

BIOLOGY matters

Fall 2012

A note from the Chair – Enrollment in the Biology major remains very strong – we have about 240 students in the program, which includes 78 first-year students and 45 graduating seniors. We also provide important courses for the Environmental Studies, Biochemistry, and Pre-Pharmacy majors, and as a result added a lab section of the fall BI 151 and spring BI 153 classes this year to accommodate all of these incoming students.

This, of course, has implications for our upper level courses as we continue to do our best to meet the needs of students as they move through the major. It is certainly exciting to have this level of interest, but it has also been quite a challenge to provide enough spots in the upper level classes. We are also very busy in other ways, as usual – so please read on to find out what we've been up to lately.....



NEWS UPDATES

Welcome to Dr. Dagan Loisel



The Biology Department is pleased to welcome Dr. Dagan Loisel. Dagan is originally from Maine, and received his undergraduate degree from Colby College. After working for two years in a cancer genetics research lab at MIT, he went to Duke University for his Ph.D. in Biology, with certificate in Genetics and Genomics, and followed that with a post-doctoral appointment in the Department of Human Genetics at the University of Chicago. Dagan's doctoral research focused on the evolutionary genetics of immune system genes in wild primates. Dagan will be teaching courses in Fundamentals of Genetics and Immune

Responses to Pathogens and Parasites. His research interests are in the fields of evolutionary genetics, population genetics, and studies of human complex traits.

New spring travel course - Valerie Banschbach travelled to Northern India in May and early June with 12 SMC Environmental Studies students, as well as fellow Bio Professor **Mark Lubkowitz** and Political Science Professor Mike Bosia, to teach a class on "Organic Farming and Conservation of Biodiversity" at the organic farm training center run by Navdanya. During the course, the group learned about Indian methods of organic farming, composting and other sustainable living technologies. While at the farm the group surveyed bird diversity on the organic farm versus neighboring synthetic-pesticide-using farms to assess impacts of organic farming on biodiversity. They also visited and met with scientists at the Wildlife Institute of India and the Forest Research Institute. In addition, they made cultural excursions into the spice and food markets of Old Delhi, the aarti Hindu ritual at Haridwar, a holy city on the Ganges River, went on a safari in the Rajaji National Park and trekked to a temple set on a mountain in the Himalayas.

New Course offerings for 2012-13 – Thanks to our new faculty, and also to meet the needs of the students in our expanding program, the Biology Department is pleased to offer some new course options for the 21012-13 academic year.

Fall Semester - Essential Microbiology (Prof. Donna Bozzone), **Fundamentals of Genetics** (Prof. Dagan Loisel), **Applied Insect Ecology** (Prof. Scott Lewins)

Spring Semester - Exercise Physiology (Prof. Doug Facey), **Immune Responses to pathogens and parasites** (Prof. Dagan Loisel)

We also feature some exciting modifications in existing courses

BI 151 (Introduction to Ecology and Evolution) - For several years the lab component of this course has featured a semester-long ecology study of the sandplain forest at neighboring Camp Johnson. The focus has been to compare plant and invertebrate communities in areas of the forest that had been burned in the mid to late 1990s to areas that had never been burned. This year, students in BI 151 will be collecting valuable data on plants and invertebrates from areas of the forest that we have not studied before, but that are scheduled for a controlled burn in spring of 2014. Therefore, our BI 151 students, along with students involved in summer research will be providing important “pre-burn” information that will be the basis for comparisons to evaluate the post-burn forest for years to come.

BI 247 (Plant Biology) - As part of the new curriculum, students enrolled in Plant Biology are applying the principles and ideas learned in class and lab to solve a real world problem off campus by working with two organic farms in Richmond and one in Huntington. Through this partnership students get to learn about growing practices and tools to measure plant health while addressing specific questions on each farm. *Maple Wind Farm* specializes in local grass finished beef and began a sophisticated soil amendment program this last year to increase the quality of feed. Using a suite of lab tools, Plant Biology students are helping to determine the benefit of these current inputs. *Sue’s Backyard Farm* is located in Huntington and specializes in mesclun salad mix, and students are performing an input versus output cost-benefit analysis based on yield, quality, and cost. Finally, Freedom and Unity is farm with an attached store located in downtown Richmond and SMC students are helping to determine how their fertilizer practices impact root and leaf crops.

