

Biomedical Science Major Annual Report 2013

Greetings from the Director, John Gunn, PhD



The year 2013 was another outstanding one for the Biomedical Science (BMS) major. The year began by interviewing high school seniors for the next BMS class. We had an outstanding pool of applicants, and a strong class of 22 freshmen began in the autumn 2013 semester (featured on page two). We have very high expectations for this group of motivated and outstanding students!

May meant graduation, and this year was particularly special. The BMS Class of 2013 had an outstanding placement into graduate and professional schools (featured on page three). As if this wasn't enough, some members of the very first graduating class of BMS students (the Class of 2009) graduated from medical school. These alumni all matched into excellent residency programs (featured on page four).

However, we were not only celebrating our seniors and alumni. We were also celebrating one of our most esteemed faculty members, Dr. Ken Jones. He was one of the founding faculty members of the BMS major and taught every freshman class until his retirement in 2011. Dr. Jones also taught human anatomy to all of the OSU medical students, which meant that BMS alumni in OSU's College of Medicine were taught by him twice. After being nominated by a BMS alumnus, Dr. Jones was awarded OSU's College of Medicine Professor of the Year award for 2012.

The summer of 2013 saw many BMS students packing their bags and heading out of the country for both study and research abroad. (Some of these students are featured on pages five and six.) Other BMS students remained in Columbus to participate in research or the Grever Internship (featured on page six).

Finally, in December 2013, we sent a group of BMS seniors to Malawi, Africa, for a service-learning project associated with a senior-level BMS class. This abroad experience was organized by Drs. Jesse Kwiek and Jordi Torrelles and was the first offering of a BMS-specific global experience.

We are proud of our students' continued growth, development, and achievement, and thank all who participate in their education. We sincerely appreciate your interest in the Biomedical Science major. Go Bucks!

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Biomedical Science Major

Mailing Address:

1080 Graves Hall
333 W. 10th Avenue
Columbus, OH 43210

Office Location:

1080 Graves Hall

Website:

medicine.osu.edu/bms

Phone:

614-247-8060

Director:

John Gunn, PhD

Program Manager:

Steven Mousetes, MEd, MLS

Motto:

*Developing leaders in research
and medicine*

The Biomedical Science annual report is published at the end of each calendar year to highlight and celebrate the accomplishments of BMS students and alumni. Previous annual reports are available on the BMS website.





Welcome, BMS Class of 2017!

Alison Anderson

Reynoldsburg, Ohio
Reynoldsburg High School/eSTEM

Emily Durbak

Sylvania, Ohio
Toledo Central Catholic High School

Alec Gonos

Cincinnati, Ohio
Turpin High School

Kelly Haller

Strongsville, Ohio
Saint Joseph Academy

Sohom Manna

Beavercreek, Ohio
Beavercreek High School

Gregory Nagy

Avon, Ohio
Elyria Catholic High School

Christina Rozman

Mayfield Village, Ohio
Mayfield High School

Adam Watson

North Canton, OH
Hoover High School

Bilen Berhane

Westerville, Ohio
Westerville South High School

Joan Garcia

Copley, Ohio
Revere High School

Victoria Gosy

Clarence, New York
Williamsville South High School

Hannah Harris

Cheyenne, Wyoming
Central High School

Jennifer Maskarinec

Washington, Pennsylvania
Trinity High School

Bryce Ringwald

Spencerville, Ohio
Spencerville High School

Peeyush Shrivastava

Mason, Ohio
William Mason High School

Matthew Davis

Chatham, New Jersey
Delbarton School

Erin Glankler

Cleves, Ohio
Mother of Mercy High School

Margaret Grau

Chardon, Ohio
Chardon High School

Young Min "Ellie" Lee

Dublin, Ohio
Dublin Coffman High School

Elina Misicka

Hilliard, Ohio
Hilliard Bradley High School

Daniel Rodriguez

North Canton, Ohio
Canton Central Catholic H. S.

Lilianna Suarez

Dublin, Ohio
Dublin Coffman High School

Highlights of the Class of 2017

- Applied for admission: 121
 - Interviewed: 48
 - Offered admission: 28
 - Matriculated: 22
- Average ACT: 32
- Average SAT: 1402 (Critical Reading and Math)
- Average unweighted high school GPA: 3.95
- Average weighted high school GPA: 4.41

Congratulations, BMS Class of 2013!



