



University of Vermont, College of Arts and Sciences  
**Department of Biology Newsletter**  
 Spring 2015

## FACULTY NEWS

### Spiders: Survival of the Fittest Group

Nature paper provides first-ever field evidence of controversial 'group selection'

By Joshua E. Brown



UVM professor of Biology Charles Goodnight, a leading expert on theoretical population genetics. (photo: Joshua Brown)

Along rivers in Tennessee and Georgia, scientists have been studying brownish-orange spiders, called *Anelosimus studiosus*, that make cobwebby nests “anywhere from the size of a golf ball to the size of a Volkswagen Beetle,” researcher Jonathan Pruitt says. The individual spiders are only the size of a pencil eraser, but they form organized groups that can catch prey ranging from fruit flies to small vertebrates. “We have found carcasses of rats and birds inside their colonies,” Pruitt says. Unlike most spiders, which are solitary, these social spiders work together in groups.

Now new research shows that they evolve together in groups, too.

Say “group selection” among some groups of evolutionary biologists and you won’t be invited back to the party. But Jonathan Pruitt, at the University of Pittsburgh, and Charles Goodnight, at the University of Vermont, have been studying generations of these *Anelosimus* spiders — and have gathered the first-ever experimental evidence that group selection can fundamentally shape collective traits in wild populations. Their [results](#) are presented in the Oct. 1, 2014 online edition of the journal *Nature*.

“Biologists have never shown an adaptation in nature which is clearly attributable to group selection,” Goodnight said. “Our paper is that demonstration.” [READ MORE](#)

## International Collaboration Identifies Fourth Novel Blood Group System

Since the 1980s only six new blood group systems have been identified. Four of the six have been identified thanks to a long-lasting collaboration between Associate Professor of Biology Bryan Ballif at the University of Vermont (UVM) and Dr. Lionel Arnaud at the French National Institute of Blood Transfusion. The proteins responsible for these four “new” blood group systems were identified using Vermont Genetics Network-funded mass spectrometers. The four new blood group systems are in addition to the better known ABO and Rh blood groups systems and bring the total count to 36. Knowing the molecular basis of all blood group systems will dramatically simplify the ability of health care professionals to provide matched blood for individuals that require life-saving transfusions.



Members of the research team (left to right) Carole Saison, Bryan Ballif, Lionel Arnaud and Virginie Helias at the INTS in Paris in 2012 while being interviewed by the Russian press following the twin discoveries of the Lan and Junior blood group systems. Lab work from the team at this time led to critical results responsible for the identification of the Vel and Augustine blood group systems. Image credit: <http://www.ntv.ru/video/293824/>

A new blood group system is first suspected when all known blood types can't explain why a patient rejects a blood transfusion or why there is a blood-based mother-fetus incompatibility. However, several suspected blood group systems have remained mysterious for decades due to an inability to determine their molecular and genetic bases. This was true for the Lan, Junior and Vel blood group riddles that Ballif, Arnaud and colleagues solved a couple years ago.<sup>1,2,3</sup> The most recent discovery of the blood group system called “Augustine” will be published in the prestigious journal *Blood* of the American Association of Hematology.<sup>4</sup>

Interestingly, blood types reflect anthropological migrations and ancestry. For example, the Junior-negative blood type is very rare worldwide except in people of Japanese Ancestry, and the Vel-negative blood type is almost restricted to people of European Ancestry. The newly-discovered blood type Augustine-negative has only been found from those of African ancestry. Up to 10,000 individuals in the United States and 600,000 individuals in Sub-Saharan Africa are estimated to be Augustine-negative.

UVM's CAS Dean's Lecture by Dr. Bryan Ballif click [HERE](#)

1. Saison C, Helias V, Ballif BA, Peyrard T, Puy H, Miyazaki T, Perrot S, Vayssier-Taussat M, Waldner M, Le Penne PY, Cartron JP, Arnaud L. Null alleles of ABCG2 encoding the breast cancer resistance protein define the new blood group system Junior. *Nature Genetics*. 2012;44:174-7.
2. Helias V, Saison C, Ballif BA, Peyrard T, Takahashi J, Takahashi H, Tanaka M, Deybach JC, Puy H, Le Gall M, Sureau C, Pham BN, Le Penne PY, Tani Y, Cartron JP, Arnaud L. ABCB6 is dispensable for erythropoiesis and specifies the new blood group system Langereis. *Nature Genetics*. 2012; 44:170-3.
3. Ballif BA, Helias V, Peyrard T, Menanteau C, Saison C, Lucien N, Bourgouin S, Le Gall M, Cartron JP and Arnaud L. Disruption of SMIM1 defines the Vel-blood type. *EMBO Molecular Medicine*. 2013; 5:751-61.
4. Daniels G, Ballif BA, Helias V, Saison C, Grimsley S, Mannessier L, Hustinx H, Lee E, Cartron J-P, Peyrard T and Arnaud L. Lack of the nucleoside transporter ENT1 results in the Augustine-null blood type and ectopic mineralization. *Blood*. In Press.

# Mansfield to Champlain

## Exploring the Impacts of Climate Change

By Joshua Brown

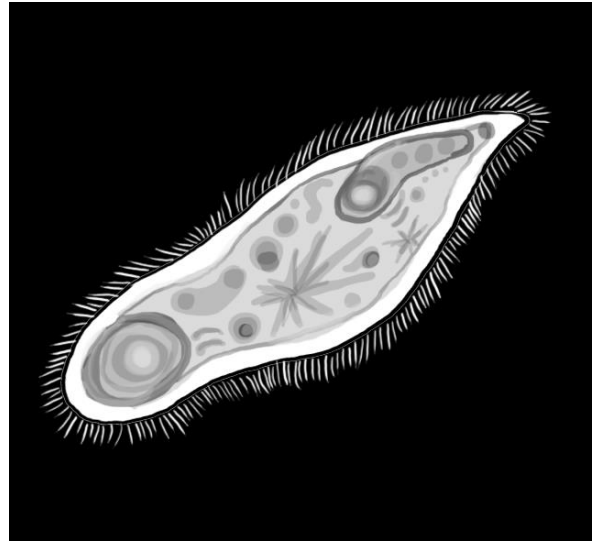


For two million years, Vermont was ruled by ice. Glaciers would surge south, retreat north. Each time the ice melted, a raw landscape of scoured bedrock would be revealed. And, each time, life would return.

In Vermont, the average temperature has risen almost two degrees Fahrenheit since 1970. And, unless we stop spewing carbon dioxide, the Intergovernmental Panel on Climate Change projects another four to eight degrees of global warming before the year 2100 – on a path to warming far beyond what has been experienced since humans evolved.

Dr. Sara Helms Cahan, Department of Biology at UVM, knows all of this – and considers what’s next. She is one of a diverse group of researchers from across the university who have cultivated a kind of useful double vision. They’re looking closely in nearby places – like Missisquoi Bay, Addison County hayfields, and Breadloaf Mountain – shining a light onto the manners and mysteries of individual plants and animals. For complete story by Joshua Brown click [HERE](#)

## Old Lab Animal Model Systems Gain New Respect—Paramecium Redux



Paramecium Illustration by Johnny Chang, ASCB

By John Fleischman

When the fledgling ASCB held its big meeting in a down-at-the-heels hotel on the Chicago lakefront in 1961, it was something of a carnival of animals, lab animals. Peter Satir, who is now at the Albert Einstein College of Medicine in the Bronx, NY, explains “It’s a voltage sensitive calcium channel and it was one of the first described channels. It goes back a long ways.” To hear where *Paramecium* are going today, Satir recommended that I speak to Dr. Judith Van Houten at the University of Vermont. Click [HERE](#) for full story.

