



# University of Vermont, College of Arts and Sciences Department of Biology Newsletter

Fall 2011



DEPARTMENT OF BIOLOGY  
[WEBSITE](#)

## Bernd Heinrich's New Research on Ravens and Stress



New research by **Bernd Heinrich**, Professor Emeritus of Biology, shows that ravens become stressed living in large groups according to this [LiveScience.com](#) story.

A *Portland Press Herald* story, "Birding: Don't Underestimate the Raven," also cites Heinrich's extensive study of ravens. Read the [Live Science article](#) and the [Portland Press Herald article...](#)

## Biology Professor Wins \$20 Million Grant to Study Lake Champlain



A statewide research partnership headed by the Department of Biology at the University of Vermont has received a \$20 million grant to develop a model that can be used to predict key ecological changes in Lake Champlain and its surrounding basin.

The stipend from the National Science Foundation, announced at a news conference Friday, will support a five-year study conducted by the Experimental Program to Stimulate Competitive Research. The program enlists scientific researchers at higher education institutions around the state — principally, UVM — as well as in government and private industry.

The project dovetails with [EPSCoR's](#) research focus on adaptation to climate change — a theme noted by Sen. Patrick Leahy, D-Vt., who spoke at the news conference.

## Biology Department's Dr. James Vincent and other UVM Scientists Featured in VPT's "Emerging Science"



Vermonters might be surprised to learn that Vermont has an aerospace community working to launch a satellite into lunar orbit; that mathematicians are using Twitter to gauge the mood of societies and that local scientists are sequencing the genome of a creature that is so like humans it may have a role in regenerative medicine.

Watch the "Emerging Science" [WEBISODE](#) on the regenerative abilities of the little skate — and how scientists are hoping to unlock the organism's genetic secrets for the benefit of humans.

## Dr. Bryan Ballif and Students Using Cutting-Edge Methods to Study the Molecular Mechanisms of Brain Development



*Pictured is Dr. Ballif (far right) with his students from left to right: CAS Biochemistry 2010 alumnus Gwen Buel, and Biology graduate students Rima Saha, Bior Bior and Mujeeb Cheerathodi.*

Dr. Bryan A. Ballif, Assistant Professor of Biology, and his students are using cutting-edge biochemical and proteomic methods to study the molecular mechanisms of brain development in his laboratory in the Department of Biology. The National Science Foundation (NSF) has recently awarded Dr. Ballif a four-year \$510,729 grant to continue his studies.

During brain development many neurons migrate from their places of birth and are guided by cues in their environment to make the critical connections and structures of a functioning brain. Dr. Ballif's study will use biochemical and newly developed proteomic approaches, which Dr. Ballif helped pioneer, to study proteins that are known to be essential for neuronal positioning. Additionally, the grant funds the teaching of a proteomics module at UVM, and in collaboration with the Vermont Genetics Network outreach team, at eight baccalaureate institutions throughout Vermont. The grant also provides summer stipends for four undergraduates and two graduate students for each of the four years of the grant.

Dr. Ballif was also invited to speak this past summer at the Max Planck Institute for Molecular Genetics in Berlin, Germany as part of the Dahlem Colloquia in Molecular Genetics. The invitation stated: "The Dahlem Colloquia in Molecular Genetics are the most prestigious seminar series to be held at the Planck Institute for Molecular Genetics. The speakers are internationally recognized leaders in their field." Former Dahlem Colloquia speakers include, David Baltimore, Mans Ehrenberg, Elisa Izzauralde, Fabio Piano, John Mattick, George Church, Stefan Beck and Robert Weinberg (who spoke two weeks before Dr. Ballif). Dr. Ballif's seminar was entitled, "Proteomic Journeys Exploring the Networks and Nodes of the Signal Transduction Superhighway: A Dab of CrkL leads to a Rsk-y path of Ras regulation."

The National Science Foundation awarded Dr. [Bryan Ballif](#) a grant to study signal transduction mechanisms during brain development. [Read more here.](#)

## UVM Biologists Participated in Environmental Impact Assessment in Liberia



### International Small Mammal Team in one of the Field Camps in the Putu Range of Liberia

**Back Row:** (left to right): Dr. Jan Decher (UVM), Jerry Garteh (Liberian Field Technician), Dipl. Biol. Natalie Weber (Ulm University, Germany), **Middle Row:** Atoh (cook), Harry B. Cheddah and Robert "Slebo" (local Field Assistants), Chris Gray (UVM Biology Grad. Student)

**Front Row:** (left to right): Anthony (cook), Juliane Schaer (Bat Research, Graduate Student, James Jah (local Field Assistant)

On invitation of internationally known wildlife ecologist Dr. John Oates, Biology MS student Chris R. Gray and Biology Research Associate Jan Decher conducted a survey of non-flying small mammals (shrews and rodents) for the Putu Iron Ore Mining Company in the Putu Mountains, Grand Gedeh County, Liberia, during all of November 2010. They were part of an international team of scientists and local Liberian assistants to establish a baseline biodiversity census before iron ore extraction begins at Putu.