RESEARCH UPDATES

Hartnett Endowment supports research at Camp Johnson - This summer, we received support from the Hartnett



Endowment to study tree composition and insect populations in Camp Johnson before a control burn is to take place in Spring 2013. From 11 weeks of data collection, we compiled a worksheet calculating densities and an estimated canopy coverage of over 11 species of trees and shrubs within the sections to be burned. We also constructed a sample collection of 13 identified species of ants from over 2,000 specimens collected. This data collected before the prescribed burn will be used by future biology classes at Saint Michael's College to compare tree and insect species diversity data collected after the prescribed burn.

During our internship, we received scholarships to attend the annual meeting of the Vermont Bird and Botanical club. Brett Engstrom, who is overseeing the prescribed burns in Camp Johnson, led field tours of different sandplain forests of Vermont. We also attended lectures by Allan Strong, Professor at the University of Vermont and Christine Massey, a Geoscience Educator and researcher at the University of Vermont.

Our time spent together allowed us to form strong relationships with Professor Banshbach and Professor Hope that we would not have otherwise made within the classroom atmosphere. From this internship, we were able to partake in both field work and lab work, and we developed skills from each learning experience that we hope to use in our future aspirations.

Jennifer Labrenz '13, Devin Latremore '14, Aerielle Matsangos '15, Nikolas Salvias '15

USFWS Internships: Taylor Luneau ('14) and Amelie Jensen ('13) were both selected as US Fish and Wildlife Service interns for the summer of 2012.

Taylor spent most of his summer working on several fisheries projects, including a project evaluating changes in body shape of salmon as they metamorphose from stream-dwelling “parr” to downstream-migrating “smolts”. He is continuing some of this work into the fall semester, and evaluating differences between fish raised in two different hatcheries and those that were stocked into stream when very young and are now undergoing metamorphosis under natural conditions.



This report from Amelie - This past summer I spent the majority of my time monitoring tree growth in riparian habitats along streams and rivers throughout Vermont. This was research for a follow up study on habitat restoration projects that the US Fish and Wildlife Service has been contributing to over the last 15-20 years. In addition to this main project I also gained experience working with other biologists. I helped with wetland vegetation surveys and took elevation measurements. I spent multiple days and nights on



islands of Lake Champlain observing cormorants and catching them to band them. I learned about fish passage by electrofishing and taking dam measurements for reconstruction. I also spent time at the Missisquoi National Wildlife Refuge collecting and relocating freshwater mussels. Throughout our fieldwork I was able to acquire experience with a GPS unit, and on days I did not spend outside I worked with GIS mapping. (To learn more, go to <https://youthgo.gov/youth-profile/amelie-jensen>)

Neurobiology Summer Research - Ali Lajoie and Marci Wood worked with



Professor Adam Weaver and former student/researcher Kristen Cowens in the Neurobiology lab this summer. Ali is a senior Biology major and Chemistry minor, and Marci is a junior Biology major/Chemistry minor in the Pre-pharmacy program. This summer, they studied the nervous system physiology of two previously unstudied species of leeches. Specifically, they investigated the heartbeat system and worked to characterize the neurons that control the leech heartbeat. They took intracellular recordings from leech heart interneurons and excitatory neurons, which are crucial in maintaining the flow of blood throughout the leech's body. Many new techniques were implemented this summer to improve success of finding these specific neurons in the leech ganglia. Future undergraduate researchers will carry on these techniques and the work done this summer.



After graduation in May, Ali plans on obtaining a job in a healthcare related field before pursuing admission to medical school. Next year Marci will begin taking classes at the Albany College of Pharmacy and Health Sciences in Colchester, VT as part of the articulation agreement between ACPHS and St. Mike's.

Last 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 **Mark Lubkowitz** from Saint Michael's College to better our understanding of how the movement of photosynthesis products in plants is regulated. This summer five biology majors and one chemistry major worked on different aspect of this project. **John Reiser** ('13) traveled to Purdue where he helped screened for novel mutations that affect carbohydrate partitioning. **Chad Chapman** ('13) and **Heidi Chapman** ('13) spent their summer at the University of Missouri characterizing sugar transporters while **Steph Locke** ('13) and **Amanda Costa** ('14) traveled to the University of Florida to work on genes that modify sugar movement within plants. **Frank Gilcreast** ('13) worked at the University of Nebraska where he used mass spectroscopy to measure the composition of sugars in transport. These researchers will be presenting their findings at the 55th Annual Maize Genetics Conference this coming March in Chicago, Illinois.