*John Fleischman is ASCB Senior Science Writer and the author among other things of two nonfiction books for older children, “Phineas Gage: A Gruesome but True Story about Brain Science” and “Black & White Airmen,” both from Houghton-Mifflin-Harcourt, Boston*



## Dr. Ingi Agnarsson's Spider Leads an Article in Nature



The team: Matjaz Kuntner, Park Ranger Honore Rabarison (aka Nono), Malagasy Graduate Student Sahondra Hanitriniaina, and Ingi Agnarsson

Dr. Ingi Agnarsson and Matjaz Kuntner were in Madagascar in 2001 to look for social spiders and noticed enormous webs, but they didn't do much about it other than marvel at it. After Ingi studied material sciences in 2007-8, he thought their silk might be interesting so they returned in 2009, found them, and realized that they were undescribed (new to science). They described them, and then characterized the material properties of their silk - that was indeed unique!



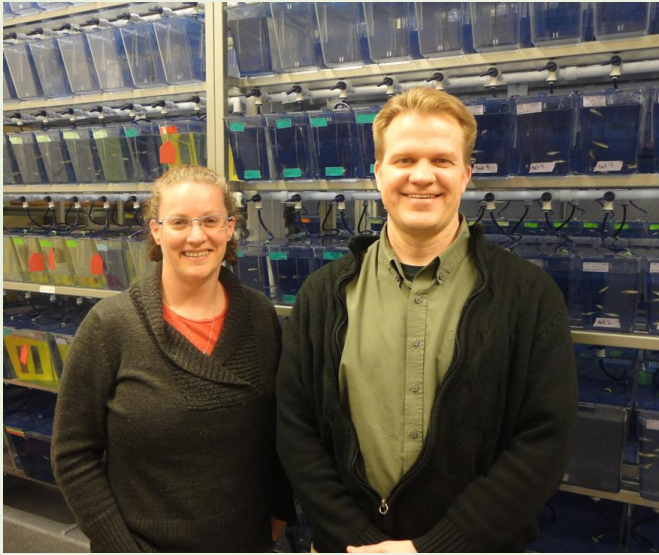
The spider is an orb-weaver from Madagascar that constructs the largest known orb web which it casts across rivers and lakes. It produces silk that is stronger than steel and 10 times tougher than Kevlar. It was named Darwin's Bark Spider (*Caerostris darwini*) in honor of Charles Darwin, 200 years after his birth and on the 150th anniversary of his "Origin of Species"

The spider Dr. Ingi Agnarsson and Matjaz Kuntner discovered and described in 2010, leads an article in the March 26, 2014 issue of Nature on biomimicry.

[ARTICLE](#)

**Left: Nono in awe of an enormous Darwin's Bark Spider web**

## NSF Awards Biology Professors Grant to Study Signaling Mechanisms of Eye Development



**Drs. Alicia Ebert and Bryan Ballif**

Alicia Ebert, Assistant Professor of Biology, is an expert in vertebrate eye development and joined the Biology Department in 2012. Dr. Ebert uses zebrafish as a model organism given their many attractive features including rapid development (three days), the many powerful genetic tools that can be used to test gene function and their excellent relevance to vertebrate developmental processes including human disorders. Recently the NSF awarded Dr. Ebert, and her Co-PI, Bryan Ballif (Associate Professor of Biology), a \$520,000 grant to investigate how two critical signaling molecules, Semaphorin6A and PlexinA2, maintain proper cell numbers and proper cohesion during eye development. While a postdoctoral fellow at the University of Calgary, Dr. Ebert had uncovered that these molecules play important roles in eye development. After setting up her lab in Vermont, Professor Ebert finished critical experiments leading to a foundational publication in the prestigious journal *Development*<sup>1</sup> that set the stage for the NSF award. Pictured are Dr. Ebert and Dr. Ballif in Ebert's zebrafish facility.

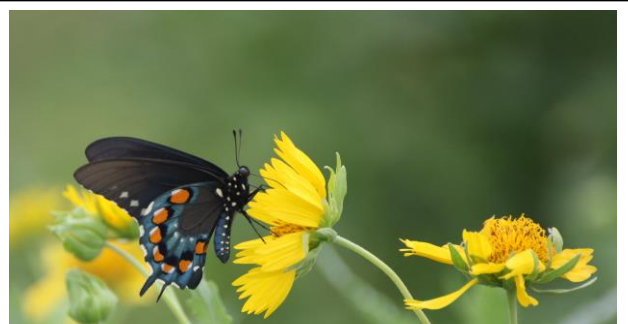
<sup>1</sup>**Ebert AM**, Childs SJ, Hehr CL, Cechmanek PB, McFarlane S. *Sema6a* and *Plxn2* mediate spatially regulated repulsion within the developing eye to promote eye vesicle cohesion. *Development*. 2014 Jun;141(12):2473-82.

## Van Houten Named First Recipient of President's Distinguished University Citizenship and Service Award



Since her arrival in 1980 as an Assistant Professor in the Department of Zoology, Judith Van Houten has established herself as a world-class researcher and scholar in the field of chemosensory transduction and a leader among the faculty at UVM.

Judith Van Houten, George H. Perkins Professor of Biology, has been named the inaugural recipient of the President's Distinguished University Citizenship and Service Award for her consistent and outstanding record of service over time to the university community. [FULL STORY](#) by Jon Reidel







Biology Department Lecturer, Allison Neal, created a [VIDEO](#) “Sex-y science: Sex ratios in patchy populations” that was a finalist in the 4<sup>th</sup> Annual Evolution Film Festival held on June 21 at the Evolution 2014 Conference in Raleigh, NC.

*Congratulations Alli!*

For a list of all entries and information on the National Evolutionary Synthesis Center (NESCent) Evolution Film Festival click [HERE](#)



Spring has sprung, and it feels great! The swallows will be back before you know it. Here is a picture of Dr. Bernd Heinrich "feeding" a feather to a swallow for its nest.

## Faculty Talks and Publications

Ruch J, Riehl T, May-Collado LJ, Agnarsson I. 2015. Multiple origins of subsociality in crab spiders (Thomisidae). *Molecular Phylogenetics and Evolution* 82:330-340.

Velez-Zuazo X, Alfaro-Shigueto J, Mangel J, Papa R, Agnarsson I. 2015. What barcode sequencing reveals about the shark fishery in Peru. *Fisheries Research* 161:34-41

Kuntner M, Agnarsson I, Li D. 2015. The eunuch phenomenon: Adaptive evolution of genital emasculation in sexually dimorphic spiders. *Biological Reviews* 90:279-296

May-Collado LJ, Kilpatrick WC, Agnarsson I. 2015. Mammals from “down under”: a multi-gene species-level phylogeny of marsupial mammals (Mammalia, Metatheria) *PeerJ* 3:e805; DOI 10.7717/peerj.805

Clarke, G. and A.K. Brody. 2015. Gender inequality in predispersal seed predation contributes to female seed set advantage in a gynodioecious species. *Ecology*. *In press*.

Smith KP, Fields JG, Voogt RD, Deng B, Lam YW, Mintz KP. Alteration in abundance of specific membrane proteins of *Aggregatibacter actinomycetemcomitans* is attributed to deletion of the inner membrane protein MorC. *Proteomics*. 2015 Feb 13. doi: 10.1002/pmic.201400505.