Among the highlights of the expedition was the capture of one specimen the Nimba Otter Shrew (*Micropotamogale lamottei*) in the creeks of the area. Only one other individual of this endangered and regionally endemic species had previously been recorded from the area almost exactly 40 years ago in December 1970 (Kuhn 1971).

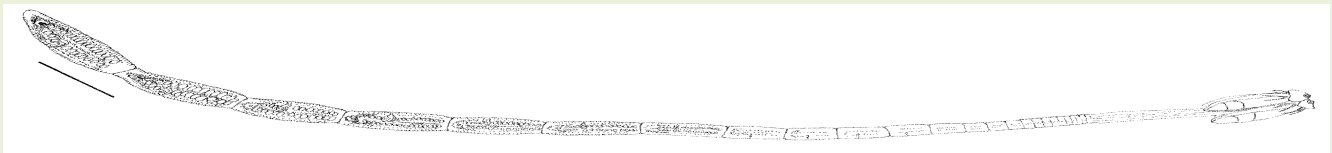


## ESA interviews: Nick Gotelli

Scientists are often portrayed in popular culture as utterly focused on their work, absolutely excluding personal relationships and all other interests and passions from their lives. But that's not at all true! [READ MORE](#)

## Professor Joe Schall Has His Own Tapeworm!

A new species of tapeworm has been named for Professor Joseph Schall, longtime member of the Department faculty. The tapeworm infects three species of sharks from the North Atlantic and has been named *Acanthobothrium schalli*. The parasite was discovered by tapeworm expert Dr. Anne Vardo-Zalik from the Pennsylvania State University who received her Ph.D. from our Department. Dr. Vardo-Zalik apparently has fond memories of Dr. Schall, or perhaps another interpretation could be made. Dr. Schall, though, appears very happy with the honor, and says, "As long as there is civilization that cares about the natural world, I will have my own tapeworm traveling about in sharks in the cold Atlantic depths." But, trying to say its new name, "Schall's Shark Tapeworm" is difficult. The Department wishes our colleague well, and everyone feels the honor suits Dr. Schall.



## FACULTY PUBLICATIONS 2011

Daly AB, Wallis JM, Borg ZD, Bonvillain RW, Deng B, **Ballif BA**, Jaworski DM, Allen GB, Weiss D. Initial Binding and Re-Cellularization of De-Cellularized Mouse Lung Scaffolds with Bone Marrow-Derived Mesenchymal Stromal Cells. *Tissue Engineering*. (Part A). 2011. Accepted/Forthcoming. ISI 5-year impact factor=5.7

Purmessur D, Schek RM, Abbott RD, **Ballif BA**, Godburn KE and Iatridis JC. Notochordal tissue increases proteoglycan accumulation and promotes a healthy nucleus pulposus phenotype in human MSCs. *Arthritis Research & Therapy*. 2011. 13(3):R81. ISI 5-year impact factor=4.8

Gotelli NJ, Smith AM, Ellison AM and **Ballif BA\*** Proteomic Characterization of the Major Arthropod Associates of the Carnivorous Pitcher Plant *Sarracenia purpurea*. *Proteomics*. 2011. 11(11):2354-8. ISI 5-year impact factor=4.9 \*Corresponding Author

Mendoza MC, Zhang W, Er EE, **Ballif BA**, Elliott HL, Danuser G and Blenis J. ERK-MAPK Drives Lamellipodia Protrusion by Activating the WAVE2 Regulatory Complex. *Molecular Cell*. 2011. 41(6):661-71. ISI 5-year impact factor=14.4

Irwin, R.E. and **A K. Brody**. 2011. Additive effects of herbivory, nectar robbing and seed predation on male and female fitness components of the host plant *Ipomopsis aggregata*. *Oecologia*, *in press*.