Summer 2012 in Declan McCabe's Macroinvertebrate lab - In recent summers one of our teaching labs has been converted into a hive of macroinvertebrate research activity. This year we set up operations in the recently renovated 301 lab (see [Biology Matters Fall 2010](#)). Professor McCabe was joined by student researchers including **Patrick Bousquet** ('13), **Jared Peick** ('13), **Anne Burnham** ('13), Tatiyanna LeShea (U. Met. Puerto Rico), Ismael Orengo (U. Met. Puerto Rico), and Adam Heckle (Community College of Vermont). Our focus this year has been on the effects of sedimentation in streams. We implemented a sediment addition experiment in one stream and examined the macroinvertebrate community correlates of sediment load in several streams. Patrick and Jared have continued their research into the academic year and are currently processing samples taken in summer and fall. Their work has complemented our long-term biomonitoring efforts that are currently in their 5th year.

The lab also supports macroinvertebrate outreach efforts through Vermont EPSCoR's [Center for Workforce Development and Diversity](#) (CWDD). This year our student interns helped host 17 high school teams from Vermont, New York, and Puerto Rico. We provided field and laboratory experiences and contributed to a training week that included speakers from UVM, Middlebury College, Johnson State College, the Vermont Department of Environmental Conservation, and Saint Michael's College Biology and Geography departments. The school teams will use their training to collaborate on research projects throughout the Champlain Basin. Results of this summer's work will be presented in Vermont EPSCoR's Symposium in April 2013.

Finally, the macroinvertebrate team has contributed to a CWDD outreach trip to Hunt Middle School in November and will host high school teams and outreach specialists from ECHO Vermont for a macroinvertebrate identification workshop in December.

Valerie Banschbach travelled to Uganda in August to participate in a workshop on ant diversity assessment in the Kibale National Forest, near Fort Portal. The workshop participants came from 17 different countries, and spent nearly two weeks collecting and identifying ants and found more than 60 genera, including two species not previously described from Uganda!

FACULTY PUBLICATIONS

Biology alumni may remember performing yeast mutation rate experiments in Genetics laboratory. Some also performed independent summer or senior research projects on this topic. Four biology majors (now alumni) coauthored a manuscript with professor **Mac Lippert** titled "High Levels of Transcription Stimulate Transversions at GC Base Pairs in Yeast", which has been accepted for publication in the journal *Environmental and Molecular Mutagenesis*. Congratulations to Matthew Alexander ('09), Kaitlyn Begins ('10), William Crall ('09), Margaret Holmes ('06) and Mac Lippert.

Valerie Banschbach published an article in the August 2012 issue of *Psyche* entitled "Edge effects on community and social structure of Northern temperate deciduous forest ants." This publication reports the results of two years of field research, which involved four SMC undergraduate Biology student researchers. The work was conducted at the Mills Riverside Park in Jericho, VT. You can click on this link for full details:

<http://www.hindawi.com/journals/psyche/2012/548260/>

STUDENT PROFILES

Anne Burnham



Hometown: West Brookfield, MA

Career Interest: Masters in Ecology, some sort of work in the environmental field (Not quite sure what the end game is as of right now)

What has your Saint Michael's experience, particularly your experience as a biology major, been like? My time at Saint Michael's has been such a rewarding experience, and one that I would not trade for anything. Having always had a love of the outdoors, I started taking biology classes and quickly developed a passion and curiosity for the natural world. I then added an Environmental Studies major as well, in order to explore not only the science of the environment, but social and economic issues that surround us. Since then, I have developed relationships in the biology department that make every day new and interesting.

I have learned so much both in and out of the classroom from professors and other students alike. The passion with which all of the professors teach, whether it be about a small bug in the bottom of a stream, a rare fern on the side of a cliff, or slime mold in the lab, inspires me on a daily basis. In a place where office doors are always open for class work or just to chat, the biology department has become a part of my family.