Gotzek, D., H. J. Axen, A. Suarez, S. Helms Cahan, and D. Shoemaker, 2015. Global invasion history of the Tropical Fire Ant, *Solenopsis geminata*: A stowaway on the first global trade routes. *Molecular Ecology* 24:374-388.

May-Collado, L. J., C. W. Kilpatrick, and I. Agnarsson. 2015. Mammals from ‘down under’: a multi-gene species-level phylogeny of marsupial mammals (Mammalia, Marsupialia). *PeerJ* DOI 10.7717/peerj.805.

Brandon Ogbunu - Invited Talk - Putting the “Rational” in Rational Drug Therapy, March 2015, University of California, Merced

Brandon Ogbunu - Invited Talk – Environmental Sculpting the Fitness Landscape, Jan. 2015, University of Massachusetts Medical School

Van Houten, J.L., Nabi, A., Picariello, T.A., Valentine, M.S., Yano, J. Meckelin guides basal body movement through interactions with the striated rootlet FASEB July 2015

Van Houten, J.L., Nabi, A., Picariello, T.A., Valentine, M.S., Yano, J Meckelin guides *Paramecium* basal body movement through interactions with the kinetodesmal fiber, ISOP meeting Seville, Spain 2015

### Dr. Agnarsson Co-PI on Grant

Dr. Ingi Agnarsson is co-PI on a small grant that got funded (2015) by the Smithsonian Global Genome Initiative to “solve” spider phylogeny



DEPARTMENT OF BIOLOGY [WEBSITE](#)

## ALUMNI NEWS

### Dr. Rebecca Irwin, Accomplished Alum 2015



Dr. Rebecca Irwin is the recipient of our 2015 Accomplished Alumni award.

Becky is a native Vermonter and completed her Bachelor of Arts with Honors (Phi Beta Kappa and Magna Cum Laude) at Middlebury College in 1996. She then came to UVM to work with Dr. Alison Brody and completed her Ph.D. in 2000. Upon completing her Ph.D., Becky had 5 publications either in print or in press, as well as two offers for Post-doctoral positions and one tenure-track job offer “in hand”. Becky chose to conduct Post-doctoral research at the University of California with Dr. Sharon Strauss. From there, Becky spent three years at the University of Georgia as an Assistant Professor and moved on to Dartmouth College where she is now an Associate Professor in the Biology Department. She will be moving to North Carolina State University as a Full Professor in August. Becky has been continuously funded since 1998 by the National Science Foundation and, more recently, by USDA. She has published over 50 articles in high profile journals and she’s in high demand as a speaker, collaborator, and graduate and undergraduate student mentor.

Becky is an accomplished leader in the field of plant-animal interactions. Her interests are broad and her knowledge is deep. Becky is among the first to explore the importance of nectar-robbing bumble bees on both male and female function in flowering plants, as well as to understand how nectar robbing affects entire communities of plants and pollinators. Becky is also among the first to examine if toxic compounds produced by plants to ward off herbivores end up in nectar and, once there, how they affect both specialist and generalist pollinators. Becky’s work doesn’t stop there. She has published extensively on the effects of drivers of global change—including invasive plants, climate change, and urbanization—on native plant-pollinator communities. It is a pleasure to honor Dr. Rebecca Irwin as one of our own.



## Dr. Concetta C. DiRusso



Dr. Concetta C. DiRusso is a Professor of Biochemistry at the University of Nebraska-Lincoln and a Fellow of the American Association for the Advancement of Science. She obtained her BA from Hampshire College, PhD in Cell and Molecular Biology from the University of Vermont in 1982, and completed postdoctoral studies in biochemistry at the University of California, Irvine. In 1986, Dr. DiRusso joined the University of Tennessee Health Science Center where she conducted seminal work describing the mechanistic details of a fatty acid-responsive transcription factor that regulates genes required for fatty acid oxidation and biosynthesis. Following a sabbatical at Odense University, Dr. DiRusso was recruited to Albany Medical College in 1996 where she characterized one of the first eukaryotic fatty acid transport proteins. Using a series of directed mutagenesis studies, she and her colleagues localized the functional domain within this protein required for transport. This foundational work allowed Dr. DiRusso to develop a novel high throughput screening method that identified several small molecule inhibitors that reduce fatty acid transport into human cells. Professor DiRusso holds two patents for these compounds, which are now in preclinical trials. Her expertise in complex lipid metabolism is of national prominence as evidenced by an uninterrupted and externally supported research program by the NIH, NSF, USDA and AHA since 1988. She has presented her work at international conferences and served on grant peer review panels for the NIH, NSF, and AHA and as an Editorial Board Member for the Journal of Biological Chemistry, Endocrine Research and Frontiers in Fatty Acid and Lipid Physiology. Dr. DiRusso has spent considerable effort to advance women and underserved minorities in the STEM disciplines, culminating in her work as Chair of the Faculty Committee of ADVANCE-NE, which developed best practices for recruitment, advancement and retention of tenure-track women faculty in STEM.

Dr. DiRusso is also serving as a Jefferson Science Fellow at USAID working in the bureau for Global Health in the Office of HIV/AIDS as a nutrition advisor. In addition, she was named the George Holmes Professor of Biochemistry at the University of Nebraska-Lincoln. Dr. DiRusso's [WEBSITE](#)

## Renny Franceschi, '71



I graduated from UVM in 1971 with a Zoology major and minors in Chemistry and English. I was particularly interested in molecular aspects of biology, which led me to study biochemistry first at NYU in the laboratory of the Nobel Laureate, Severo Ochoa, and then at Purdue University where I earned a PhD in 1978. After a 2 year postdoctoral stint at the University of Wisconsin-Madison, where I worked on vitamin D metabolism, I took a faculty position at the Harvard School of Public Health. I subsequently held faculty positions at the University of Texas and the University of Michigan where I am currently a Professor in the Schools of Dentistry, Medicine and Biomedical Engineering. For most of my career, my research has focused on mineral metabolism and bone formation, particularly mechanisms of gene regulation in osteoblasts, the cells that make bone. We've also done work developing gene therapy approaches for bone regeneration and, more recently, on prostate cancer.

I've published over 120 peer-reviewed scientific papers and have been continuously funded by the National Institute of Health for the past 30+ years. In 2008 I was awarded the Distinguished Scientists Award for Basic Research in Biological Mineralization by the International Association for Dental Research. I also served as Associate Dean for Research at the University of Michigan, School of Dentistry where I teach cell and molecular biology to first year dental students.

I fondly remember my undergraduate years at UVM where I was inspired to pursue a career in biomedical research. Outstanding professor to whom I am particularly indebted were Drs. Howard Rothstein, Beale Hyde and David Weller who first exposed me to biochemistry and molecular biology (which was in its infancy in those days). Dr. Franceschi's [WEBSITE](#)

## Alumni Dr. David Topham and Influenza Research



Dr. David Topham, member of the UVM class of 1985, was awarded his BS degree in Biology with the class of 1986. He was also awarded his MS and PhD from the University of Vermont. Dr. Topham is an Associate Professor of Microbiology and Immunology, a member of the David H. Smith Center for Vaccine Biology and Immunology, and co-directs the New York Influenza Center of Excellence – one of the six national Centers of Excellence in Influenza Research and Surveillance supported by the National Institutes of Health. He has also served on IBM's Global Pandemic Steering Committee. His research interests are in the area of immune responses to influenza and experimental vaccines, and include computational modeling of the immune system. He said his career “all started with my BS in Biology at UVM”.

