windows in front of his desk reflect the room: hand-peeled log beams, wide-plank floor, oriental rug, comfy couch, ladder ascending to a loft, one wooden chair. A whole tree trunk, perhaps two feet in diameter, rises through the center of the room, holding up the ceiling. On its branches hang a towel, binoculars, hawk feathers, a corkscrew. A stripped balsam fir makes a coat rack by the door. [READ MORE](#)



Dr. May-Collado Invited Speaker

Dr. Laura May-Collado was an invited speaker at the TEDxpuravida conference that took place in Costa Rica last March. Click [TEDxpuravida](#) website for more information.

Dr. Laura May-Collado Offers First Marine Mammal Field Course at UVM

Last summer (May 31st to June 15th) Dr. May-Collado offered the first Marine Mammal Field Course at UVM (BIO 296). The course base location was the STRI Research Marine Station at the Archipelago of Bocas del Toro in Panama. The course was designed to provide students with a basic training on marine mammal biology, field methods, and conservation issues affecting these animals and their habitat. The first week of the course students learned about the evolutionary history of marine mammals, physiological and anatomical adaptations to aquatic systems, and about their ecology. They also had an introductory workshop on field monitoring data collection: sighting information, estimation of group size, behavior, and photo-identification (a photographic technique used to identify individuals). Lectures and workshops were scheduled at nighttime and during daytime (7:30 a.m. to 4:30 p.m.) students participated in monitoring and behavioral surveys. During these surveys students develop skills in the three standard data collection methods: photo-identification, behavioral observations, and acoustic monitoring. At the end of the first week students developed an independent project proposal and discussed the feasibility of their projects with their mentors. During the second week lectures were focused on animal behavior, acoustic communication, conservation biology, and data analysis. Project results were presented as written articles following the format of the Marine Mammal Science journal and presented orally at a mini-symposium. These projects can be accessed at the Dr. May-Collado [WEBSITE](#). This spring semester 2016, some these students will continue working on their independent projects manuscripts for publication!



Scarus on one of our boats



Christian listening to dolphins

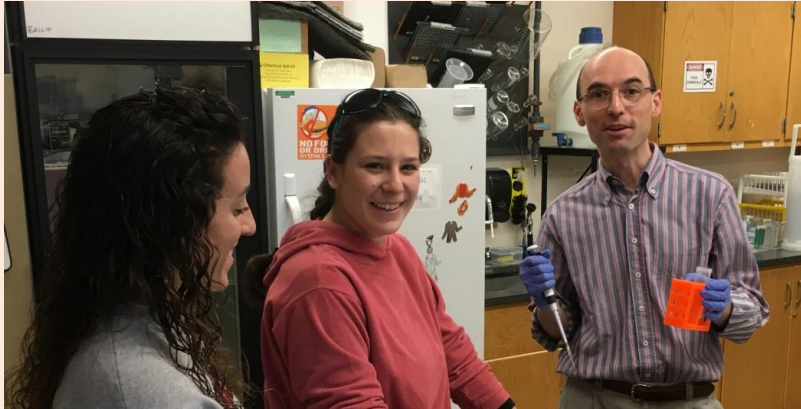


Breanna collecting behavioral data



Breanna, Sarah, Julia, and Heather analyzing data for their independent projects.

Wheeler Endowment Helps Bring Visiting Scholar from Paris to the Biology Department



Dr. Arnaud (at right) was captured assisting graduate student Judith Keller (center) and her undergraduate assistant Emi Eakin (at left)

The J. Wheeler endowment was established in 1941 "to advance learning and education in the [Biology] department," and helped fund the visit of Dr. Lionel Arnaud, adjunct Assistant Professor in the UVM Biology Department. Dr. Arnaud travelled from Paris, France, where he has been studying rare blood types for a decade. Part of his work has been in collaboration with UVM Biology Associate Professor Bryan Ballif. Dr. Arnaud is, among other things, an expert in cellular biochemistry and molecular biology and spent his two-week visit in the Biology Department to assisting graduate and undergraduate students on a variety of projects. He also gave a seminar to the department entitled, "Research on blood groups in the 21st century: chronological inconsistency or new opportunity?" Dr. Ballif and Dr. Arnaud first met as postdoctoral associates at the Fred Hutchinson Cancer Research Center in Seattle, WA. There they studied molecular mechanisms of brain development. Dr. Arnaud's visit was perfectly timed so that he could describe to the undergraduates in Dr. Ballif's Developmental Biology course the experiments that the two conducted in Seattle, and which led to important advances in our understanding of brain development.

We are grateful to the J. Wheeler Endowment for making Dr. Arnaud's visit possible and we hope to receive additional such gifts to further the research and teaching missions of the department.

Burst in Student Publications in the Agnarsson Lab

Our lab success rests primarily on internationally collaborative student-driven research. Since 2015, we have seen a burst in student research output with the publication of 10 papers with student co-authors including 10 undergraduate students and six graduate students. These include a paper in PeerJ first authored by UVM undergraduate Austin Dziki, a paper in Molecular Phylogenetics and Evolution on which there are four undergraduate co-authors—one of which subsequently became a UVM graduate student (Laura Caicedo-Quiroga), and a highly collaborative taxonomic paper published in Zookeys where the list of authors include two UVM undergraduates, one University of Puerto Rico undergraduate, one Madagascan graduate student, one Singaporean graduate student, a PhD from the Slovenian Academy of Sciences, and professors from Iceland and Pittsburgh!