Members of the Class of 2013
(listing high school, hometown, and graduate/professional pursuits)

Russell Bonneville

Bishop Ready High School
Grove City, Ohio
MD - The Ohio State University

Mark Doles

Granville Christian Academy
Pataskala, Ohio
PharmD - The Ohio State University

Kristen Duckro

Beavercreek High School
Beavercreek, Ohio
Postbac Research – Germany

Alec Graham

Dublin Coffman High School
Dublin, Ohio
Entering workforce

Monica Lachey

Archbishop Alter High School
Springboro, Ohio
MPH - Emory University

Michael Ratti

Olentangy Liberty High School
Powell, Ohio
MD - The Ohio State University

Shrey Shah

St. Ignatius High School
Westlake, Ohio
MD - University of Cincinnati

Sarah Swager

Bradford High School
Somers, Wisconsin
Postbac Research - The Ohio State University
Pursing Nurse Practitioner Program

Nicholas Denton

Mentor High School
Mentor, Ohio
PhD (Biomedical Sciences) - The Ohio State University

Amie Draper

North Olmsted High School
North Olmsted, Ohio
PhD (Bioinformatics) - University of Pittsburgh

Corey Fete

Fairfield High School
Fairfield, Ohio
PharmD - The Ohio State University

Nicholas Jarjour

Home Schooled
Charlottesville, Virginia
PhD (Biomedical Sciences) - Washington University

Calvin Lam

Northside College Prep
Chicago, Illinois
DDS - The Ohio State University

Erica Schmenk

Kalida High School
Kalida, Ohio
Patient Care Technician - Blanchard Valley Hospital
PA Program - Ohio Dominican University (AU14)

Ronald Siebenaler

St. John's Jesuit High School
Holland, Ohio
MD/PhD - University of Michigan

Featured Alumnus: Tyler Miller



Tyler Miller, from Ottoville, Ohio, was in the BMS Class of 2010. Prior to entering OSU, Tyler had never worked in a research lab, but he quickly determined that his passion is research. Tyler experienced great success during his years in BMS, and after being offered admission to several MD/PhD programs, he decided Case Western Reserve University was the best fit for him. Here is Tyler's story:

Currently, I am in my 4th year of the Case Western Reserve University's MD/PhD dual degree program. During my first two years, I completed all of my medical and graduate school classes as well as my research rotations. This allowed me to start full time on my thesis research in May 2012, something I had been looking forward to since I graduated from OSU in June 2010.

My first taste of research came in my freshman year at Ohio State through the BMS program. I had a great lab and mentors and quickly fell in love with biomedical research. I worked with Drs. Sam Jacob and Sarmila Majumder in a cancer research lab that focused on epigenetics. The first project I worked on full time looked at tamoxifen resistant breast cancer and the role of a newly discovered class of biological molecules, microRNAs. It turned into my initial first-author paper and I've been interested in microRNAs ever since. I worked in the Jacob lab my entire collegiate career, except for the summer going into my senior year. With the help of the BMS program, I earned a prestigious research internship that summer at MIT through the Amgen Scholars program. I conducted leukemia research with Dr. Michael Hemann at MIT's Koch Cancer Institute, where the lab was working on and published the first *in vivo* shRNA screen in cancer.

With my research background at Ohio State, I came into my MD/PhD program looking for a lab and mentor that would allow me to conduct the most cutting edge cancer research for my thesis project. I ended up finding two mentors who are that cutting edge of their fields and agreed to co-mentor me. Dr. Jeremy Rich, the chair of the Stem Cell Biology and Regenerative Medicine at Cleveland Clinic, is a leading researcher of cancer stem cells, a new paradigm in cancer research. We work on cancer stem cells in glioblastoma, the most common and most lethal form of brain cancer. Dr. Paul Tesar is a rising star at Case Western in the Department of Genetics and a world expert in neural stem/progenitor cell biology and cellular reprogramming. My current thesis research capitalizes on the expertise of both labs, as well the expertise of my previous labs at Ohio State and MIT, with which I actively collaborate. For my thesis project, I've made a novel adaption of the *in vivo* shRNA screening technology pioneered at MIT to study the epigenetic regulation of brain cancer stem cells in their native microenvironment in the brain, with the goal of finding a way to disrupt the cancer stem cell state and render them sensitive to therapies. It's an ambitious project, but the extensive research experience and education I received through the BMS program at Ohio State gave me a significant advantage over most entering graduate students and allowed me to hit the ground running.