David Topham joined the faculty at the University of Rochester Medical Center in 1999 and was appointed in 2009 as Vice Provost and Executive Director of the Health Science Center for Computational Innovation (HSCCI), a partnership between the University and IBM. As Executive Director of the HSCCI, Dr. Topham's responsibility is to support collaboration in biomedical research using High Performance Computational Resources. He will bring together academic biomedical and health-related Research Investigators, High Performance Computational Biologists, and HP Research Computing resources. Dr. Topham provides strategic direction to the HSCCI and facilitates the development of research projects between UR scientists and its corporate partners, as well as support from state and federal agencies. [READ MORE](#)

### UVM Alum Carly Brown Awarded 2014 Knowles Science Teaching Foundation Teaching Fellowship



The Knowles Science Teaching Foundation ([KSTF](#)) recently announced its 2014 Teaching Fellows, one of whom is a Burlington born, 2007 and 2013 graduate of the University of Vermont Departments of Biology and Plant Biology, Carly [Brown](#). Selected from a pool of more than 180 applicants, Carly was one of 32 exceptionally talented, early-career science, technology, engineering and/or mathematics (STEM) teachers to be awarded a 2014 KSTF Teaching Fellowship.

In the fall, Carly began her first year of teaching at Craftsbury Academy, in Craftsbury, VT.

### Honorary Degree Recipient Ian D. Boyce *Doctor of Humane Letters*



Ian D. Boyce, UVM Class of 1989, has served the University of Vermont with dedication and passion as a student and an alumnus. A well-rounded student athlete, he served as an orientation leader, on presidential committees, and in the Boulder Society, among his many leadership activities as an undergraduate at UVM. Celebrated as one of the best two-way forwards in UVM Catamount history, he led the hockey team to compete in its first NCAA Hockey Division I tournament in 1988. [READ MORE](#)



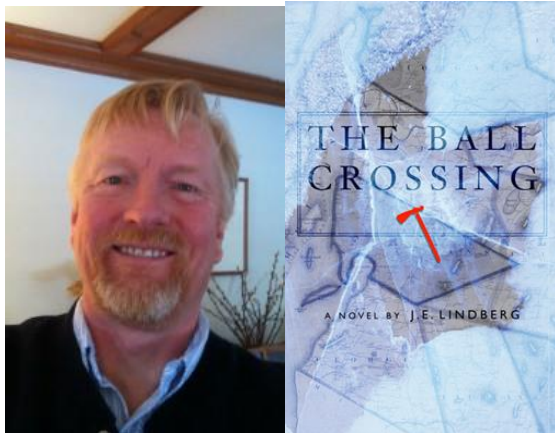
## Taking Science into the Classroom: Two Recent PhD Alumni Accept Faculty Positions in New England



The job market in academia is tough these days, and getting a tenure-track job at a university in the sciences can require an impressive resume filled with both research accomplishments and teaching credentials. Two of our recent Biology PhD graduates, Dr. Heather Axen (left) and Dr. Allison Neal (right), took advantage of the opportunity to gain additional teaching experience at UVM once they finished their degree by becoming lecturers, teaching everything from non-majors biology to advanced courses in Population Genetics and Ecological Parasitology. All this hard work has paid off, as Heather has recently accepted a tenure-track position at Salve Regina University in Newport, Rhode Island, and Alli will be starting as an Assistant Professor this fall at Norwich University in Northfield, Vermont. Congratulations to them both, and we wish them luck as they embark on this next important stage in their careers.

## John Lindberg's New Book "The Ball Crossing"

I'm a 1987? Graduate of the BS Biology program (among 3 other degrees I have from UVM: BA Psychology, BS Civil/Environmental Engineering, MS Environmental Engineering). I grew up in St. Albans, VT and my education at UVM was a foundational step in my life.



I'm presently living in in Hampstead NH with my wife Sally Gunn who is also a UVM Engineering graduate and our 13 year old son Ian. I work with EnSafe Inc. a national EHS consulting firm based in Memphis, TN and I'm also an Adjunct Instructor at UMass Lowell with the Department of Work Environment.

In addition to catching up, my other reason for writing is to let my fellow alums know that I recently wrote and published an historical novel set in northwestern Vermont in the mid-1870s. It is called "The Ball Crossing" and is available as an e-book through Amazon, Barnes and Noble and Kobo. Author's website click [HERE](#)

## UVM Well Represented on the Faculty of Virginia Military Institute



The University of Vermont, Department of Biology is well represented on the faculty of Virginia Military Institute, a small nationally-ranked liberal arts and engineering college in the mountains of Virginia. Professor Wade Bell received his Ph.D. in 1999 working in the laboratory of Professor Judy Van Houten. Assistant Professor Ashleigh Smythe received her B.S. in 1993 spending time in the laboratory of Professor Charles Goodnight and then after graduation collecting lizards for Professor Joe Schall's lizard malaria project in Puerto Rico. Dr. Bell teaches courses in Cell Biology and Immunology. Dr. Smythe teaches Invertebrate Zoology and Parasitology. Both also teach General Biology. Dr. Bell continues to do research on Paramecium, the wonderful model he used while working with Dr. Van Houten. Dr. Smythe has become a Nematologist, receiving a Ph.D. from UC Davis in that field. She conducts research on marine nematode phylogeny and also has fascinating projects involving insect and mammalian parasites. Both credit their UVM Biology Department experience as having a significant impact on both their teaching and research.



Research by UVM alum Heather Axen reveals invasive fire ants traveled the world in 16th century Spanish galleons - read news story [HERE](#)

## Dr. Marc Allard Video

Dr. Marc W. Allard is a graduate of UVM and is now a senior scientist with the FDA.

The FDA is spearheading the use of whole genome sequencing to aid in the fight against outbreaks of foodborne illnesses by identifying the DNA fingerprint left by disease-causing bacteria. GenomeTrakr is a global database of these genome sequences, which FDA coordinates with other state and federal laboratories, and has made publicly available.

Click [HERE](#) to view "FDA's Genome Trakr – Pushing Back the Frontiers of Outbreak Response"

## War halts homeland rebuilding for Vermont “Lost Boy”

Story by Tim Johnson, Burlington Free Press



Bior arrived in Burlington in 2001 as a refugee and became the first of the so-called “lost Boys of Sudan” in Vermont to receive a Ph.D., in biology. He then headed back to his land of origin to put his skills to use in nation-building. South Sudan had gained independence in 2011 after long-running civil wars that led to the initial exodus of Bior and thousands of others. [FULL STORY](#)

## Ken Field’s Research on White-Nose Syndrome



University of Vermont 1990 Alum Ken Field’s research on white-nose syndrome in bats was recently featured on the front page of the Science Times section of the NY Times. Click [HERE](#)

## What our Graduates are Doing with their Degrees

**Laura Hill Bermingham, Class of 2008**, won the Joseph E. Carrigan Award for Excellence in Teaching and Undergraduate Education in 2014. The Carrigan Award is the most prestigious faculty teaching award in the College of Agriculture and Life Sciences at UVM. It recognizes outstanding effort and achievement in undergraduate teaching, student advising, and undergraduate education. Dr. Bermingham got her Ph.D. in Biology at UVM, with an emphasis on Ecology and Evolution. Laura is currently a Lecturer and Research Associate in Plant Biology at UVM.