Hill Bermingham, L. and **A.K. Brody**. 2011. Pollen source affects female reproductive success and early offspring traits in the rare endemic plant *Polemonium vanbruntiae* (Polemoniaceae). *Plant Species Biology*, in press.

Minajigi A, **Deng B**, Francklyn CS. Fidelity Escape by the Unnatural Amino Acid  $\beta$ -Hydroxynorvaline: An Efficient Substrate for *Escherichia coli* Threonyl-tRNA Synthetase with Toxic Effects on Growth. *Biochemistry*. 2011, 50, 1101–1109.

**Goodnight, C. J.** 2011 Evolution in Metacommunities. *Philosophical Transactions of the Royal Society B*. In Press.

**Helms, K.R.**, Hayden, C.P. & S.B. Vinson. 2011. Plant-based food resources, trophic interactions among alien species, and the abundance of an invasive ant. *Biological Invasions* 13: 67-79.

Rella-Hapeman, P., E. Latch, J. Fike, O. E. Rhodes, and **C. W. Kilpatrick**. Landscape genetics of fishers (*Martes pennanti*) in the northeast: Dispersal barriers and historical influences. *Journal of Heredity*.

Ardren, W. R., P. W. DeHaan, S. T. Smith, E. B. Taylor, R. Leary, C. Kozfkay, L. Godfrey, M. Diggs, W. Fredenberg, J. Chan, **C. W. Kilpatrick**, M. P Small, and Denise K. Hawkins. Genetic structure, evolutionary history, and conservation units of Bull Trout in the Coterminous United States. *Transactions of the American Fisheries Society*.

Borroto-Páez, R., C. A. Mancina, C. A. Woods, and **C. W. Kilpatrick**. 2011. Updated checklist of endemic terrestrial mammals of the West Indies. Pp. 389-414, in *Terrestrial Mammals of the West Indies Contributions* (R. Borroto-Paez, C. A. Woods, and F. E Sergil, eds.). Florida Museum of Natural History and Wacahooto Press, Gainesville, 497 pp.

**Kilpatrick, C. W.**, R. Borroto-Páez, and C. A. Woods. 2011. Phylogenetic relationships of recent capromyid rodents: A review and analyses of karyological, biochemical and molecular data. Pp. 51-70, in *Terrestrial Mammals of the West Indies Contributions* (R. Borroto-Paez, C. A. Woods, and F. E Sergil, eds.). Florida Museum of Natural History and Wacahooto Press, Gainesville, 497 pp.

Ford, A. F. and **J. J. Schall**. 2011. Relative clonal proportions over time in mixed-genotype infections of the lizard malaria parasite *Plasmodium mexicanum*. *International Journal for Parasitology* (in press).

Ford, A. F., A. M. Vardo-Zalik, and **J. J. Schall**. 2011. Relative clonal density of two malaria parasites, *Plasmodium falciparum* and *P. mexicanum*, in mixed genotype infections: validation of a technique using microsatellite markers. *Journal of Parasitology* (in press)

de la Rua, N., Dorn, P.L., **Stevens, L.** In press. High Genetic Diversity in a Single Population of *Triatoma sanguisuga* (Le Conte, 1855) Inferred from two mitochondrial markers: cytochrome b and 16S ribosomal DNA. *Infection, Genetics and Evolution*.

**Stevens, L.**, Dorn, P.L., Klotz, J., Schmidt, J., Lucero, D., Klotz, S.A., 2011. Chagas Disease: *Trypanosoma cruzi* the first hundred years, *Triatomine Biology* . *Advances in Parasitology* 7x.

Lodh, N., **L. Stevens**, and B. Kerans. in press. The relationship of host lineage variability with parasite susceptibility for whirling disease. *Journal of Parasitology*.

Miller, M.S., G.P. Farman, J.M. Braddock, F.N. Soto-Adames, T. C. Irving, **J.O. Vigoreaux**, and D.W. Maughan. (2011) Regulatory Light Chain Phosphorylation and N-terminal Extension Increase Cross-Bridge Binding and Power Output in *Drosophila* at In Vivo Myofibrillar Lattice Spacing. *Biophys J.*, 100: 1737-1746.

Tanner, B.C. W., Miller, M. S., Miller, B. M., Lekkas, P., Irving, T. C., Maughan, D. W. and **Vigoreaux, J. O.** (2011) COOH-terminal truncation of flightin decreases myofibrillar lattice organization, cross-bridge binding, and power output in *Drosophila* indirect flight muscle. *Am. J. Physiol. Cell Physiol.*, 301: C383-391.