<https://peerj.com/articles/1422/>

<http://www.sciencedirect.com/science/article/pii/S1055790315002092>

<http://zookeys.pensoft.net/articles.php?id=5480>

ALUMNI NEWS

Beth Dutton, 3 Rivers Wet Weather

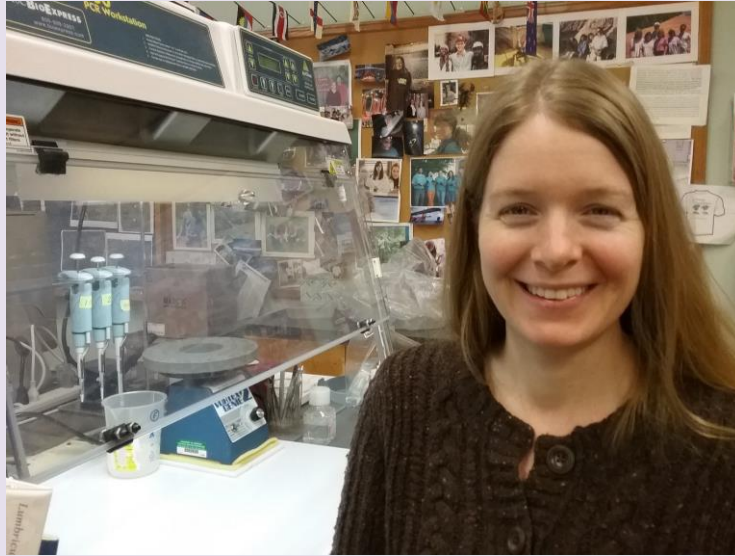


Beth Dutton, Class of 1985, is a Program Manager at the Pittsburgh environmental non-profit 3 Rivers Wet Weather. “After my college years in beautiful Vermont, I felt very much connected to the natural world, and wanted to find a career that was both very practical and also integral to protecting the environment, especially water. Little did I know that just such a career lay in the not particularly glamorous field of sewage. As Program Manager at 3 Rivers Wet Weather, I help local municipalities address the impacts that sewage overflows and storm water have on the three large rivers in Pittsburgh and our many local streams. It’s a fascinating issue which spans the environment, public health, economics, and politics, and requires us to engage 83 local governments to come up with the most cost-effective solutions to comply with regulatory requirements and improve our region’s water quality.

One of my other favorite professional roles is coordinating the activities of the Pittsburgh Green Infrastructure Network, a central collaborative of organizations, universities, businesses, and government partners who recognize the benefits of using green infrastructure, such as rain gardens and green roofs, in managing the region’s storm water problem. In this forum we meet, discuss, and learn about the most effective use of sustainable storm water management in capturing storm water to reduce flooding, sewer overflows, and polluted runoff into stream.”

After graduating from UVM, Beth served as a Captain in the United States Air Force in administration and earned an M.S. in Environmental and Occupational Health from the University of Pittsburgh’s Graduate School of Public Health. [WEBSITE](#)

Research Co-Led by UVM Attracts Major Media Coverage



Dr. Ellen Martinsen

By Dr. Joseph Schall

Dr. Ellen Martinsen has a long commute. She is an Adjunct Professor in the Biology Department, mentoring undergraduates and conducting research, but also is on the staff at the National Zoo/Smithsonian Institution in Washington. Her most recent publication required lots of travel between labs at UVM and the Zoo, but resulted in an enormous amount of very positive notice. Within only a day after publication, hundreds of general and science news sites around the world featured the study, and one site produced a short video highlighting the general findings. That video had one and a half million views in only one day. By evening, the video was adding 2,000 views per minute that continued as morning traveled around the globe. Ellen has had to suffer bad ribbing that she was such an internet sensation. Why the excitement?

Ellen's research centers on the malaria parasites (*Plasmodium*) of birds, especially how the parasites may spill-over from the birds in zoos into native, wild birds when mosquitoes feed on different bird species. One day she isolated a malaria parasite's DNA in a mosquito, and the gene sequences showed it fit into the evolutionary clade of the *Plasmodium* infecting mammals, not birds. The mosquito harbored the remnants of its blood meal, and Ellen showed it came from a White-Tailed Deer. Biologists have long been sure that there is no native *Plasmodium* infecting mammals in the Western Hemisphere, and no *Plasmodium* infects any deer world-wide. A half century ago, a paper claimed to have found *Plasmodium* in a single WT Deer in Texas, but no-one has since found that parasite despite a great many deer being examined. That report was dismissed, and the parasite became the "Big Foot" of *Plasmodium*.

That single mosquito led Ellen to organize a team of researchers, including the Biology Department's Joe Schall, Emeritus Professor and long-time malaria researcher. She gathered samples of WT Deer across its range, as well as Black-Tail Deer in the western USA, Elk, Pronghorn Antelope, and many zoo hoofed animals, plus lots more mosquitoes. The result, published in *Science Advances* in February, found no *Plasmodium* in any of the mammals except for WT Deer. Two *Plasmodium* species were found in WT Deer across its range, and up to a quarter of the deer were infected at local sites. Applying sophisticated molecular and analytical methods found that the two parasite species diverged about the same time as the origin of WT Deer from its ancestor that came over Beringia millions of years ago from Asia. Thus, Ellen had found the malaria Big Foot twice over: the only native *Plasmodium* in a mammal in the entire New World and in a deer host. *Story continues on next page*

How could these common parasites have been missed for so long? Ellen believes this means we must do surveys using modern techniques to uncover unknown parasites, even in common animals literally in our own backyards. Do the parasites affect the health of the deer? That, as scientists always say, requires further research.

This remarkable story also highlights the value of our diverse academic community in the Biology Department: our dynamic undergraduates, graduate students, postdoctoral fellows, research staff, adjunct faculty, and even our "retired" emeritus faculty like Joe Schall and our Bernd Heinrich (also still very active in research). Ellen's ongoing research promises new surprises. But, can she top the media sensation leading from the WT Deer malaria project?



ADDITIONAL LINKS ABOUT THIS STORY:

University Communications News Release:

<http://www.uvm.edu/~uvmpr/?Page=news&storyID=22251>

Field & Stream

[Malaria Found Among Surprising Number of Whitetails](#)

The Scientist

[Malarial Parasite Found in Deer](#)

R&D

[Malaria Found in American White-Tailed Deer](#)

Business Standard

[Malaria infects white-tailed deer too](#)

Capital Wired

[A New Type Of Malaria Parasites Has Been Found In White-Tailed Deer](#)

BioScience Technology

[Discovery: Many White-tailed Deer Have Malaria](#)

HNGN

[White-Tailed Deer And Malaria: One In Four U.S. White-Tailed Deer Have Parasite](#)

Lucas Bernacki, Excellence in Teaching Award



Lucas Bernacki, Alum of UVM and currently Assistant Professor of Biology at St. Joseph's College, Standish, Maine, was awarded the 2015 Excellence in Teaching Award at the College's Annual Academic Awards Ceremony held in April. This student-nominated award recognizes a faculty member who has made an impact on student learning and exemplifies the qualities of respectfulness, enthusiasm, preparation, creativity, and fairness.

Lucas Bernacki's research interests are primarily in molecular ecology. His past research has focused on conservation genetics for the purpose of managing populations of both threatened species as well as game species. These projects have included investigations into the population structure of a variety of species such as *Limulus polyphemus* (Atlantic Horseshoe Crabs), *Salmo trutta* (Brown Trout), *Coregonus clupeaformis* (Lake Whitefish), *Necturus maculosus* (Mudpuppies), *Apalone spinifera* (Spiny Softshell Turtles), and *Odocoileus virginianus* (White-tailed Deer). Outside of work, Professor Bernacki enjoys small game hunting, dog training, and cross-country skiing. Click [HERE](#) for more info; [HERE](#) for Bio



FUTURE BIOLOGIST

"I'm happy to report that Benjamin Katz is well on his way to pursuing a career in marine biology. As you can see, Ben, who turns 12 in June, recently caught his first striper during a trip with dad on the Chesapeake Bay. Here he is proudly showing it off, before humanely releasing it back into the bay to grow a bit more and for another fisherman to reel in. His sister Emma, 8, while not that big on fishing, amazingly has found that she loves raw oysters, not just from the bay, but from all over the country. So maybe we'll have two biologists in the family one day!"