What additional activities did you pursue related to the biology major? For the last two summers, I have been lucky enough to spend my summers working as a research intern for the EPSCoR Streams project in the macroinvertebrate lab under Prof. Declan McCabe. This opportunity allowed me to spend my summers working in streams all over northern Vermont. Through the Streams project, I fell in love with field work as well as with the Burlington area, which has so much to offer. During my second summer with the Streams project, I was promoted to the head of lab, which pushed my comfort zone and helped me to grow as a leader in ways that I did not think that I could.

In May of 2012 I was lucky enough to travel with the Environmental Studies department to study organic farming and conservation of biodiversity. While there, we explored everything from bug and bird diversity to various composting methods. This was such a unique experience that changed the way that I view the world. Going to an area that is so socially and biologically very different from Vermont was eye opening. I would not trade my experiences or the relationships that I formed with the professors that traveled with us for the world.

This semester I am a waste water intern at Ben and Jerry's in Waterbury Vermont. While this internship is different from my other experiences, it is interesting to see biology applied in the work place, and has been eye opening. Working with a company full of like-minded people who truly care about reducing their impact on the environment and doing everything they can to be better has been an amazing experience.

What are your post-graduate plans? I am currently in the process of looking into and applying to graduate programs all over the country. I hope to pursue a Masters in Ecology beginning in the Fall of 2013.

Patrick Bousquet



Hometown - Hooksett, NH

Career Interest – Marine Intertidal Ecology

What has your Saint Michael's experience, particularly your experience as a biology major, been like? – Being a Biology major has reaffirmed my love for ecology. The majority of my courses have been biology (of course majoring in biology). The class sizes, most of which have fewer than 25 people, made the transition from high school to college about as smooth as can

be. The professors are very approachable and, because of the small class sizes, know your name. Because of their approachability, the professors seem more like colleagues than teachers. There has yet to be a course in the biology major that I have not enjoyed. The courses range through most all branches of biology. The curriculum of the biology major enables you to experience all fields before fine-tuning your specific branch. Because of the liberal arts approach to of the biology major, I feel like I have learned specific skills that prepare me better for the not-too-far-away real world.

What additional activities did you pursue related to the biology major? - In the biology department, I am a teaching assistant for an introductory biology lab. This has been a great experience and sparked an interest in potentially finding a career in teaching. I also am currently working on a senior research project. Last summer, I worked with Professor McCabe in his benthic macroinvertebrate lab. I have also done a few Science Club trips, mainly a trip to Montreal to the BioDome and Botanical Gardens. In the spring semester of my junior year, I studied abroad in Sicily. While there, I studied the Mediterranean Ecosystem and the geology and volcanology of the Italian island.

What are your post-graduate plans? - Ultimately, I intend to apply for a graduate program (either Masters or Ph.D.) in marine intertidal ecology or watershed ecology. However, right now, my plan is to find a job in marine intertidal ecology as an assistant to gain experience in the field.

Stephanie Locke



Hometown: Hyde Park, VT

Career Interest: Ph.D. in Marine biology

What has your Saint Michael's experience, particularly your experience as a biology major, been like? My experience as a biology major at Saint Michael's College has been the greatest decision I have ever made; not only to fulfill my passion for science but also for my future goals. The biology major here at Saint Michael's gives all of us 'Discovery Channel' children the option to pursue any field while providing a wide spectrum of education of all the branches in biology. Each year I register for classes, the college has always graced me with the chance to explore topics that I never thought I would have the opportunity to

study. The small community of the biology department has truly delivered the utmost support and networks that will fuel my future. Overall, my experience of the biology major would not have been the same without the wonderful people I worked with and the fervent professors that have never once hesitated to lend a hand (or an opportunity). If I could leave the department with one message it would be that the close-knit family of the major has exemplified the true meaning of support and that they have all taught me so much more than the biological processes.