Chakravorty, S. Wadja, M. and **Vigoreaux, J. O.** (2011) Analysis of mating song in *Drosophila* muscle mutants. In *Methods in Invertebrate Muscle Biology*. Benian, G. and Bernsteins, S., editors. Elsevier Journals Publishing. (invited chapter).



## Graduate Student Nicholas De La Rua in Search of the Elusive Vector of Chagas Disease

For the past three summers, I have been fortunate enough to travel to Guatemala in search of the elusive vector of Chagas disease, the Triatomine insect or los cinches. These travels have taken me across the country, but the most memorable experiences are those with our colleagues and people I encounter in the rural, isolated villages most at risk of vectoral transmission. This year I met two people that impacted my world view more than previous trips.

First, I shared a room with a Guatemalan, Belter, who was exactly my age and a community organizer helping bring together researchers and villagers; to observe the parallels and differences of our lives was intriguing. It's truly amazing how two people of very distinct realities can communicate even with a language barrier when there is genuine interest in each other.



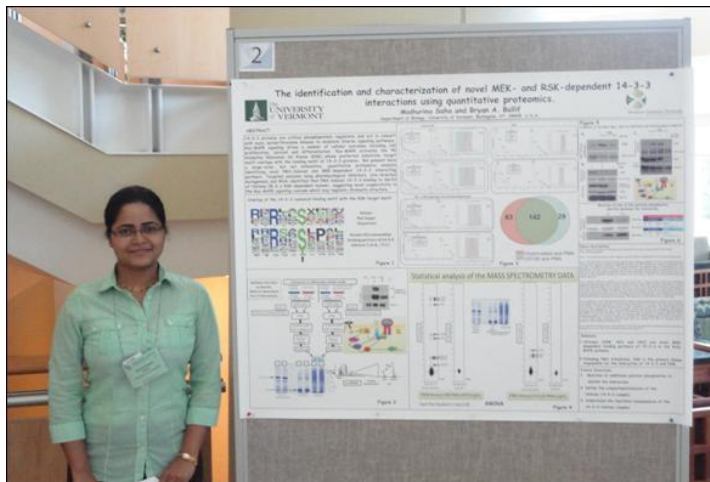
When traveling to the isolated villages, observing a way of life and poverty that is so distinct from my experience as a privileged student often shook my world view, but during this last trip I met a woman who shook it even more. During an environmental survey of a village in the mountains of Olopa, Guatemala, we interviewed a very old woman who lived alone with almost nothing. During the survey, we learned that she essentially survived by the charity of her neighbors. She was very kind, frail, and injured. At the age of 77 years old, she was the oldest person I have met in the country side. In the day to day grind of graduate school, it is easy to forget the human element of research focused on improving life through applied molecular ecology and phylogeography, but these two photographs serve as reminders of those at risk and those who work hard at actually making a difference.

## Ant Collection in Southern Arizona



Jen Grauer, Yainna Hernaiz-Hernandez, and Michael Herrmann spent the month of July in Southern Arizona collecting soil samples and live specimens of harvester ants to study the abundance and diversity of microbial and fungal pathogens and to look at the evolution of pathogen resistance in the ant species. Michael also collected samples for an experiment on Sexual Conflict in the mating swarms of harvester ants, as well as samples for analysis of cuticular hydrocarbons that these ants use for recognition and communication.

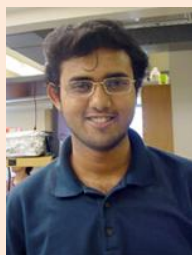
## Madhurima Saha Presents Research at the Gordon Research Conference-Mechanisms of Cell Signaling



The Gordon Research Conference-Mechanisms of Cell Signaling was the most ideal conference for my field of research because it deals with unfolding the interconnectedness of different cellular signaling cascades. This conference allowed scientists and prospective Post-Doctoral candidates like me, to gain a better understanding of the molecular concepts and model systems of crucial signaling pathways related to human diseases like cancer. Interaction with experts and future post-doctoral mentors in the field of signaling proteins helped me obtain new insights into my research. Attending this conference inspired me to explore the other possible answers to my question and open doors for my career as a Post-Doctoral fellow. Therefore, the Gordon Research Conference - Mechanisms of Cell Signaling served as a great platform for me to expand my horizons for understanding the Ras-signaling pathway and its novel downstream targets. This was my only chance to present the two chapters of my doctoral dissertation, receive the criticism from the signaling experts and work with it during my defense presentation. I want to thank The Mini grant committee, GSS and the Ronald Suiter Award committee for providing me with the travel grant to attend this important conference.