Mitch Katz, UVM Class of 1988; FTC Office of Public Affairs

ACCOMPLISHED ALUMS 2016

Dr. Wade Bell, Graduate Alum



Professor Wade Bell received his Ph.D. in 1999 working in the laboratory of Professor Judy Van Houten. Dr. Bell teaches courses in Cell Biology, Immunology and General Biology at the Virginia Military Institute.

Wade still has an active laboratory studying the cell biology of *Paramecium*. He is particularly interested in regulatory processes involving calcium and has recently turned to mitochondria as his organelle of interest. In addition to his research, Wade has played an active role in the leadership of national and international professional organizations. He has served on the Board of Directors of the National Association of Advisors for the Health Professions and on steering committees for the International Society of Protistologists. He currently sits on the Board of Directors of the American Society for Microbiology, the largest life sciences membership organization in the world. Despite all these commitments, Wade still enjoys tennis and playing baseball with his son. [WEBSITE](#)

Dr. Holly Prendeville, Undergraduate Alum



Holly started working in research labs the first semester she arrived at UVM. Working with Dr. Lori Stevens, she developed a project examining the ability of defensive chemicals produced by flour beetles to inhibit the growth of bacteria and fungi. The study was published in the *Journal of Chemical Ecology* with Holly as the first author.

“I am interested in how microorganisms affect plant populations, the role of maternal effects in trait evolution, and how mating patterns affect trait evolution and maintain diversity in natural populations. Currently, I am a Research Geneticist (post-doc) at the USDA Forest Service, Pacific Northwest Research Station in Corvallis, OR. To guide post-fire restoration efforts in grasslands in the Interior Northwest, I am investigating the efficacy of seed-zones via a reciprocal transplant experiment with Bluebunch wheatgrass (*Pseudoroegneria spicata*). This project is in collaboration with J. Brad St. Clair and members of the Rocky Mountain Research Station in Boise, ID including Nancy Shaw and Francis Kilkeny.” [WEBSITE](#)

Max Kravitz, UVM Biology '12



I graduated UVM in 2012 in Biology. Currently, I manage a QC Laboratory at Pfriem Family Brewers in Oregon. We are a rapidly expanding Belgian inspired brewery making traditional Belgian beers and hop-forward American ales. We just were awarded brewery of the year in Oregon! [WEBSITE](#)



Norine Noonan on Jeopardy!



Norine (Freeman) Noonan '70 appeared as a contestant on Jeopardy!

On March 10, Norine Noonan was selected through a nearly year-long process that starts with tens of thousands of people taking the online Jeopardy! test and included an in-person audition in Tampa. Only about 400 people are invited to appear on a season of new games for the show. Noonan finished third and wished there had been some biology categories! It is a once-in-a-lifetime experience as contestants who are selected to appear on TV cannot compete ever again. Dr. Noonan is a professor of Biological Sciences at USF St. Petersburg and also directs the Advanced Placement Summer Institute there.

Noonan described the experience of competing on the show as significantly more difficult than she had anticipated. “Of course, it’s so very easy to be an armchair contestant,” she added. “It was actually pretty stressful – more than I thought it would be.”

The most challenging aspect of the show was learning the timing of the button to ring in to answer. “Too soon and you are locked out; too late, and you won’t get to control the board... and controlling the board is what it’s all about,” she said.

Noonan described her time on the show as a once-in-a-lifetime experience. More about Dr. Noonan [Dr. Norine Noonan](#)

GRADUATE STUDENTS

GRADUATES 2016

Congratulations to the following graduate students who completed their degrees!



Federico Lopez-Osorio, Megan Valentine, Dr. Alicia Ebert, Dr. Rona Delay, Shreoshi Pal Choudhuri, Dr. Gene Delay, Marion Weir, Dr. Bryan Ballif, Dr. Judith Van Houten (Ryan Joy not in picture)

Ryan M. Joy – DCBLD2/ESDN is Essential for Proper Optic Tract Formation and Retinal Lamination. Advisor: Dr. Bryan Ballif

Federico Lopez-Osorio – Phylogenetics and Molecular Evolution of Highly Eusocial Wasps. Advisor: Dr. Ingi Agnarsson

Shreoshi Pal Choudhuri – Receptors for the Detection of L-Amino Acids and IMP by Mouse Taste Sensory Cells. Advisor: Dr. Eugene Delay

Megan Smith Valentine – Polycystin-2 (PKD2), Eccentric (XNTA), and Meckelin (MKS3) in the Ciliated Model Organism Paramecium Tetraurella. Advisor: Dr. Judith Van Houten

Marion Elizabeth Weir – Novel Mechanisms Governing Autoregulation of the Src Family Kinase Fyn and its Crosstalk with Protein Kinase A. Advisor: Dr. Bryan Ballif

Sarah Emerson 2016 Graduate Teaching Assistant of the Year



Sarah is an outstanding Biology Teaching Assistant. She is very knowledgeable in topics ranging from Introductory Biology to Cell Biology to Genetics. Her pleasant demeanor and approachability meant she was busy during office hours assisting a long line of students. Students go out of their way to mention what a great experience it was/is to have her leading the lab. Sarah has also become a key person in her research laboratory generating new protocols and actively mentoring undergraduate students. Sarah is finishing her third year as a PhD student in the Dr. Alicia Ebert lab and is researching signaling pathways during eye development in zebrafish.

Quotes from former students:

“Sarah is by far the best TA I have had in my experience at UVM. She is knowledgeable & respectful and kind. I would definitely recommend her as a TA!”

“Sarah is great! She’s very interested in the material which adds enthusiasm to the lab, she’s very helpful as well”

“Sarah was very friendly to all students and everyone felt respected, she put a lot of time and effort into helping us excel”

Congratulations Sarah!

BEES UNDER SIEGE



Samantha Alger

By Judy Simpson (CBS News Report, July 30, 2015), Charlotte, VT

Bees are a multibillion dollar industry in the United States, responsible for pollinating millions of acres of crop lands. But in recent years, bees have been under siege by a variety of diseases and parasites.

There are about 8,000 registered honeybee colonies in Vermont. But there has been no way for beekeepers in Vermont to track just how healthy the hives are in comparison to other states. That is, until now.

Samantha Alger is working on her Ph.D. in biology at the University of Vermont. She is spearheading a survey of commercial honeybee producers in Vermont. It is the first-of-its-kind study for the state.