What additional activities did you pursue related to the biology major? Not only did I enjoy a wide variety of topics in the biology major during my time at Saint Michael's; but I also came to realize that I loved being in the lab setting. Beginning my freshman year, I took every opportunity to work in any lab that needed a teaching assistant. Around the same time, I began to work in the department prepping the labs. If it meant sharing my enthusiasm or providing insight for the topic, I wanted to be involved. Working in the biology department allows a student a significant amount of opportunities. Being one of the many students that "lived" in the department presented me the advantage to join and become the Vice President our National Biological Honor Society on campus. Additionally, my dedication to the major allowed me to be recognized by one of the most zealous professors of the department, Dr. Mark Lubkowitz, who awarded me the opportunity to work with him for two years on the \$6.2 million Plant Genome Project funded by the National Science Foundation (NSF). That year quickly became saturated with more lab experience and in the following years, I found that I only craved more. Working one-on-one with the professors also helped me to a great extent in finding connections for internships in the area. It quickly became apparent that my opportunities were endless when I began to ask around the

department of any companies/programs that were in need of interns. The great reputation that Saint Michael's sustains with its connections has allowed me to enrich my connections by working at numerous institutions/companies like the University of Florida, ECHO aquarium, Green Mountain Antibodies, and Aquatec Biological Sciences. These additional activities gave me amazing opportunities both in the department and off campus which in turn has tremendously benefited my overall direction in life (including my resume).

What are your post-graduate plans? – Being a Vermont native, I hope to attend a graduate program in a more coastal climate and gain further experience in the field of marine biology. Although I do not have a specific career in mind; I know I would like to obtain my Ph.D. in marine sciences and pursue any opportunities that may provide.

ALUMNI NEWS & PROFILES

Dr. **Tracy Romano** (class of 1986) was inducted to the SMC Academic Hall of Fame at the annual Fall Convocation on Friday, September 28. Tracy is the Executive Vice President for Research and Zoological Operations at the Mystic Aquarium in Mystic, Connecticut. Her research background and interest focuses on marine mammals, particularly beluga whales. While on campus, Dr. Romano had lunch with officers of our chapter of Beta Beta Beta (national Biology Honor Society) and also had an after-lunch open forum during which she discussed how her commitment to studying marine mammals led her from St. Mike's to her current position, which includes studies of how the immune system of belugas responds when the whales are under stress. It was great to hear about the work going on at the aquarium, and also with wild belugas in the arctic.



Congratulations to **Matt Hajdun** (class of 2005), who received a Milken Family Foundation Award on October 15.



Recipients of this award are nominated by their peers to recognize “strong long-range potential for professional and policy leadership” and “an engaging and inspiring presence that motivates” colleagues, students, and the community.

After Matt graduated as a Biology major (and was awarded the Father Prevel Award at Commencement), he completed a 9th semester doing his student teaching for elementary education licensure. Upon graduation, Matt taught at an orphanage in Honduras and then in a bilingual inner city school in New Britain, CT before moving to Burlington, where he teaches at Champlain Elementary School. He is currently pursuing a Master's degree in the Graduate Education program at Saint Michael's. See local news coverage from [WCAX](#) and [WPTZ](#).

Ashley Jean, Class of 2010



Current position: First year medical student at Tufts University School of Medicine. (Photo on left is from Ashley's “white coat” ceremony.)

Background: I am from Sanford, Maine and am currently living in Cambridge, Massachusetts.

What got you interested in your current field? Growing up, I was always interested in science and wanted to become a veterinarian. However, my senior year in high school I took a year-long anatomy and physiology class that really inspired me to pursue a career as a physician.

What led you down the path to where you are now? As I mentioned, I became interested in pursuing a career in medicine during my senior year in high school, and therefore entered Saint Michael's College as a biology major. During my first year I met Professor Bozzone at a pre-health advisory meeting and over the next four years, used her guidance and advice to take the necessary steps to get into medical school. During my time at Saint Michael's, my younger sister also battled a serious illness, and had an incredible team of doctors and surgeons. Her strength and courage and the amazing care she received solidified my decision to go into medicine.

What experiences in the Saint Michael's College biology department prepared you for your post-graduate training and your career? Many of my experiences at Saint Michael's helped prepare me for medical school. The biology department at St. Mike's is incredible, and the professors are nothing but supportive. The classes were challenging and academically prepared me for the rigors and demands of medical school. During my senior year, I also completed an internship at the Vermont Office of the Chief Medical Examiner where I assisted in autopsies and conducted a research project. I believe this experience helped my medical school application stand out, and was a major determinant in my acceptance at Tufts.