*Dr. Madhurima Saha*

### Samya Chakravorty Awarded the Ronald Suiter Prize and Grad College Travel Mini-Grant



Samya Chakravorty went to the 52nd Annual Drosophila Research Conference of the Genetic Society of America (GSA), 2011, from March 30 to April 3rd in San Diego, CA. He was awarded the Ronald Suiter Prize of the CAS and the Grad College Travel Mini Grant to attend the conference. At the conference he presented a poster titled "Functional Role of Flight Muscle in Male Courtship Song of *Drosophila Melanogaster*".

### Mujeeb Cheerathodi Presents Poster at the Annual Conference of American Society of Mass Spectrometry in Denver



Mujeeb Cheerathodi presented a poster titled "Identification of CrkL-SH3 binding proteins from murine embryonic brain: Implications during brain development" at the 59<sup>th</sup> Annual Conference of American Society of Mass Spectrometry in Denver, Colorado on June 7.

## GRADUATE STUDENT PUBLICATIONS 2011

**de la Rua, N.**, Dorn, P.L., Stevens, L. In press. High Genetic Diversity in a Single Population of *Triatoma sanguisuga* (Le Conte, 1855) Inferred from two mitochondrial markers: cytochrome b and 16S ribosomal DNA. *Infection, Genetics and Evolution*.

Stevens, L., Dorn, P.L., Klotz, J., Schmidt, J., **Lucero, D.**, Klotz, S.A., 2011. Chagas Disease: *Trypanosoma cruzi* the first hundred years, *Triatomine Biology . Advances in Parasitology 7x*.

**Lodh, N.**, L. Stevens, and B. Kerans. in press. The relationship of host lineage variability with parasite susceptibility for whirling disease. *Journal of Parasitology*.

**Chakravorty, S.** Wadja, M. and Vigoreaux, J. O. (2011) Analysis of mating song in *Drosophila* muscle mutants. In *Methods in Invertebrate Muscle Biology*. Benian, G. and Bernsteins, S., editors. Elsevier Journals Publishing. (invited chapter).

## South Burlington High School Student, Mentored by Dr. Charles Goodnight, Wins Awards at Vermont Science Fair



South Burlington High School Student, Riya Patel, at the Intel ISEF conference, May 8-13<sup>th</sup> 2011, Los Angeles California

South Burlington High School student Riya Patel won a number of prizes at the Vermont State Science and Math Fair for her project on “The optimization of bioremediation”. The awards she received include a gold medal from the Vermont Principal’s association, a \$50 prize from the Tau Beta Pi Engineering Honor Society, and \$100 prize from the Society of Manufacturing Engineers. As a result of these prizes Riya was invited to the International Sustainable World Project Olympiad in Houston Texas, and the INTEL International Science and Engineering Fair in Los Angeles, California, where she presented her poster in May of this year. Riya examined the effects of nutrients and nutrient levels on the rate at which naturally occurring sea water bacteria break down oil pollutants. She found that Nitrogen/Phosphorus/Potassium fertilizer and Iron Sulfate significantly increased the rate at which oil was remediated, indicating that the ability of natural bacteria to break down oil pollution is limited by nutrient availability.

Riya was mentored on this project by several area scientists, including Biology Professor Charles Goodnight, and UVM Biology alumnus and St. Michael’s College Associate Professor Declan McCabe.

## “BULLY BOY”, UVM BIOLOGY’S OWN WORLD RECORD MUSK OX

*By Mark Biercevicz*



Outside the Marsh Life Science Benedict Auditorium one can find birds and mammals on display from the University of Vermont Biology Department. On route to various areas within the UVM campus, many folks pass by here every day with no knowledge of the storied legend which resides up on the wall behind the Polar Bear.

Meet “Bully Boy”, UVM Biology’s own World Record Musk Ox.

The Musk Ox (*Ovibos moschatus*) is not an ox, nor does it have musk glands. This large hairy ruminant dates back to the last Ice Age, and is most closely related to sheep and goats. Musk Oxen are similar in size to bison, standing 4-6 feet tall at the shoulder and 6-8 feet long, with short legs, a humped back and thick curving horns. They are stocky with short tails.

The Musk Ox feeds on lichens, grasses, moss, pine shoots, leaves and shrubs. During the winter, they dig large craters in search of dried plants which are buried beneath the snow.