"So this year is the first year Vermont is involved in the National Honey Bee Survey, which is an attempt to collect baseline data on honeybee disease and pathogens nationwide. So this is really exciting; this is the first year of Vermont's involvement. There have been 28 states involved in the past," Alger said.

The bee population nationwide has been under attack by bugs and diseases, like colony collapse disorder, the varroa mite and pesticides to a certain extent. [FULL STORY](#) More about [BEES](#)

Graduate Students and Faculty Present at the Society for Developmental Biology Meeting in Snowbird, Utah

Graduate students Ashley Waldron (Biology), Sarah Emerson (Biology) and Riley St. Clair (Neuroscience) traveled to the [Society for Developmental Biology meeting in Snowbird, UT](#) with Biology faculty mentors, Assistant Professor Alicia Ebert and Associate Professor Bryan Ballif.

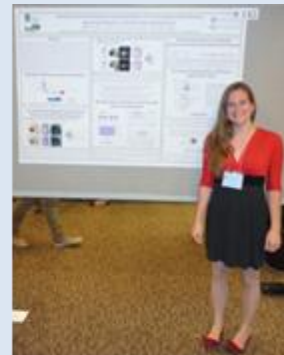
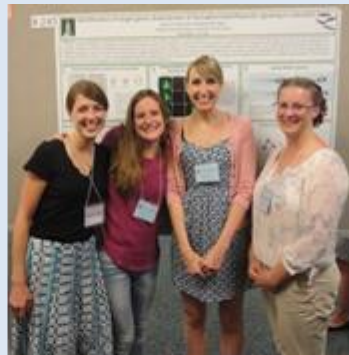
Poster presentation titles are below. Denotations are for Biology Department-affiliated undergraduates (*), graduate students (#) and faculty (^) are indicated.

Biochemical and Functional Characterization of the Semaphorin6A-PlexinA2 Signaling Pathway in Zebrafish Eye Development. Riley St. Clair#, Marion Weir#, Alicia Ebert^ and Bryan Ballif^

ESDN/DCBLD2 serves as a scaffold for the signaling adaptor CrkL and is essential for proper development of the zebrafish eye. Bryan A. Ballif^, Ryan M. Joy^, Tyler M. Aten*, Miranda M. Redmond*#, Erin E. Wysolmerski# and Alicia M. Ebert^

Identification of target genes downstream of Semaphorin 6a/Plexin A2 signaling in zebrafish. Sarah Emerson# and Alicia Ebert^

Defining the role of Histidyl tRNA Synthetase in the Zebrafish Eye and Ear. Ashley Waldron#, Susan Robey-Bond, Alicia Ebert^



Participants are shown below at play and at work. Top left, left-to-right: Alicia Ebert, Ashley Waldron, Sarah Emerson, Riley St. Clair and Bryan Ballif

Samantha Alger Provides Testimony at the Vermont State House



In January 2016, PhD Candidate Samantha Alger provided expert testimony at the Vermont State House hearings for two separate bills: H.236: Bill proposes to ban the use, sale, or application of neonicotinoid pesticides; H.539: Bill proposes to establish a Pollinator Protection Committee. Along with Chas Mraz, third generation beekeeper and owner of Champlain Valley Apiaries, they asked that Vermont gain regulatory authority over treated seeds, a source of much of the neonicotinoids brought into this state but currently not regulated. They also recommended that the state continue their apiary inspection program in order to monitor potential pesticide related die-offs and bee disease spread. While the bill to ban neonicotinoids was not passed, a new bill was put forth asking that the state gain regulatory authority over seed coatings.

Vermont is currently taking action for pollinator protection by continuing the state apiary inspection program through two new hires and organizing a pollinator protection committee aimed at the development of a State Managed Pollinator Protection Plan (MP3) that will outline a set of recommendations and practices for the protection of managed pollinators in Vermont that allows both crop production, native bees, and beekeeping to thrive.

John Wheeler Graduate Student Research and Development Awardees

Lauren Ash – *Research Title:* Detecting the emerging infectious disease Ranavirus in amphibian communities of Vermont

Laura Caicedo-Quiroga – *Research Title:* Tracking of *Phrynos longipes* movement across surface-cave habitats to estimate opportunities for gene flow

Emily Mikucki – *Research Title:* The diversification of diapause strategies across butterflies

Congratulations!

A Day in the Life of UVM Biology Students

By University Communications



Third-year neuroscience graduate student Riley St. Clair begins the process of separating proteins in a sample. With her mentor, Bryan Ballif, UVM associate professor of biology, she is studying cellular signaling pathways critical to neurodevelopment. She also works with Alicia Ebert, UVM assistant professor of biology, to study many of these same neurodevelopment pathways in zebrafish, which have many of the same protein structures as humans. “Zebrafish are excellent models for studying development -- they lay external eggs, and their embryos are transparent,” says St. Clair.



Students in a BioCore 11 lab in Jeffords Hall work on an exercise involving gel electrophoresis.

Dominican Outreach, Teaching Underprivileged Children about Nature



Zamira Yusseff-Vanegas with children in the Dominican Republic

“As part of this project we created a spider biodiversity camp for underprivileged children in the Dominican Republic in summer 2012. Our goal was to introduce them to the thrill of discovering the biodiversity that surrounds them, to the relevance of science in their world, and most importantly to their own potential as young scholars. We are doing this work in collaboration with Dominican Outreach, a program directed by Father Dale A. Johnson, in Puerto Plata, Dominican Republic. We worked with Father Dale to create a science camp in which we taught children how to collect, preserve, and identify arachnids, providing them with keys to spiders they are likely to encounter. The children worked side-by-side with project participants working in the Dominican Republic as part of our collection efforts in that country.”



STEM Judges

Katie Miller and Allyson Degrassi were judges at the VT state STEM (Science, Technology, Engineering and Math) Fair hosted by Norwich University this year. It was Ally's 4th year as a judge and Katie's first. The goal of the STEM Fair is to increase the proportion of middle school and high school students to pursue advanced education and training in the STEM disciplines. The judges are meant to encourage critical thinking and reward students for their high quality inquiry.

Fascinated with Forensics and Natural Collections



By Sohath Zamira Yusseff-Vanegas

“I think that my destiny was to be a biologist; I was fortunate to be born in a small town named Velez, located in the Andes Region of Colombia, one of the most beautiful and mega-diverse countries on the planet. Thanks to my parents, I developed a sense of belonging, appreciation and respect for nature; from a very young age they always emphasized how important it was to protect the ecosystems, plant trees, keep the water clean and take care of the animals.” [READ MORE](#) In VES News, Page 3

2016 SUITER PRIZE RECIPIENTS

Samantha Alger and Philip Burnham – This prize allowed Samantha and Philip to attend the American Beekeeping Conference in January

Laura Caicedo-Quiroga – The prize will help fund Laura’s poster presentation, “First characterization of cryptic diversity of Phrynidæ in the Caribbean based on molecular phylogenetics and DNA barcoding” at the 20th International Congress of Arachnology Conference in July.