**Anne Vardo-Zalik, Class of 2008**, has completed a year of postdoctoral work at the University of California and in 2014 was awarded a competitive 3 year NIH Postdoctoral Fellowship to continue her studies on the genetics of malaria parasites. Dr. Vardo-Zalik chose to accept a faculty position offer from Pennsylvania State University instead. She will begin teaching at Penn State in 2014. While a graduate student in the Biology Department, Anne won many awards, including best student talk at two international meetings.

**Dilhan Weeraratne, Class of 2007**, completed a postdoctoral fellowship at Harvard Medical School and Children's Hospital Boston in pediatric oncology in 2014. Dilhan, an alumnus of the Biology Department at UVM, completed his PhD in 2007 under the supervision of Dr Judith Van Houten. Following his PhD, he has been working on understanding the genomic complexity of medulloblastoma, the most common malignant brain tumor in children, in Scott Pomeroy's laboratory at the Harvard Medical School.

[READ MORE](#)





## David White on Top of Bondcliff in New Hampshire



“Although my father would have told you I always liked to argue, that is not the reason I became a lawyer. I decided to attend law school when I was living in Vermont, doing environmental work, and I saw that the lawyers held so many of the important keys. I decided that if I was going to make a difference in this world, I had to be a lawyer.”

I am a lawyer in Boston. I like hiking. In June of last year, I finished hiking the New Hampshire 4,000 footers. There are 48. I am one away from my New England 67, and just six away from the New York/New England 115.

## Max Kravitz, UVM Biology '12

“I was working in the Brehm neurobiology lab in the Vollum Institute at Oregon Health Science University (OHSU) in Portland, Oregon that used electrophysiology to study the effects of specific mutations in components of the neuromuscular junction in zebrafish. Now I'm set to be the microbiologist at an exciting up and coming Belgian inspired brewery in Hood River, Oregon called pFriem.”



Max Kravitz and his little visitor for the day in the zebrafish room facility where they house numerous neuromuscular mutant fish



## College of Medicine Class of 2015 Thanks Biology Department Mentors

There are a few of us who passed through the Biology Department a few years ago, either as majors or course-takers who would like our colleagues and mentors to know that WE MADE IT!

Charlie Hackett, Julia Hobson, Elizabeth Landell, Darlene Peterson, Matt Robichaud, David Swift and Tyler Van Backer

*Darlene Peterson*  
*College of Medicine Class of 2015*

## GRADUATE STUDENTS

### GRADUATES 2015

*Congratulations to the following graduate students who completed their degrees!*



**Critian Dambros, Dr. Nick Gotelli, Dr. Linden Higgins, Yainna Hernaiz-Hernandez, Dr. Sara Helms Cahan, Dr. Alicia Ebert, Dr. Bryan Ballif and Erin Wysolmerski** (other Grad students listed below were not available for picture)

**Alexandra Beattie** – An Analysis of the Effect of –Hydroxy-Methylbutyrate on the Flight Ability and Lifespan of *Drosophila Melanogaster*. Advisor: Dr. Jim Vigoreaux

**Lucas Bernacki** – The Molecular Evolution of Non-Coding DNA and Population Ecology of the Spiny Softshell Turtle (*Apolone spinifera*) in Lake Champlain. Advisor: Dr. C. William Kilpatrick

**Cristian Dambros** – Determinants of Termite Species Taxonomic, Phylogenetic, and Functional Diversity in the Amazonian Forest. Advisor: Dr. Nick Gotelli

**Jonathan Gonzalez** – Investigations into Host-Specific Interactions and Local Adaptation in the Mycorrhizal Symbiosis. Advisor: Dr. Alison Brody

**Yainna Hernaiz-Hernandez** – Effects of Hybridization and Life History Tradeoffs on Pathogen Resistance in the Harvester Ants. Advisor: Dr. Sara Helms-Cahan

**Allison Neal** – Local Mate Competition and The Sex Ratios of Malaria Parasites, with a Focus on *Plasmodium Mexicanum*. Advisor: Dr. Joseph Schall

**Tyler Picariello** – Meckelin Functions in the Guided Movement and Orientation of Basal Bodies Prior to Duplication in *Paramecium Tetraurelia*. Advisor: Dr. Judy Van Houten

**Jonathan Vick** – The Contribution of Purinergic P2X and P2Y Receptors to the Excitability of Mouse Vomeronasal Sensory Neurons. Advisor: Dr. Rona Delay

**Erin Wysolmerski** – FGF8A is Required for Proper Vascularization of the Zebrafish Retina. Advisor: Dr. Alicia Ebert

### Erin Wysolmerski 2015 Graduate Teaching Assistant of the Year



Erin is extremely knowledgeable in the molecular and cell biology field and is excellent at guiding students through difficult concepts such as bacterial transformation and PCR. She has been instrumental in giving helpful suggestions in lab meetings and helping to improve protocols from her own experiences. She is a team player and is helpful if other TAs need assistance (many new TAs attended her lab sections to prepare for their own!). She has an excellent rapport with her students and they enjoy being in her lab and appreciate her competency. Quotes from former students “When I sought out help from her outside of lab, she always made sure that I fully understood the topic before I left”, “She not only explains all of the lab protocols clearly, but also explains how they can be used in the real research fields,” “I find that her direction leads me to a great understanding of the topic, likely the result of her subsequent questions and clarifications of the lab and class material”

Erin has been accepted into the masters in teaching in curriculum and instruction program at UVM and will be starting that program in the Fall...so, she won't be far away!

***Congratulations Erin!***

## PhD student Mike Herrmann in the Media Spotlight



Mike Herrmann and advisor Sara Helms Cahan inspecting an ant colony

The private lives of ants became international news this past October, when PhD student Mike Herrmann's research on the evolution sexual conflict in Harvester Ants was published in the prestigious scientific journal *Proceedings of the Royal Society of London B*. In the study, Mike demonstrated that male and female ants are engaged in an evolutionary tug-of-war over the male's sperm, with males attempting to reserve their sperm for the perfect mate while females try to take the sperm by force through extended copulation. The sexy story was picked up by the press, with articles in local outlets (e.g., [Seven Days](#)), national newspapers (The Washington Post, the Los Angeles Times), and even the CBC radio show *Quirks and Quarks* (podcast [LINK](#)). Click [HERE](#) to read the UVM CAS article by Joshua E. Brown and to access links to national newspaper coverage. Kudos to Mike for becoming a science celebrity!

### Ronald Suiter Award Winners

**Katie Ann Miller** – Presentation title: “Variation in C:N:P Stoichiometry across a climate gradient in *Aphaenogaster rudis* species” at the Ecological Society of America Meeting, August 9-14, 2015

**Nabil Nasseri** – Presentation title: “Just the two of us...or is it the three of us? The role of ant-hemipteran mutualisms in maximizing fruit and flower production of an invasive hardwood, honey mesquite (*Prosopis glandulosa*)” at the Ecological Science at the frontier: Celebrating the ESA Centennial, August 9-14, 2015

**Nelish Pradhan** – Presentation title: “Population Structure of the Himalayan wood mouse (*Apodemus Gurkha*) in Central Nepal” at the 95<sup>th</sup> Annual Meeting of the American Society of Mammalogists, June 2-16, 2015

***Congratulations!***



## Samantha Alger Receives a 2015 NSF Graduate Research Fellowship



Samantha Alger, a Ph.D. student under the guidance of Dr. Alison K. Brody, received a 2015 National Science Foundation Graduate Research Fellowship. Samantha studies the prevalence, effects, and transmission of RNA viruses in native bumble bees here in Vermont. In addition to her work with native bees, Samantha recently spearheaded Vermont's involvement with the National Honey Bee Survey. The survey is a nationwide effort to gather baseline data on bee disease. Thanks to a recent collaboration with the Vermont Beekeepers Association, Bee Informed Partnership, and USDA APHIS, this summer will mark Vermont's first year of involvement with the survey. This is an important step in maintaining healthy pollinator communities for Vermont!