This shaggy prehistoric-looking creature was abundant in the North Country until it was hunted to extinction by the mid-1800s. In 1930, 34 Musk Ox from Greenland were reintroduced to Alaska in an attempt to save the species from extinction. These Musk Oxen thrived, and the resident Native Alaskans used the soft underwool to establish a small cottage industry knitting sweaters, scarves, and caps. And that’s what it would have remained, a small cottage industry, if it hadn’t been for Dr. John J. Teal, Jr., a student of Arctic explorer Vilhjalmur Stefansson, and an anthropology professor at the University of Vermont.

UVM Professor John Teal’s life-long project was to domesticate the musk ox for its underwool, or qiviut, as an appropriate form of agriculture in the arctic. Eight times warmer than sheep wool by weight and very lightweight, qiviut is one of the finest natural fibers known to man and is often referred to as “the cashmere of the north.”

While teaching at UVM, Teal established the Institute of Northern Agricultural Research, headquartered in Huntington, Vermont. Beginning in 1954, Teal engaged in several expeditions to the arctic, capturing several musk oxen, and forming his original herd which were homed at Teal’s farm in Huntington. After spending 10 years with musk oxen on his Vermont farm, Teal concluded that they were amiable, hardy, and easy to domesticate.

The Vermont Musk Oxen were certainly the “talk of the town” and Musk Ox stories spread throughout the state of Vermont. One particular male Musk Ox, Bully Boy, stood out from the rest. Bully Boy was born in 1955 and lived for nearly 10 years. On one memorable Labor Day, Bully Boy decided to take an unscheduled tour of the town. It took many townspeople and a well coordinated effort to bring the big boy back to the farm. But it was his size that separated Bully Boy from the rest. After being weighed and measured, it was determined that Bully Boy was the World Record Musk Ox!! His horn spread was 5 inches above the previous record, and his weight was 400 pounds more!!

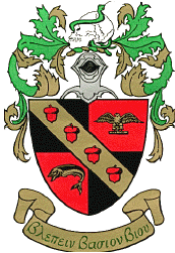
Professor Teal died at his Vermont home in 1982. Years later, his son/son-in-law found the mount and two musk oxen skulls, which were donated to Professor Bill Kilpatrick of UVM’s Biology Department.

Today, John Teal’s herd lives on a 77 acre farm in Palmer, Alaska. The Musk Ox Development Corporation, a non-profit organization, owns and operates the farm, and provides Oomingmak, a native knitters’ cooperative, with its qiviut. Oomingmak was established by Teal to help develop a cottage industry for subsistence natives in remote coastal villages, so they may sell knit garments made of qiviut to help support their families. While at the same time, the collaboration also helps ensure the survival of this once endangered species.





*The Vertebrate display outside the Marsh Life Science Benedict Auditorium got a Fall dusting on Halloween morning. Mark Biercevicz, Nelish Pradhan, and Renee Berteau, spent a couple of hours vacuuming and dusting the Catamount, polar bear and birds on display there. The animals seemed to appreciate the attention.*



**TRI BETA** is the National Honor Society for students who major in Biology. The society has a three-part mission: stimulation of scholarship, dissemination of scientific knowledge, and promotion of biological research. It is primarily designed for undergraduates, with the goal of recognizing students with outstanding scholarly achievement in the life sciences and actively promoting undergraduate participation in research.

**PROMOTED MEMBERS:** Rob Rudy and Megan Gibeley

**NEW MEMBERS:** Kelsey Haist, Chelsea Manning, Rhys Niedecker, Mitchell Dundon, Jess Johnson, and Luke Soelch

**WE ARE PROUD TO RECOGNIZE OUR GRADUATING SENIORS!**  
Sam Roberts, Shannon Kostin, Clayton Barnes, Jess Johnson, Meredith Sooy

For information on Tri Beta go to: [TRIBETA](http://tribeta.org)

### **Donations Made to the Department of Biology in 2011**

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

Mr. Timothy Abrahamsen  
Ms. Marymegan Daly  
Mr. and Mrs. Walter R. Klein  
Mrs. Jennifer Hollister-Lock and Mr. Michael Damian Lock  
Ms. Wendy Sara Rosenblum

*Thank you all very much!*

### **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**

<https://alumni.uvm.edu/giving/support.asp>

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

**Please send to:  
Development and Alumni Relations  
Grasse Mount  
411 Main Street  
Burlington, VT 05401**

**Thank you for your support!**