Do you have any advice for students interested in your field? My best advice for those interested in medicine is to work hard and be confident in yourself. Medical school is extremely competitive and requires a significant amount of work just to be accepted. Remember to believe in yourself, and keep the big picture in mind. Seek the help and support of the professors and take advantage of all of the resources Saint Michael's has to offer. If you are interested in medicine specifically, make your way down to Professor Bozzone's office, she will be one of your best resources.

Are there specific opportunities you think biology majors should pursue before graduation? Absolutely. Saint Michael's has so many opportunities for biology majors. For those interested in medicine, I would highly recommend getting involved in research or completing a medically related internship. Also take some time and get involved within the community by volunteering or becoming active in the MOVE program. Getting some medically related experience either through work or shadowing would also be beneficial.

Janel Roberge, Class of 2012



Current position: Biologist at Aquatec Biological Sciences

Background: Born in Milan, NH attended school in Berlin, NH. B.S. in Biology

What got you interested in your current field? What got me interested in my current position was that it was a job actually in my field! I know too many people who have four-year degrees but work in the food industry, etc. What really caught my attention about the job was that it involved macroinvertebrates! My time at SMC has really taught me to appreciate the little critters that everybody takes for granted. However as part of my job I have also been trained to perform many other tasks, those not involving macroinvertebrates, and will continue to

learn even more!

What led you down the path to where you are now? A combination of factors have led me to where I am today. First and foremost attending SMC provided me with both the skills I now use in my day-to-day life, and the mentor friend-like professors who informed me that there was an opening at the company for which I now work. There wasn't even an open job posting for my position so having these types of connections and people looking out for me was vital to my attaining a job. Networking is definitely in abundance at SMC and current and future students should take advantage of it!

What experiences in the Saint Michael's College biology department prepared you for your post-graduate training and your career? The old adage 'college teaches you how to learn,' is definitely true. My experiences

within the Biology Department specifically taught me a whole host of lessons. General work ethic, attitude, and an ability to 'roll with the punches' are characteristics that I've developed more deeply in my time with the department. On a more technical skill level, the research that I did with the EPSCoR Streams Project and work I accomplished through being a teacher's assistant and lab prep work-study in the Biology Department provided me with the valuable skill set of being able to taxonomically categorize macroinvertebrates. It was this skill set that got my current employers interested in me, even though that may sound a little crazy to the average person.

Do you have any advice for students interested in your field? I don't believe that there are necessarily *specific* opportunities that biology majors should pursue before graduation. I can tell you first hand that sometimes doing research or an internship that doesn't sound like exactly what you want to do 'when you grow up' can be the best thing you'll ever do for your future self. I didn't think that I'd have a job that I love, learning all sorts of new techniques and tests and processes just by deciding to study bugs one summer. Sometime taking a leap and choosing to do something out of the box (whatever your own personal box may be) can be the most rewarding thing, even if it doesn't seem that way at first. At any rate, doing research and maybe even an internship will definitely get the employers looking more seriously at you!

What advice would you give current Saint Michael's College students interested in graduate study and/or specifically interested in your field? Because I graduated with a more 'generalist' BS in Biology, I don't have advice for specific fields. The best thing I can tell current students is that there *are* jobs out there! Stay optimistic and don't be afraid to call on your professors or other professionals you know to help pull some strings - it is well worth it!

Ryan Larson, Class of 2004



Current position: Postdoctoral Scientist, Tuberculosis Program, Seattle BioMed; Senior Research Fellow, Department of Immunology, University of Washington

Background: I grew up in Franconia, NH and moved to Colchester, VT where I received my BS in Biology from SMC in 2004. After graduating from SMC I took a research technician position in Laura Haynes' lab at the Trudeau Institute in Saranac Lake, NY studying the effects of age on the immune response to vaccination and infection. Following two years in upstate NY I moved to Seattle, WA and began graduate school in the University of Washington's Department of Immunology. I received my Ph.D. in immunology in 2011 and shortly thereafter took a postdoctoral position studying the immune response to tuberculosis at Seattle BioMed.