## Nabil Nasserri Awarded the Rob & Bessie Welder Wildlife Foundation Refuge Fellowship



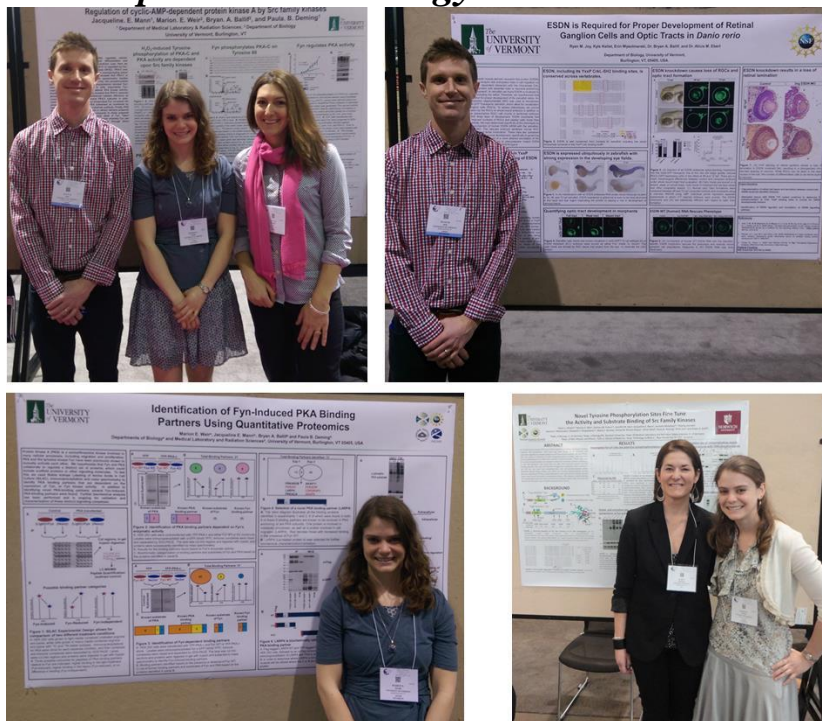
A bruchid beetle (Family Chrysomelidae) walking on a honey mesquite stem with a blister beetle (Family Meloidae) in the background. Bruchids are a major seed predator while blister beetles primary pollen predators of honey mesquite.

*Photo by Nabil Nasserri*

Nabil Nasserri was awarded the Rob & Bessie Welder Wildlife Foundation Refuge Fellowship for the second straight year. The Welder Fellowship will help fund Nabil's PhD research on the effect of ant-hemipteran mutualisms on the arthropod community of an invasive tree, honey mesquite, in south Texas.

In addition, Nabil has also been awarded the Ronald Suiter prize to attend and present his PhD work at the Centennial Anniversary of the Ecological Society of America conference to be held in Baltimore, MD.

## Cell Signaling Studies Presented at *Experimental Biology 2015 in Boston*



Clockwise from top left: Biology Graduate Students Ryan Joy, Marion Weir and Professor Paula Deming (UVM Medical Laboratory Sciences); Ryan Joy; Professor Karen Hinkle (UVM Biology Adjunct and Norwich Biology); Marion Weir

Biology Department graduate students Marion Weir and Ryan Joy, along with their advisor, Bryan Ballif, and collaborating professors Paula Deming (Medical Laboratory Sciences, UVM) and Karen Hinkle (Biology, Norwich University and adjunct UVM Biology) presented four studies at this international conference. The work was tied together around an important set of cellular enzymes, tyrosine kinases of the Src family. Src family kinases are critical for cellular migration and cellular proliferation and therefore have implication in development and diseases such as cancer. Indeed Src, the prototypical family member, was the first identified oncogene.

### Poster Presentations (Presenters Underlined):

1. Regulation of cAMP-Dependent Protein Kinase A by Src Family Tyrosine Kinases. M.E. Weir, J.E. Mann, B.A. Ballif and P.B. Deming.
2. Delineation of ESDN-Dependent Signaling Mechanisms Required for Zebrafish Eye Development. R.M. Joy, E.E. Wysolmerski, B.A. Ballif and A.M. Ebert.
3. Identification of Fyn-Induced PKA Binding Partners Using Quantitative Proteomics. M.E. Weir, J.E. Mann, B.A. Ballif and P.B. Deming. Univ. of Vermont.
4. Novel Tyrosine Phosphorylation Sites Fine Tune the Activity and Substrate Binding of Src Family Kinases. K.L. Hinkle, M.E. Weir, Z. Fulton, J. Hao, J.E. Mann, A. McGehee, T. Corwin, U. Stelzl, P.B. Deming, P. Juo and B.A. Ballif.



## Ally in the Woods with Mice



Allyson Degrassi, PhD Candidate, handling a deer mouse for her study on "Effects of hemlock woolly adelgid on small mammal communities". Ally was also a judge at the Vermont State Science and Math Fair given at Norwich University in March.

## Grad Student and Ring Leader

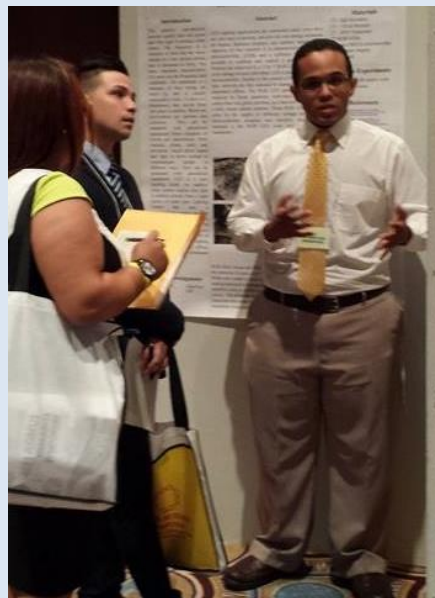


In September, Graduate Student Erin Wysolmerski was an invited seminar speaker at Immaculata University in Malvern, PA. Her talk was about using zebrafish as a model to study retinal development. After her talk, she entered the owner/dog costume contest with her dog Molly, at the Ridgewood Canine Camp in Reading Pa. She (and Molly) won first place for her costume as a ring leader with a

## Katie Miller Mentors Poster Presentation Winner



Last summer, Katie Miller mentored a high school student, Rubén García Reyes, through the summer 2014 Research Internship Program at UVM through the Ana G. Méndez University System in Puerto Rico and supported by UVM. Rubén presented the results from their research at the Ana G. Méndez Research Symposium in Puerto Rico which composed of 92 Pre-college students and 92 undergraduate and graduate students. At this symposium, Rubén was selected as one of the Top 5 Best Poster Presentation Winners (in the pre-college classification). We are very proud of all the work that he did over the summer and his subsequent accomplishments! Go Rubén!



