

BIOLOGY matters

Fall 2011

A note from the Chair - WE ARE NUMBER ONE, in terms of declared majors in the incoming first-year class. With over 80 incoming students declaring biology as their major, our program surpassed all other declared majors among incoming students (except “exploratory”). We’ve known for some time that we’ve got a good thing going, and apparently the word is getting out. We love to see interest in our program – and had the opportunity to spread the word a bit further at our Fall Academic Preview Days (October 8 and November 12), which included a “Biology Department Open House” with faculty and students available in the Department to talk with interested families and answer questions after the scheduled academic sessions. It was quite successful.

There are many other things to brag about – and some of them are highlighted in separate articles, including campus honors to some of our faculty, and some new and ongoing grants that support more student and faculty research opportunities. *so read on.....*

NEWS UPDATES

Biology Faculty honored - Our terrific department faculty continue to be acknowledged by students and colleagues for the contributions they make to the life of the Saint Michael’s College campus and community. At the faculty-staff-senior brunch last May, Donna Bozzone and Mark Lubkowitz both received senior class recognition awards. In addition, the yearbook dedication went to Doug Green, who passed away in mid-March. Doug was also recognized at the fall Academic Convocation as the recipient of the annual Joanne Rathgeb Teaching Award.

NSF Research Grant - This year the National Science Foundation awarded a five-year, \$6.2 million dollar plant genome grant to a consortium of scientists from the University of Missouri, Purdue University, University of Florida, University of Nebraska, VT EPSCoR, and Saint Michael’s College (Dr. Mark Lubkowitz) to better our understanding of how CO₂ captured in leaves through photosynthesis is distributed throughout the plant. The research will explore the process of distributing photosynthetic products throughout crop plants (called carbohydrate partitioning) and describe how carbohydrates move within plants from tissues where they are synthesized (source tissues) to regions where they are stored or consumed (sink tissues). Whereas photosynthesis is well understood, surprisingly, how the products of photosynthesis (i.e. sugars) leave their sources and move to their sinks and how this process is regulated is not well understood.



In its most reduced form our research seeks to answer: where is the bottleneck in source to sink transport and what controls it? These are important questions because every aspect of the plant life cycle is influenced by carbohydrate partitioning. For example, if a flower or developing fruit fails to receive the energy it needs, it will not mature properly. Likewise, growth rates are a function of how well source to sink transport works. Slow growth rates can have profound impacts on humans such as low crop yields or reducing the speed at which an area can reforested. In other words, plants that cannot unload their leaves grow slower and have a lower amount of biomass as a result. Furthermore, the changes in atmospheric CO₂ levels and climate are expected to pose many challenges for plants and how plants

respond to these changing environmental stressors will at some level depend upon source to sink transport. Whereas our immediate goals are to try to understand the genes that regulate carbohydrate partitioning, the long-term and potential applications of this research is to increase crop yields and biofuel production and to capture CO₂ in the atmosphere to help offset global climate change.

In the summer of 2011, five biology majors and one art major worked on different aspect of this project. Sara Williams ('11) traveled to Purdue where she helped identify mutations that affect carbon partitioning. Jake Withee ('11) and Allen Hubbard ('11) spent their summer at the University of Missouri characterizing sugar transporters while Steph Locke ('12) and Ryan Gannon ('11) traveled to the University of Florida to work on genes that modify sugar movement within plants. Lindsey Goudreau ('12) designed the project's website which will eventually be used to disseminate the consortium's discoveries.

Teaching Gardens - The Teaching Gardens of Saint Michael's College are an active outdoor learning laboratory that consists of an arboretum, a children's literature garden named Books in Bloom, The Native Plants of Vermont Garden, the International Garden, and the Word Garden. Founded in 2004 by professors Mark Lubkowitz (Biology) and Valerie Bang-Jensen (Education), these gardens have grown through collaborative work between the departments of Education, Biology, and Applied Linguistics. In addition to serving our college community, these gardens are a destination in Chittenden County for visitors who want to learn about plants, their role in children's literature, and our environment or just want to picnic in an aesthetically pleasing corner of our campus. This summer the Teaching Gardens website got a makeover. Check it out at www.smcvt.edu/teachinggardens



Research Conference Presentations

Senior Emily Ogilvy, travelled with her adviser, Dr. Valerie Banschbach, to the 59th annual national meeting of the Entomological Society of America held in Reno, Nevada, Nov. 14 to 16, to present their research, "*A Study of Ant Diversity in Burned Versus Unburned Sandplain Forest in Vermont.*" For this research, Emily used a digital reference collection from the Museum of Comparative Zoology, Harvard University, to identify more than 1,700 ant specimens. The specimens were collected by Saint Michael's students in Introduction to Ecology and Evolution classes (BI 151) over the past three years.