SUITER PRIZE [INFORMATION](#)

2015 Carolyn M. Glass '83 Awardees

Nabil Nasser - Project Title: *Ant-Hemipteran Mutualist: Host plant antagonist or “budding” mutualist?*

Nelish Pradhan – Project Title: *Conservation Genetics of Nepalese Endemic Mammal, Himalayan Wood Mouse (*Apodemus gurkha*)*

WELCOME NEW GRAD STUDENTS!

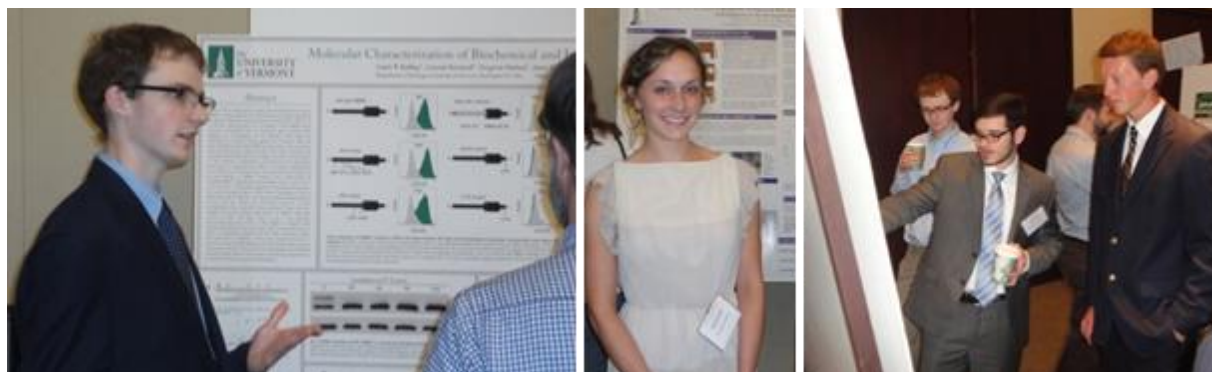


Lisa Chamberland, Emily Mikucki, Lauren Ash, Laura Caicedo-Quiroga, Muhammad Kala (not in picture: Raquel Lima & April Makukhov) *Photo by Nabil Nasser*

UNDERGRADUATE STUDENTS

University of Vermont Beckman Scholars Travel to Conference in Irvine, California

The University of Vermont was one of twelve institutions nationally to receive the prestigious [Beckman Scholars Award](#) in 2014. Jim O. Vigoreaux, Professor of Biology and Associate Provost, has overseen the \$130,000 award which provides tuition and research support to five top UVM undergraduates. These undergraduate scholars recently participated in the [2015 Beckman Symposium](#) in Irvine, California, presenting their research and interacting with scholars from across the country. Our five Beckman Scholars are pictured below (left-to-right, Sam Barritt (Integrated Biological Sciences Major), Nathan Gasek (Integrated Biological Sciences Major), Liam Kelley (Biochemistry Major), Laurel Haines (Integrated Biological Sciences Major), and Anna Schmoker (Chemistry Major). They were accompanied (pictured at far right) by Associate Professor of Biology, Bryan Ballif, one of the Beckman Scholar mentors. *Story continues on next page*



The three senior students, Liam, Anna, and Nathan, presented posters on their research

Liam is mentored by Dr. Ballif and his research project is titled, "Investigation into the Orientation and Cellular Function of SMIM1." Anna is co-mentored by Drs. Rory Waterman and Giuseppe Petrucci (Chemistry) and her research project is titled, "Development and characterization of a quantitative method for respirable nanoparticle risk assessment." Nathan is mentored by Dr. Vigoreaux and his research project is titled, "An investigation of the role of the amino and carboxyl terminal region of flightin and their contributions to thick filament properties in *Drosophila* flight muscle." Laurel is mentored by Dr. Kalev Freeman (Surgery) and her research project is titled, "Histone-mediated calcium overload as a mechanism of endothelial barrier dysfunction." Sam is mentored by Dr. Paula Deming (Medical Laboratory Sciences with a secondary appointment in Biology) and his research project is titled, "A quantitative Phosphoproteomic Analysis of Fyn-Activated PKA Substrates."

All students enjoyed the excellent speakers and the hospitality provided by the Beckman Foundation (shown below). They also took an excursion to the Pacific, a first for some, where they enjoyed dinner at the Crab Shack and playing Frisbee Fiesta on the beach (data not shown).



Daniel C. Oppenheimer '06 Summer Research Awards go to Emma Chereskin and Helaina Stergas

Emma Chereskin, in Dr. Ingi Agnarsson's lab, will be working in Puerto Rico using mini radio tags to learn about daily movement patterns and habitat use in whip spiders.

Helaina Stergas in Dr. Alicia Ebert's lab, will be working on characterization of novel gene in zebrafish retinal development.

Congratulations!

Luke McCartin, Summer Research Awardee



Over the past academic year, I have been working in Dr. Alison Brody's lab helping Grad Student, Nabil Nasser, identify arthropod samples from his field work over the past couple of summers in Texas on Mesquite trees. Nabil is studying the effects that an ant-hemipteran mutualism has on the total arthropod community present on the host tree. This summer I will be studying the effects of this mutualism on the insect community on goldenrod in our local ecosystem. This mutualism is important to study, because it commonly occurs and its presence is hypothesized to significantly alter the composition of the insect community. I hypothesize that the presence of this mutualism will lower the diversity of the insect community, and reduce the abundance of important insects that provide vital ecosystem services, such as pollination. The thought is that the ant actively defends the hemipteran from enemies, in return for the consumption of its honeydew secretions, so I expect to see a less diverse community on those goldenrod plants from which ants are excluded. I am looking forward both to exploring this interesting species interaction, and to a great summer of field work in the gorgeous Vermont countryside.