What got you interested in your current field? I have always had a fascination with infectious diseases and can remember reading books about the dangerous pathogens studied at the Centers for Disease Control and historic outbreaks of zoonotic pathogens, those that are transmitted between species. While reading and learning about microbiology throughout high school and college, I had very little exposure to immunology and the mechanisms by which our body fights infection. My interest in immunology was piqued during Prof. Lippert's microbiology course at SMC. While I had always been interested in infectious disease, the notion that mammals have co-evolved with pathogens and as a result our immune system is able to mount a complex multi-faceted response to foreign invaders was incredibly captivating. Ultimately, these interests led me to pursue a research technician position in immunology and infectious disease. With the help of SMC biology alum Melissa Barber, I was able to find a position at the Trudeau Institute, a world renowned infectious disease and immunology research center. This is where I solidified my desire to pursue a career in immunology and infectious disease research. Working with a complex pathogen like *Mycobacterium tuberculosis*, arguably the most successful human pathogen, is truly fascinating because so little is known about how it is able to evade the immune system and persist for the life of the host.

What led you down the path to where you are now? I entered my first year at SMC as an exploratory major. However I was certain that I wanted to incorporate the pre-med curriculum into my education because my initial plan was to go to medical school following college. Eventually I became a Biology major and integrated myself into the department as much as possible. I was able to interact with some of the more senior students in the department through my work study position and learned about their independent research projects with the faculty and thought it sounded like a great opportunity. It was about this time that my advisor Prof. Martin suggested pursuing undergraduate research. The decision to do undergraduate research at SMC was a defining moment in my research career trajectory and provided me with important skills that allowed me to be competitive in the job market after graduation. Research experience gained at SMC enabled me to dive straight into my work as a research technician and played a huge role in my being accepted to graduate school.

What experiences in the Saint Michael's College biology department prepared you for your post-graduate training and your career? The biology department provided a multitude of opportunities and learning experiences that prepared me for entering the work force after graduation and ultimately was critical in my admission to graduate school. The classes and labs that I took at SMC emphasized the importance of using the scientific method to formulate and address hypotheses with the ultimate goal being to communicate your findings in a succinct manner. I still recall and adhere to Prof. Martin's strict rules for writing lab reports for General Biology. The senior level courses that I took, such as Prof. Banschbach's Animal Behavior class and Prof. Bozzone's Developmental Biology class were built around discussing the research in the respective fields and our understanding of the material was tested by our ability to design experiments to address questions pertinent to the field. One of the most important aspects to being a successful scientist is being able to formulate interesting questions that can be addressed in a hypothesis-driven manner, and I believe developing these skills as an undergraduate prepared me for a future in research.

My undergraduate research experience with Prof. Lippert provided me with the basic lab skills and ability to carry out hypothesis-driven research that is necessary in any research discipline. The undergraduate research experience at SMC is extremely unique because of the low student to professor ratio and the sense of community that you form with other students and faculty advisors doing research. In addition to my time in the lab with Prof. Lippert, I was incorporating a bioinformatics component into my project and was able to receive mentorship from Prof. Green in designing and writing computer programs that identified specific DNA sequences of interest. This experience highlights the multi-faceted and collaborative nature of the SMC Biology faculty. I encourage students to take advantage of each faculty member's expertise, as this will only enrich your experience in the department.

Are there specific opportunities you think biology majors should pursue before graduation? Take full advantage of the liberal arts curriculum provided by SMC. Graduate programs and medical schools are seeking students with diverse educational backgrounds, and this is for good reason, as the sciences are becoming increasingly multidisciplinary. It is not uncommon for me (a cellular immunologist) to interact with computational biologists, mathematicians, parasitologists, and biostatisticians on a daily basis. Being able to communicate across disciplines is vital in the team-oriented and collaborative approach to research that is common nowadays.

I would also highly recommend pursuing undergraduate research or an internship that is directly related to your field of interest. This will help you determine whether that field or area of work is truly something you want to pursue as a career, and it will prove invaluable in the post-graduation job search and/or graduate school admissions process. This process will also likely involve writing a fellowship or grant application to fund your research or internship, another important skill that will be heavily utilized if you choose a career path in biomedical research.