The students in those classes worked at the Camp Johnson Vermont Army National Guard Base, located next to Saint Michael's College, and collected macroinvertebrates as part of the ecological monitoring efforts for that threatened sandplain forest ecosystem. Using this massive dataset, Emily found 30 species of ants, a tally that encompasses much of the total ant diversity in Vermont. On analyzing the data, Professor Banschbach explained, "we found a significantly greater ant abundance and species diversity in the habitat that was subject to a controlled burn 13 years ago than in control plots that were not burned..... Our work has important implications for conservation of the sandplain forest and for the utility of ants as a bioindicator taxon"

Emily's summer research was support by a grant from the Saint Michael's College Vice President for Academic Affairs (VPAA) summer student research fund. Her trip to the conference was also supported by a VPAA student research travel grant.

In October, Dr. Mac Lippert co-chaired a Symposium on *Transcription and Genetic Instability* and gave a talk titled, *Role for Topoisomerase I in Transcription-Associated Mutagenesis*, at the 42nd Annual Meeting of the Environmental Mutagen Society in Montreal Quebec.

STUDENT PROFILES

Janel Roberge



Home town: Milan, NH

Career interest: Registered Dietician, Masters in Public Health

What has your Saint Michael's experience, particularly your experience as a biology major, been like? - Overall, my Saint Michael's College experience has been nothing short of amazing. Despite my involvement in several activities on campus to maintain a well-balanced nature, my passion is and always has been in the sciences. As a biology major, I have been given the tools I need to further my own education both inside and outside the classroom. My major has truly instilled in me a curiosity for the world around me that I never even knew could exist. Additionally, over the past three years, my biology professors have literally become a part of my Saint Michael's family and I know that no matter what I chose to pursue, every single one of them would provide me with 100% support.

What additional activities did you pursue related to the biology major? - The biology major has opened up so many doors of opportunity for me in these past three years. I was easily intimidated my first year here both academically and socially, but my professors and classmates had encouraged me enough throughout my freshman year that by the time sophomore year rolled around, I knew I wanted to start assuming more responsibility within the major. I requested to become a teaching assistant and was granted a position as teaching assistant in the general biology labs. This was also the year that I switched into being a work-study student in the biology department. Because I'm the type of student that benefits from hearing something said several times and by different people, I absolutely love being a teaching assistant because I know that somehow I am making a difference to the students in my lab sections. Not to mention, meeting some great new people!

In addition to work-study and teaching assisting, the biology major has also altered my perception of what it means to lead, and learn, outside the classroom. Following my sophomore year, I had the privilege of staying in the beautiful Burlington area to participate in summer research. This was an extremely formative summer for me personally, and I have the biology department to thank wholeheartedly for it. I always had this misconception that undergraduate research would involve being cooped up in a lab all day crunching numbers – this was my worst nightmare being a math-fearing outdoorsy girl, but my summer research experience with the EPSCoR Streams Project completely broke all the stereotypes I had ever conjured up about research. I spent every day that summer outside, playing in streams, gaining invaluable knowledge of the region I now call home. The following summer I was 'promoted' to being the head of the same lab in which I had worked the previous summer. Being a leader sometimes pushes one out of one's comfort zone, but if there's anything that I have taken away from my experience as being a biology major at Saint Michael's College, it's that sometimes we learn the most when we are pushed to do things we never thought we were capable of.

What are your post-graduate plans? - I have fallen in love with the Burlington area and as a result, plan on staying here for the next few years. I will be taking a year off and during that year will be applying to graduate schools across the country; I aspire to get my Masters in Public Health. I also have a growing interest in food politics and a passion for helping others and as a result, will be looking, perhaps in this interim year, into becoming a registered dietician.

Sean Mannion



Home town - West Roxbury, MA

Career interest - Physical Therapy

What has your Saint Michael's experience, particularly your experience as a biology major, been like? - My experience as a Biology major has given me a strong passion in the medical field. Having attended a small high school, I felt right at home within the biology “family” where I was fortunate enough to get to know the professors on a personal level. I could not have asked for a better learning environment, and combined with small lecture and lab settings, I was able to grow tremendously both academically and personally. Surrounded by other motivated students and a teaching staff that immersed us in their passion for biology, I feel both well prepared and excited for a career in health sciences.