Academic Programs for Learning and Engagement (APLE) Awardees



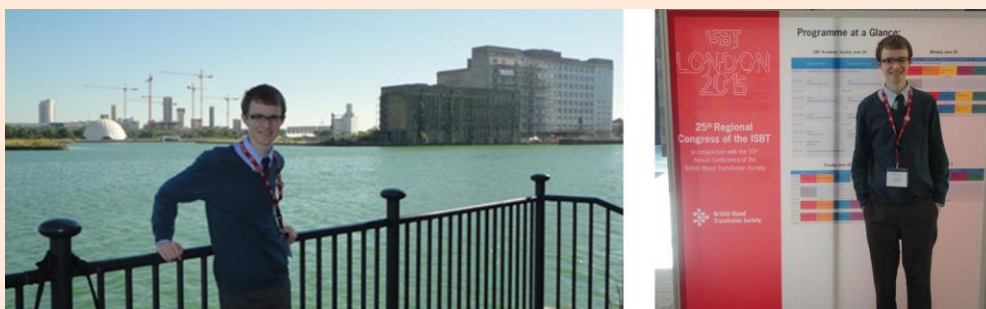
Nicole Reber and Emma Chereskin, undergrads working in Dr. Ingi Agnarsson's lab, were awarded the APLE award to start a project tagging amblys using tiny radio transmitters this summer in Puerto Rico under the supervision of Research Associate Laura Caicedo-Quiroga.

Congratulations!

UVM Biology Features Invited Speakers at the International Society for Blood Transfusion's Congress in London, UK

UVM Beckman Scholar Liam Kelley, and his Biology Department mentor, Associate Professor Bryan Ballif, were selected to present oral presentations at the [International Society for Blood Transfusion's annual meeting in London](#).

In collaboration with Dr. Lionel Arnaud, adjunct Assistant Professor of Biology (see related article in this issue), and an international team of investigators, Dr. Ballif has identified four novel blood group systems in the past three years. See [link1](#) and [link2](#) for related UVM Communication articles. Dr. Ballif presented work describing the identification of the fourth novel blood group system, Augustine, [recently published in the journal, Blood](#). Liam presented work on the molecular nature of the third novel blood group system, VEL. [Liam's work was recently published in the international biochemistry journal, FEBS Letters](#) and was a highlighted publication (see screen capture below). Also shown below is Liam just outside of the conference center on the banks of the Thames and in front of the conference program.



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Current Issue

Highlighted Articles

Step forward in understanding the Vel-negative blood type

Arnaud L. *et al.*, 2015

Bryan Ballif and colleagues recently ascribed the rare Vel-negative blood type to a deletion in the *SMIM1* gene, causing a frameshift in the corresponding small integral membrane protein. However, how SMIM1 presents the Vel antigen has so far remained a question unresolved.

Arnaud *et al.* show here that SMIM1 is a type II transmembrane phosphoprotein that displays the Vel antigen at its extracellular C-terminus. These findings are expected to have significant impact in the field of Transfusion Medicine.

STUDENT HONORS AWARDS 2016

Each year the Department of Biology recognizes and awards undergraduates who have excelled academically and have made outstanding contributions to research.

Congratulations to all!

Erin Keller - Received the *George Perkins Marsh Award in Ecology/Evolution*

Thesis Title: Life history of *Monocystis* parasites and genetic diversity of their hosts, the invasive *Amyntas* earthworms

I have been interested in ecological parasitology since I took a biology course with Dr. Joseph Schall my freshman year. Since then, I have worked in an ecological parasitology lab for three years and have written my honor's thesis on the life history of a parasite and the genetic diversity of its earthworm host. After I graduate, I intend to go to graduate school to receive my PhD specializing in ecological parasitology. In the future, I would like to become a professor of biology and continue my research on the ecology and evolution of parasites, preferably with a concentration on how the ecology and life history of parasites are changing in response to climate change.

Laura Hoyt - Received the *Joan M. Herbers Award in Biology*

Thesis Title: Inhibitory Effects of Ethanol on the NLRP3 Inflammasome

I'm currently working in the lab of Dr. Matthew Poynter as a lab technician, and we've received a grant from the University of Vermont to use this knowledge to develop still better inhibitors of the NLRP3 inflammasome that could potentially be explored as treatments for diseases associated with its over-activation. I'm also currently researching the consequences of chronic alcohol treatment on the inflammasome, and compounds which could be used to treat alcoholism associated immune suppression and de-regulation. Through my work in Dr. Poynter's lab I've become captivated with the field of immunology. My hope is to be accepted into an MD/PhD program for entry in 2018 and combine my love of caring for patients directly with biomedical research. While it's hard to predict with certainty what field I will eventually focus on, I'm currently anticipating on continuing research in the field of immunology. Eventually, I would love to combine my research interests in immunology with clinical practice in fields like oncology, allergy, or rheumatology.

Michael Gomella - Received the *Bernd Heinrich Award In Physiology or Evolution*

Thesis Title: The effect of cyclophosphamide on salt taste in mice

Doing research that revolves around taste has given me a unique appreciation of the human mouth. The complexity of our oral system is often overlooked in everyday life, but upon closer inspection, you begin to realize how important our mouths really are in making us human. This sort of revelation has led me to pursue a career in dentistry. My plan is to participate in the National Institutes of Health IRTA program next year, which is a program that gives pre-professional students the chance to work in a NIH lab for a year before ultimately going on to higher education. This, along with the three years of research I have had with Dr. Eugene Delay, will give me the experience that I need to become an academic dentist. This will allow me not only to be involved with taking care of patients, but also conducting research which will advance the field of dentistry.

David Polson - Received the *Paul A. Moody Award in Biology*

Thesis Title: Performance characteristics of a point-of-care platform for quantification of oxidation reduction potential (ORP) and exploration of ORP after traumatic brain injury

In the Dr. Kalev Freeman laboratory, I have been given the opportunity to explore the effects of traumatic brain injury on the biomarker, oxidation reduction potential (ORP). ORP is an aggregate measurement of oxidative stress as measured by a novel diagnostic platform that I have been working to evaluate and optimize. In addition to this, I have been involved in assessing physiological responses of cannulated rat and mouse mesenteric arteries when exposed to different pharmacological agents. With regard to my future goals, I plan to enroll in pharmacy school where I will pursue a Doctor of Pharmacy degree. I am looking forward to engaging in research throughout my graduate career.

Nathan Gasek - Received the *Kurt Milton Pickett Award*

I did not write a senior thesis, however, I did write a research manuscript in the past month that is currently under review in *Biology* titled: "The Contributions of the Amino and Carboxy Terminal Domains of Flightin to the Biomechanical Properties of *Drosophila* Flight Muscle Thick Filaments". In regards to my research interests, I study how muscle structure and function is tuned by proteins that bind muscle myosin. Specifically, I have used the *Drosophila* model system to investigate the myosin associated protein *flightin* and its role in dictating the demanding biomechanics accrued by insect flight muscles. I hope to use the skills and insights that I gained in the Vigoreaux Laboratory as I apply for MD/PhD programs over the coming year.