What advice would you give current Saint Michael's College students interested in graduate study and/or specifically interested in your field? For those students with a particular interest in cellular immunology and/or infectious disease I would highly recommend pursuing an internship at an institution that has an immunology department. In this sort of setting, you will be exposed to the techniques and models that are directly relevant to immunology, as well as get a feel for what graduate school might be like. Gaining skills relevant to your field of interest will be extremely useful for graduate school applications and hitting the ground running when you start

your thesis research. The path I took after graduation from SMC involved taking a research technician position, however, this is not necessary. I only chose this route to experience immunology and infectious disease research, which I was not exposed to while at SMC.

There are multiple institutions that have summer research internships for undergraduates. For example, my current employer Seattle BioMed has a competitive summer undergraduate research internship program. I would also recommend contacting principal investigators directly via email, expressing your interest in immunology research and desire to gain experience in an immunology lab. However, this should be in addition to the undergraduate research opportunities available at SMC, which I believe is an unparalleled experience.

Randy Breeckner, Class of 2011

Current position: Seaman in the United States Coast Guard



Background: I am from Washington Depot, CT where I graduated from Shepaug Valley Regional High School. At Saint Michael's College I was a Biology major with minors in Political Science and Environmental Studies. I also participated in student government, rugby, Tri Beta, and yearbook.

What got you interested in your current field? I have always considered a career in the military because of my love for team sports and being part of a bigger picture. Having a degree in biology helped me lean towards the Coast Guard because of their work in environmental protection and their immediate response to oil spills.

What led you down the path to where you are now? During my senior year I began applying for masters programs in marine biology and zoology thinking I wanted to immediately go from undergrad to grad. After I began getting into schools I realized that I had no way of paying for them and did not want to risk going into debt. I then decided to take the job application route with little success in finding anything related to the animal sciences. It was the perfect time in my life to meet with a recruiter. I chose the Coast Guard because I admired that "Environmental Protection" is listed under their mission statements and because of my love for anything marine related. I attended boot camp in Cape May, NJ from March-May 2012 where I graduated with company Mike-186. I then received my orders to be a Seaman at the small-boat station in Miami Beach, FL.

What experiences in the Saint Michael's College biology department prepared you for your post-graduate training and your career? While my current job does not require any degree, let alone a biology degree, I find that it is useful every day. When I see any trash or oil sheens in the ocean I realize the direct affect they can have on the marine environment. While I sometimes get mocked by my shipmates for leaning overboard or off the docks to pick up one plastic bag, I know that picking up that bag may save an endangered sea turtle. Right now I am only a Seaman in the Coast Guard which is starting from the very bottom, but I plan to apply for Officer Candidate School in hopes of becoming an officer at a Preventions Department or a Marine Safety Office where I could focus on water pollution and other marine hazards.

Do you have any advice for students interested in your field? I would recommend the Coast Guard to anyone who loves being out on the water and has an interest in search and rescue or law enforcement. While my current job is not science focused, I still get a great satisfaction from what I do. I never saw myself working in search and rescue or law enforcement, but every time our station gets a case, I cannot wait to respond to it. If you love being part of a team and are unsure of what to do post-grad, I would advise meeting with a recruiter because the military can take you down a path in life that you may have never expected and will set you up for a strong future.

Are there specific opportunities you think biology majors should pursue before graduation? I would recommend to all biology majors to pursue an academic internship. My junior year at Saint Michael's I had an animal husbandry internship at a tropical salt-water fish farm. I learned so much from that internship and it broke up a

little of the monotony of always being in a classroom. That internship gave me hands-on training working with tropical marine life and a chance to get off campus for a new experience. I would also recommend that all biology majors take a class outside of their current interests. My senior year I took Botany just to fill in a biology elective slot. I assumed I would not enjoy it because of my passion for animals, but it ended up being one of my favorite and most memorable classes!

What advice would you give current Saint Michael's College students interested in graduate study and/or specifically interested in your field? I always recommend planning ahead. I ended up not attending graduate school, but one of the best decisions I made my senior year was applying. Getting into schools boosted my confidence and relieved any concerns I would have for applying later in life. I am also happy I spent so much time applying for jobs. All of those applications and interviews gave me great practice and taught me what I can improve on when I look into future careers. At first it may seem like a Debbie-downer on your senior year to be filling out applications and finding recommendations, but it will make your post-grad life much easier to work out the kinks while you are still a student.