What additional activities did you pursue related to the biology major? - During my freshman year, I joined the Saint Michael’s rescue squad, a volunteer group of Saint Mike’s students who provide emergency medical services to critically sick and injured people in the surrounding areas. This enabled me to get hands on experience in the medical field, and piqued my interest in physical therapy, as I now want to help people recover from debilitating accidents such as automobile crashes and strokes.

I have also spent four years working in the biology lab, as a senior prep assistant under Professor Martin where I help prepare the labs for the general biology students. I love the atmosphere and the people I work with, and it allows me to spend time outside of the classroom/lab learning new things related to biology. I have also learned important life skills, such as how to become better organized thanks to Professor Martin.

What are your post-graduate plans? - After I graduate, I hope to stay in the Burlington area and get a job in some health related field. I would like to take a year off before applying to UVM’s Doctor of Physical Therapy program.

ALUMNI NEWS & PROFILES

Jacob Awar Ayuen ('06) is in his first year of a Physician's Assistant Program at Union College in Lincoln, Nebraska. Awar, as we all know him, was initially selected to receive one of the College's five Primary Care Service Scholarships, but learned in the fall that he has been awarded a National Health Service Corps Scholarship. Awar is one of only 62 Physician's Assistant students nation-wide selected for this prestigious federal award, which includes full tuition and fees scholarship, allowance for all books, equipment and supplies, and a living stipend during his PA studies at Union College. The scholarship requires a commitment that Jacob will work in a medically underserved location for three years upon graduation, which fits his career goals perfectly. Congratulations, Awar!

Kevin Kosco ('04)



What is your position? - I am currently a second year resident in the Department of Endodontics, which is part of the College of Dentistry at the University of Florida. I completed my Doctorate of Dental Medicine in May of 2010 and I will graduate with a Certificate in Endodontics and a Master of Science in Dental Sciences in June of 2012.

What sparked your initial interest in biology and in dentistry? - I always loved science and math as a kid, mainly because I enjoyed trying to find solutions to a problem. On the same hand, I enjoyed being around people and helping them as much as possible. I shadowed a dentist in my hometown during high school and fell in love with the notion that it was your job to help people every day while using critical thinking to solve their problems. A degree in biology was the obvious choice for my curiosity in science, but it also built a great foundation for a profession in the dental field.

What experiences did you have in the Saint Michael's College biology department and the college as a whole that prepared you for your career? - This list is endless. What I didn't always recognize while in school is that every experience you have can be taken and learned from in a way that can help you later in life. Of course, the strong education I earned while studying for my degree was priceless, but there were other subtle experiences that shaped the person I am today. While I was taking Professor Hope's course on the natural history of Vermont, I never thought this would aid in my dental career, but there have been times when I have built rapport with patients speaking of the bogs in Vermont—places they too have staggered through in mud up to their knees. Furthermore, just the experience of living in Vermont sparks numerous conversations about the changing of the leaves in fall, or the long and seemingly never-ending winters. All in all, I would probably need to write a novel to completely answer this question, as the positive experiences are numerous.

Within your field, what options do you see for Saint Michael's College biology graduates? - There are several options for SMC biology graduates in the field of dentistry, and more specifically Endodontics. A biology background is a solid foundation for pursuing a clinical dental/endodontic career as well as a career in academia. Moreover, the laboratory experiences and opportunities that a student receives while in the biology department at SMC can be monumental for a career in dental research.

What specific opportunities you think biology majors should pursue before graduation? - Before graduation, I would simply try to do as much as you can, and enjoy every minute of it. You can take away something positive from every class on campus. The experiences in some courses are obviously important, such as Dr. Lippert's and Dr. Lubkowitz's courses in microbiology and molecular biology—they lay the foundation for understanding how the human body responds to infections and the ways we treat those infections. I understand that it's not always fun writing up Dr. Facey's 10-12 page lab reports on a sunny Sunday afternoon (I did my fair share of those), but understanding how to write in a scientific way is an extremely important and valuable tool. Don't tell yourself that science courses addressing environmental issues or animal biology are irrelevant to your studies to become a clinical health care provider, because you're wrong. The time one spends in the biology department is not just about walking out on graduation day with a

diploma and a degree, it is about developing yourself as a person and building a strong character. The faculty and staff at SMC are there to guide and help you, but you have to be willing to accept the opportunity and work to reach it.