Students Analyze Acoustic Recordings



Spring BCOR 12, 2016 students and other undergraduates are collaborating with Dr. Laura May Collado and Ph.D. student Gabriel Melo Alves, who is visiting from the University of Para, Brazil since last July, to analyze hundreds of acoustic recordings from two Latin American dolphins: *Inia* spp. and *Sotalia* spp. They have a mega database consisting of recordings from over 20 collaborators throughout South and Central America. The geographical coverage of the acoustic repertoire of these species, along with previous phylogeographic work, will provide significant insights on the evolution of acoustic communication of these aquatic mammals.

MORE NEWS!

Donations Made to the Department of Biology

The Department of Biology would like to thank the generous contributions made by the following in 2015 and 2016. Your donations are very much appreciated!

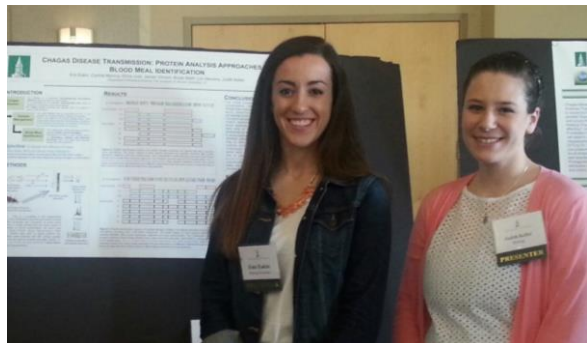
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Ms. Joan L. Read
Mrs. Wendy Sara Rosenblum
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Thank you all very much!

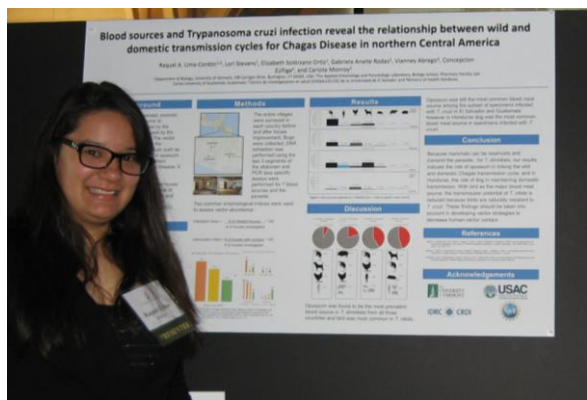
UVM 2016 Research Conference

The UVM Student Research Conference on April 28 was a daylong event highlighting the quality and breadth of undergraduate, graduate and medical student research being conducted at the University. Below is a list of some of the Biology Department's participants and their research titles

Poster Presentations

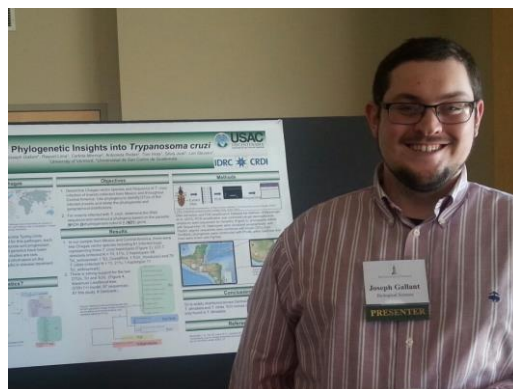


Emi Eakin, Undergrad and Judith Keller, Grad Student – Chagas Disease Vector Blood Meal Sources Identified by Protein Mass Spectrometry



Raquel Lima, Grad Student – Blood sources and *Trypanosoma cruzi* infection Reveal the Relationship Between Sylvatic and Domestic Transmission Cycles for Chagas Disease in Northern Central America

MORE [CONFERENCE](#) INFO



Joseph Gallant, Undergrad – Phylogenetic Analysis of the Parasite that Causes Chagas Disease: Insights into *Trypanosoma Cruzi* from Central American and Mexico

Oral Presentations

Sarah Emerson – Roles of the Plexin A Family in Zebrafish Eye Development

Erin Keller – Life History of *Monocystis* Parasites and Genetic Diversity of their Hosts, the Invasive *Amyntas* Earthworms

Marissa Ng – Thermal Effects on Survival and Filtration Rates of Zebra Mussels (*D. polymorpha*) in Lake Champlain

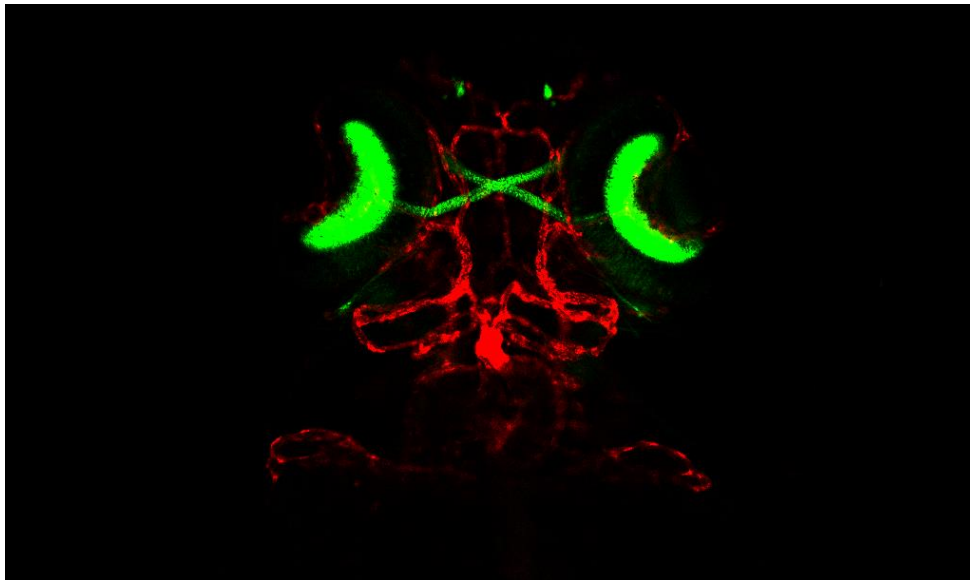
Gurkiranjit Rattu – Use of a Chemical Chaperone to Attenuate Allergic Airway Inflammation

Ashley Waldron – Characterization of Zebrafish Histidyl-tRNA Synthetase

2015 Art of Biology Contest Winners



1st Place Winner: “The major components of my PhD work: how do ant-hemipteran mutualisms affect the arthropod community on honey mesquite (*Prosopis glandulosa*). Here an ant (*Camponotus* spp.) tends a treehopper (*Vanduzee segmentata*) on honey mesquite. The ants rub their antennae over the hemipterans to "encourage" them to secrete out a sugary liquid called "honeydew" that the ant collects for food and in return they protect the hemipterans from predators and parasitoids”. Photo was taken by Graduate Student Nabil Nasserri at the Welder Wildlife Refuge in Sinton, TX with a Canon 40D and macro lens.