**Rubén Garcia Reyes presenting on his research**



## UNDERGRADUATE STUDENTS

### UVM Department of Biology Students' Research Supported by Beckman Scholars Program



“It’s not so much an obligation,” junior Nathan Gasek says of the research he’s conducting in Professor Jim Vigoreaux’s lab. “It’s more something that you’re excited to do.” His work is supported by the Beckman Scholars Program, a national funding source that has chosen UVM as a partner school in large part, Vigoreaux says, thanks to the quality of undergraduate mentorship the faculty provides. (Photo: Sally McCay).

Nationwide, there are only 61 undergraduates who are part of the prestigious Beckman Scholars Program. At the University of Vermont, there will soon be five.

Sponsored by the Arnold and Mabel Beckman Foundation, the Beckman Scholars Program is awarded to 12 institutions annually to support research in biology, zoology, biological science, biochemistry, chemistry and neuroscience at the undergraduate level. The three current scholarship recipients, juniors Liam Kelley, Anna Schmoker, and Nathan Gasek, are majoring in biochemistry, chemistry and biological science. One new scholar, Laurel Haines, biological science will be joining this selected group beginning June 1.

Complete story by Sarah Zobel [HERE](#)

## Erin Keller's Research on an Invasive, Harmful, Earthworm from Asia that could cause Problems for Vermont Woodlands



A semester abroad is always an important experience in our students' academic life. For Erin Keller, a Biological Science major and member of the Honors College, Norway as it approaches winter was the perfect choice. Erin has achieved an outstanding academic record at UVM, so a semester abroad fit well into her plans. In addition to a full load of courses, including learning Norwegian (Erin already uses her skill in French with some fellow students in her program), she has been "enjoying" long hikes in the mountains in freezing rain, ocean boating and fishing in the arctic sea, and tours of historic sites.

Being a Vermonter to the core, she doesn't mind being frozen to the core, much to the amazement of the other students. Erin has been already heavily involved with research at UVM, working with Dr. Josef Gorres of the CALS Plant and Soil Science Department and Emeritus Professor Joseph Schall of the Biology Department (an example of cross-disciplinary training encouraged at UVM). The "worm crew" studies an invasive, harmful, earthworm from Asia that could cause problems for Vermont woodlands.

During her Sophomore academic year, and the past summer, Erin worked in both the field and laboratory on the ecology of the pest and a parasite that partially castrates worms. Her dedication was apparent when she continued working on the project just hours before the flight was due to leave for her trip to Europe. Also, she is now amazing her fellow students in Norway by happily searching for and identifying earthworms during her travels. Erin Keller is a good representative of UVM students, very active, enthusiastic, productive, hardy, and sometimes even a bit of "Vermont weird" in her interests.

## STUDENT HONORS AWARDS 2015

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

### **Christopher D. Bernard Received the George Perkins Marsh Award in Ecology/Evolution**

Christopher received a Biological Sciences Major and Minor in Chemistry and Pharmacology. He did some research in the Molecular Physiology and Biophysics Department with Dr. Mark Miller in which the aim of the research was to investigate the effects of aging and exercise on human skeletal muscle at the single fiber level. Christopher was president of the club baseball team at UVM, which he played on for 4 years. Some of his interests include basketball, skiing, and cliff jumping. He will be attending UVM Medical School in the Fall to pursue interests in either Anesthesiology or Orthopedic Surgery.

### **Carlie R. Wilson Received the Joan M. Herbers Award in Biology**

**Thesis Title:** The Role of BBC73C in Paramecium

Carlie is interested in molecular and cell biology research and has been working in Dr. Judy Van Houten's lab for almost four years. She started her research project in Spring 2013 and has enjoyed collaborating with lab members and learning new techniques. "I am especially interested in how my lab's research relates to human disease. My future goal is to become a doctor and I am applying to medical school this summer. In the year between graduation and medical school I hope to gain clinical experience in a hospital and will also be applying for positions as a research assistant."

### **Jordan A. Munger Received the Bernd Heinrich Award In Physiology or Evolution**

**Thesis Title:** Determination of Soluble CD14 Molecular Weight Variants in Human Plasma

When Jordan was in fifth grade, his grandfather, a pathologist, brought him into his laboratory and showed him cancerous tissues under a microscope. His teachings inspired Jordan to study intricate molecular processes of disease in order to improve human health. At UVM he had the privilege of building upon his biology coursework and was trained in two laboratories in the UVM College of Medicine, Department of Pathology. His studies were to quantitatively measure different forms of important inflammatory proteins as they likely might exist *in vivo*. The findings from this project will hopefully help inform further research and treatments of complex cardiovascular diseases. "The many skills and experiences I have gained through my undergraduate education at UVM have led me to pursue a career in academic medicine. Outside of academics and career pursuits, I love to play music and stay active in the great outdoors with my friends. I will forever be grateful that I was able to study under the incredible faculty at UVM and live in the beautiful state of Vermont."

### **Jennifer A. Trimble Received the Paul A. Moody Award in Biology**

**Thesis Title:** Lifetime Exposure to Estrogen in Postmenopausal Women

Jennifer is a Biological Science major from Merrimack, New Hampshire. "My current research focuses on how lifetime estrogen exposure interacts with the dopaminergic system (specifically the catechol-o-methyltransferase gene) to impact cognition after menopause. Sixty-seven postmenopausal healthy women were recruited for a three-hour study day. We obtained DNA samples, performed psychiatric tests, and administered cognitive tasks. I plan to pursue a career in medicine focusing on preventative health, either as a primary care physician or a family nurse practitioner. I also hope to continue doing research in the future."

### **Clare H. Martin Received the Kurt Milton Pickett Award**

**Thesis Title:** The Effect of  $\beta$ -hydroxy- $\beta$ -methylbutyrate (HMB) on age-related muscle degeneration in *Drosophila melanogaster*: an analysis of flight ability, lifespan, and muscle cell autophagy response

Clare's research focused on the effect of nutritional supplementation on metabolic processes and longevity in *Drosophila Melanogaster*. She hopes to apply her research experiences at UVM to continue to study how preservation of muscle function later in life can trigger numerous positive systemic health benefits both on the cellular and organism level. Her goal is to pursue a career in medicine and environmental health that will allow her to work with and educate patients and their communities to find preventive solutions to the public health crises of our time. She's excited to be traveling to the Amazon Basin of Ecuador with Timmy Global Health where they will be working with local communities to set up mobile medical clinics in areas that have limited access to health care.



**Department of Biology Students Graduate from the Honors College  
Congratulations!**



Harshal Athalye, James Contompasis, Carlie Wilson, Dr. Jim Vigoreaux, Sarah Light, Hannah Johnson and Jonathan Karp



This photo was taken by Gina Marie Castellano, sophomore at UVM. The picture was taken in Costa Rica, and relates to the BCOR 12 lab she was in. They were studying different reproductive structures of the flower. Currently they are learning about the evolution of these traits.

## MORE NEWS!

### Karen Duncan New Biology Department Office Manager



Karen Duncan joined the UVM Department of Biology as Business Manager in September 2014. She has spent 16 years working at UVM in the Health Promotion Research Center in the College of Medicine, in the Vermont Genetics Network (VGN) and 2 years as Grants Management Coordinator in the Rubenstein School of Environment and Natural Resources.

Karen was born and raised in Vermont and currently lives in Richmond with her partner, 3 cats and 3 dogs. She loves refinishing old furniture and gardening (she's very happy that winter is finally over!). Welcome Karen!

### UVM STUDENT RESEARCH CONFERENCE 2015



Jaye Grundy, Liam Kelley, Marion Weir, Riley St. Clair, Ryan Joy

The University of Vermont's Student Research Conference (SRC) showcases the research and scholarly activity of undergraduate, graduate and medical students across campus.