Finally, what advice would you give current Saint Michael's College students interested in a career in dentistry and a specialty in endodontics? - The best advice I could give is to knock on the door of Dr. Bozzone. She guided me through my course selection and studies at SMC, as I was planning on applying to dental school. She is a great person, has an amazing personality, and will tell it to you straight. She never led me astray or told me what I wanted to hear, but rather informed me of the requirements for acceptance and the ways to strengthen my application. The other great thing to do is shadow a dentist and/or an endodontist in your area for an extended amount of time. Don't just go once or twice to see what they do, go a couple times a week over a period of a month or two. Finally, I would not be afraid to take a course you feel may not benefit your future in a career. It's a new experience—something you haven't done before or know anything about! Everything you do and every course you take can be a positive experience for your future. Recognize the opportunities and jump all over them.

Sarah Kulpa ('06) - Botanist for the U. S. Fish and Wildlife Service, Nevada Fish and Wildlife Office, Reno, Nevada.



Background - I graduated from St. Michaels College in 2006 with a bachelor's degree in Biology. I graduated from the University of Nevada, Reno in 2010 with a master's degree in Natural Resources and Environmental Science. I currently work for the Nevada Fish and Wildlife Office in Reno, Nevada as a botanist. I am in charge of planning for and managing rare, listed (threatened and endangered), and candidate plant species in the State of Nevada. A typical day at the office does not exist for me because my job activities are constantly changing with the seasons and can range from wandering around the desert surveying plant species to conducting consultations on proposed Environmental Assessments in accordance with section 7 of the Endangered Species Act.

What got you interested in your current field? - Growing up, I spent a lot of time outdoors and science was always my favorite subject in school. In high school, my earth science teacher introduced my class to environmental issues plaguing western Massachusetts, which was dealing with pollution issues from PCBs. A class canoe trip down the Housatonic River was enough to convince me that I wanted to pursue a biology degree at St. Michaels.

What led you down the path to where you are now? - In the broad field of biology, environmental science was my true interest. While at St. Michaels, I did a semester abroad in Cairns, Australia where I took all field based biology classes. Being outside dealing with the heat, mosquitoes, and multitude of poisonous species didn't deter me at all, but instead made me want to pursue a career where I could do this all the time. Upon returning to St. Michaels, I took Prof. Lubkowitz's botany class and have been chasing plants ever since. I received an internship with the Chicago Botanic Gardens Conservation and Land Management Program immediately after graduating from St. Michael's and was placed in the Carson City, Nevada Bureau of Land Management Office working for the Seeds of Success program. With this job I spent a year hiking and camping around northern Nevada collecting seeds, setting up monitoring plots and collecting data on rare plant species, and performing rangeland health and fire assessments. I learned that to be competitive to get a federal job I would need to go back to school and get my masters, which I completed at the University of Nevada, Reno in 2010. My thesis work focused on post-fire restoration and seed source of restoration material in the Great Basin. While going to school, I also worked as a contractor for the Stillwater National Wildlife Refuge in which I performed botanical surveys and developed a monitoring protocol on Anaho Island, Nevada. Between my graduate school experience with plants in the Great Basin and working directly for the Stillwater National Wildlife Refuge, I was fortunate enough to then get the botanist job with the U.S. Fish and Wildlife Service.

What options or opportunities do you see in your field for SMC biology graduates? - There are a lot of field biology internships, especially in the western United States. I would recommend applying to the Chicago Botanic Gardens Conservation and Land Management Program upon graduation if any students want to pursue a federal biology job.

Are there specific opportunities you think biology majors should pursue before graduation? - I highly recommend talking with the folks over at the Career Development office. Donna Atwater really helped me while I was a student by helping me focus my career interests and develop job application and interview skills. I also recommend pursuing summer internships or independent research opportunities because these experiences really build your resume and make you a more attractive graduate school candidate.

Finally, what advice would you give current Saint Michael's College students interested in graduate study and/or specifically interested in your field? - Don't be afraid to take a chance! If you asked me if I ever pictured myself falling in love with the desert and living in Nevada when I was at St. Michael's, I would have laughed at you, but now that this is my reality, I wouldn't change it for the world. I also recommend that students interested in a field-based biology career gain experience in the field before starting a graduate program. This will help you focus your interests and ensure that you are going to pursue something that you are really interested in. Finally, network as much as possible and say yes to opportunities that present themselves because, from my experience, these opportunities end up navigating your career path.