2nd Place Winner: “The neurons (green) and blood vessels (red) of a zebrafish embryo imaged with confocal microscopy. My thesis research aims to image and 3D print the development of the optic nerve and retinal blood vessel in zebrafish”. Photo was taken by Micala Baroffio, Honors College Senior doing thesis research in Dr. Alicia Ebert's lab.

Creating a Biology Community

Halloween BioLounge Painting and Pumpkin-Carving Party

For many years, the Biology graduate students have been asking for a lounge space for studying and talking science over a cold brew. This year, we are finally turning this request into reality, with a new “BioLounge” space in the former Environmental Chamber space vacated by Plant Biology. To kick off the renovation, the department held a group painting party and Biology-themed pumpkin-carving party this past October. Labs got creative with their entries, ranging from (zebra)fishy DNA strands to larger-than-life carvings of spiders and army ants. Faculty and students pitched in to put a fresh coat of paint on the walls, complete with a faux-fireplace to cozy up the room. The space is progressively taking shape as a graduate student hangout, where you can play ping-pong, eat your lunch with friends and colleagues, and relax on the sofa on a Friday afternoon after a long week of research. Thanks to all who donated paint, furniture, muscle-power, and ideas for their help in making the BioLounge come together!



Faculty member Alicia Ebert discussing science design with PhD students (L-R) Ashley Waldron, Sarah Emerson, Lauren Ash, and Andrew Nguyen. Professor Bryan Ballif is putting the finishing touches on the “fireplace” in the back left corner.



Professor Brent Lockwood offers his professional expertise on carving techniques to grad students Zamira Yussef, April Makhukov, and Emily Mickuki.

Visit the Zadick Thompson Natural History Collection



<http://www.uvmzoo.org/>

Alumni Update – The UVM Connection

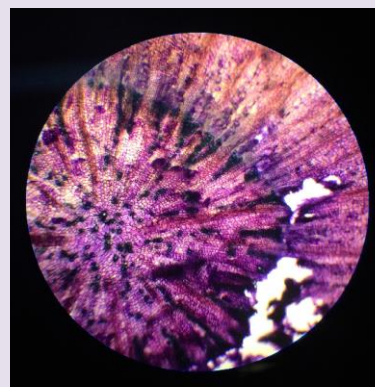


Check out the online connection to communicate with classmates from the past
<http://www.alumni.uvm.edu/>

Visit the Biology Stockroom for Lab Supplies



The Biology Stockroom, located in 004 Marsh Life Science building, is a nonprofit facility that provides convenient on site access to scientific products, many discounted and shipped free of charge. We buy by the case and pass the savings on to you. If we don't stock what you need we offer an ordering service, with overnight delivery on refrigerated/frozen products. Don't have time to stop in? We offer delivery service to main campus locations. We depend on your support for continued operation. Please consider us prior to making your next purchase. We're happy to provide you with a current quote. For more information click here: [STOCKROOM WEBSITE](#)



Microscope view of stained celery cells. The photo was taken in my BCOR 011, Exploring Biology Lab. I am a first year student and a zoology major. My interests are really focused on attaining my goal for after college. I plan to work on an animal reservation in South America, hopefully it will happen for me!
Haley Beubis



DEPARTMENT OF BIOLOGY [WEBSITE](#)

Yes! I am pleased to support the UVM Department of Biology and its commitment to excellence in education and research!

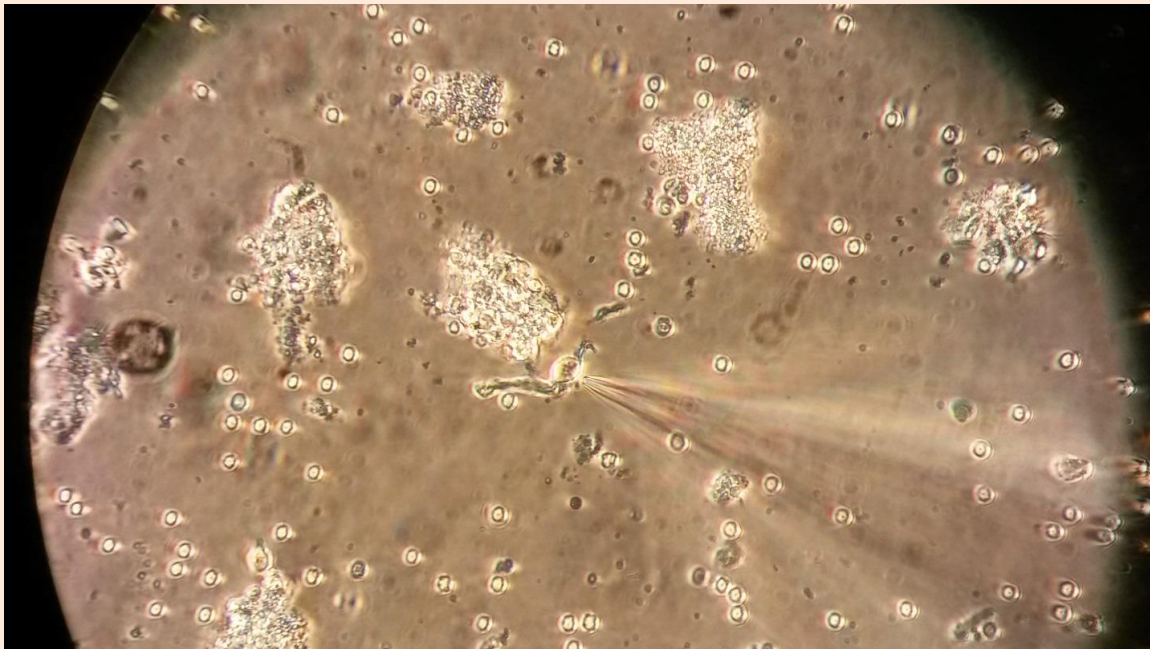
We are grateful for your contribution to the Biology Department of any amount

Please click the following link to make your donation. Scroll down, choose “Other” and type in “Department of Biology” <https://alum.uvm.edu/foundation/giving/cas>

Or send a check in the amount of \$_____ made payable to the University of Vermont Foundation. On the memo line of the check write “Department of Biology”. Cut this box out and send it with the check.

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Thank you for your support!



Here is a picture by Grad Student, Brendan Chandler, of a neuron isolated from a mouse vomeronasal organ in the Rona Delay lab. They are investigating the effects of oxytocin on cell excitation. In this picture, he is looking at the neuron under a phase contrast microscope, and is about to “patch clamp” the neuron in order to record electrical activity from it.