The SRC acknowledges and thanks students' mentors, and celebrates the UVM colleges, schools and programs that encourage, sponsor and support student research. The audience includes UVM students, faculty, staff and the wider community. For information on all oral and poster presentations click [HERE](#)



Sleepy Dolphin by Laura May Collado



## Remembering Jane Graiko



**Jane Graiko at the UVM Activities Fest**

It is with a heavy heart that we communicate the death of Jane Graiko, who passed away December 28, 2014 from health complications. Jane worked at UVM for nearly 25 years, the last four as the inaugural Coordinator of the McNair Scholars Program. “Jane was the consummate professional who poured her heart into her work. Her commitment to our program and devotion to the scholars was unsurpassed”, says Jim Vigoreaux, former Director of the McNair Scholars Program. Jane was a familiar face in the Biology Department and good friends with many of the faculty and students. “My interactions with her while at UVM were always great and even after I left Vermont, she would reach out to me with emails to check-in”, say Dominick Lemas, McNair Scholar and Biology major, class 2006. We extend our condolences to her husband Ron, daughter Debbie, and son Ronald Jr, their spouses and children.  
*An obituary can be found at: [JANE GRAIKO](#)*

## Tri-Beta News

Tri-Beta honors students for 2015 are Lizzie Ambros and Sienna Weinstein.



Tri-Beta Inductees for 2015 (left to right) Samuel Raszka, Sarah Weiss and Sarah Fuller

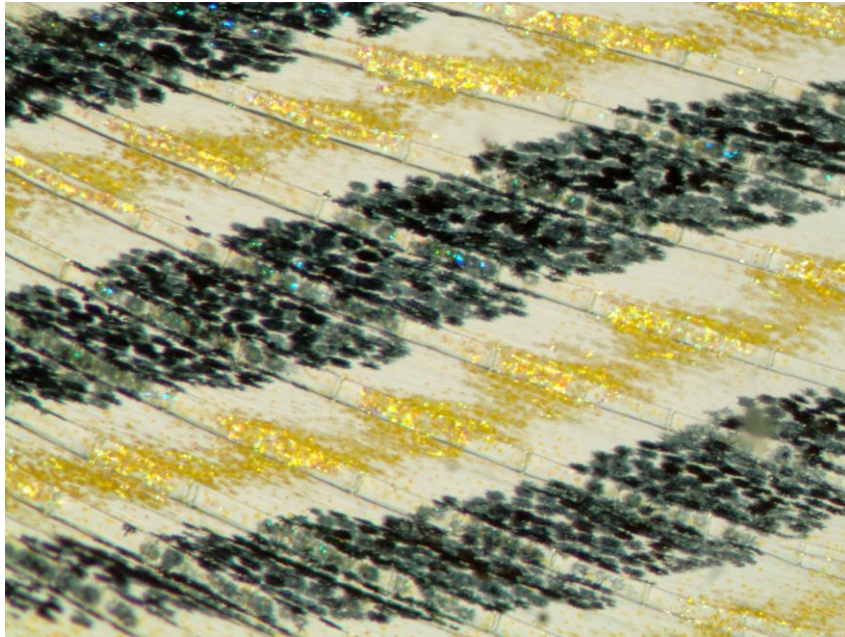
## Visit the Biology Stockroom for Lab Supplies



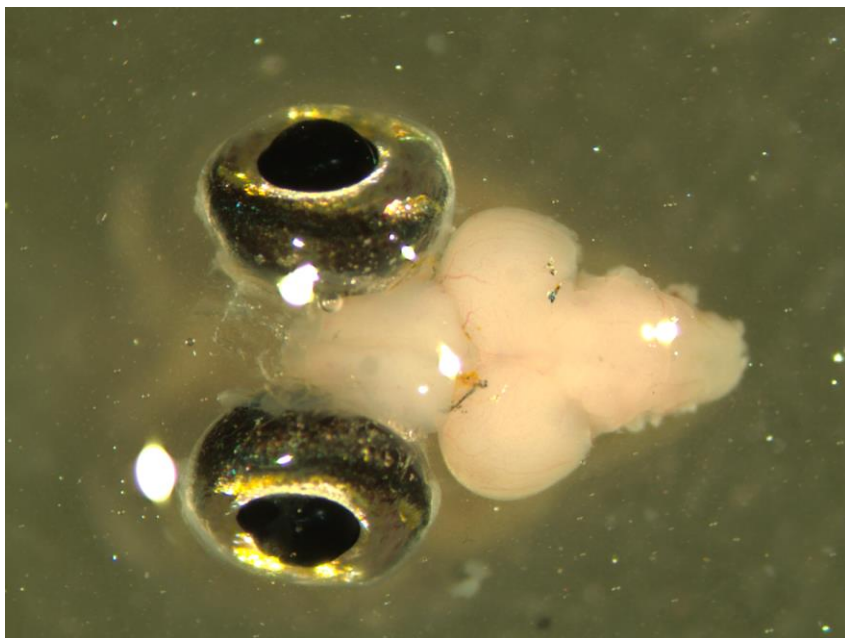
The Biology Stockroom, located in 004 Marsh Life Science building, is a nonprofit facility that provides convenient on site access to scientific products, many discounted and shipped free of charge. We buy by the case and pass the savings on to you. If we don't stock what you need we offer an ordering 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](#)



## 2014 Art of Biology Contest Winners



**1<sup>st</sup> Place Winner:** Close-up of the anal fin of an adult zebrafish. This was taken with brightfield microscopy at 6.3X zoom. Fins are important to the Ebert laboratory as we use fin tissue for DNA analysis and genotyping mutants. Photo was taken by Sarah Emerson, Graduate Student in Dr. Alicia Ebert's Lab



**2<sup>nd</sup> Place Winner:** Image of the brain and eyes of an adult zebrafish dissected out of the cranium. This was taken with brightfield microscopy at 6.3X zoom. The Ebert Lab studies molecules that regulate the axons of retinal ganglion cell's migration from the eye to the brain centers that perceive vision. Photo taken by Helaina Stergas, Undergraduate student in Dr. Alicia Ebert's Lab

## Donations Made to the Department of Biology in 2014 and 2015

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



**Dr. Norine Freeman Noonan  
Ms. Penny Goodyear  
Norfolk Hunt Club  
Dr. Alan Leslie Johnson  
Mrs. Joanne V. McGill Johnson  
Mr. and Mrs. Bryant Jones  
Dr. Barbara Kay  
Ms. Wendy Sara Rosenblum  
Joe and Renee Schall**

*Thank you all very much!*



Dr. Nick Gotelli and Elizabeth Farnsworth, guest instructor in Dr. Gotelli's upper division ecology class, serenading the students!

### 1<sup>st</sup> Annual Graduate Holiday Party



On the 12<sup>th</sup> of December 2014, the graduate students from the Biology Department got together for the 1<sup>st</sup> Annual Graduate Student Holiday Party to celebrate the end of the fall semester. Food, fun and laughter was shared by all – especially during the White Elephant gift exchange!

## Dr. Alicia Ebert's Lab Members, the "Fluorescent Proteins"



**Rock On!**

## Alumni Update – The UVM Connection



Check out the online connection to  
communicate with classmates from the  
past

<http://www.alumni.uvm.edu/>

**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://alumni.uvm.edu/foundation/giving/online/>**

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.

**Please send to:  
UVM Foundation  
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**Thank you for your support!**