BMS Class of 2009 Residency Placement

Eight members of the inaugural Biomedical Science major graduated from medical school in 2013. All matched successfully with residency programs, with most receiving their first choice. Placements were as follows:

- **Corey Beals** (Dayton, OH) - Surgery at The Ohio State University Wexner Medical Center
- **Shannon Conneely** (Massillon, OH) - Pediatrics at Cincinnati Children's Hospital Medical Center
- **Megan Conroy** (Gaithersburg, MD) - Internal Medicine at Georgetown University Medical Center
- **Matthew Flanigan** (Cincinnati, OH) and **Zachary Rossfeld** (Lima, OH) - Internal Medicine at The Ohio State University Wexner Medical Center and Pediatrics at Nationwide Children's Hospital
- **Benjamin Jones** (Lebanon, OH) - Anesthesiology at the Medical University of South Carolina
- **John Reid** (Cincinnati, OH) - Internal Medicine at the University of Cincinnati Medical Center
- **Stephen Smith** (Franklin, OH) - Pathology at The Ohio State University Wexner Medical Center

Summer 2013 Experiences



Katie Stanfill (Class of 2014) - Ecuador

I spent my summer in Ecuador where I worked with the Ohio University Tropical Disease Institute studying Chagas Disease. The first week was an International Research Workshop where we were in class learning all about the unique challenges of conducting research internationally. Then for the following weeks, we were in the southern part of Ecuador next to Peru's border working in the rural villages. Each day, we would travel with the public health officials to the homes, educate the locals about the disease, and collect samples of the chinchorro bugs and small mammals to bring back to the mobile lab. In the lab, we would then dissect the chinchorros and mammals and test for the presence of Chagas. We were collecting data to determine the level of prevalence in the area.

I loved being able to work alongside those of many different cultural backgrounds and disciplines. I was able to spend two days shadowing in the hospitals in the capital city. I got to spend some time in the emergency room and observe several surgeries. Being able to see firsthand the level of healthcare was eye opening, to say the least. I had a blast and took away an appreciation for having access to not only quality healthcare, but also my education, living conditions, and the resources of healthy food and water.

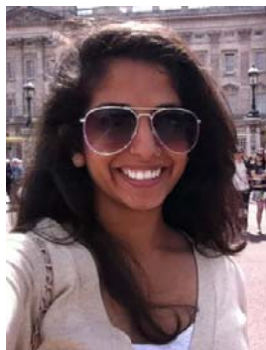
I got to hike several mountains and explore the country. I have been studying Spanish at Ohio State and, while I was in Ecuador, I was able speak in Spanish and even got to try translating for other students. It was the experience of a lifetime and I am grateful. I would highly recommend the program to other students!



Andrew Branstetter (Class of 2016) - Costa Rica

I studied and volunteered abroad in San Jose, Costa Rica through the organization International Studies Abroad (ISA) and Experiential Learning Abroad Programs (ELAP). While living with a host family for two and a half months, I enrolled in Latin American Literature and Spanish Phonetics classes at a local university. I also volunteered at an HIV shelter for impoverished Central Americans afflicted with HIV or other illnesses, then at an elementary school teaching English classes. Although I did not conduct any research while in Costa Rica, my time abroad confirmed that I do want to continue perfecting my Spanish as well as eventually returning to Latin America when I am older. Ideally, I will become involved in organizations that provide physicians to local communities in impoverished areas in Central and South America. This

summer helped me foster friendships and relationships that I will never forget, while also allowing me to travel around the beautiful, vibrant destinations within Costa Rica.



Radhika Tampi (Class of 2014) - England

I traveled to Sheffield, England for nine weeks to work at the Sheffield Institute of Translational Neuroscience (SiTraN). While there, I created an inducible model of Amyotrophic Lateral Sclerosis (ALS) in zebrafish with Dr. Tennore Ramesh. I had worked on motor neuron diseases for two years at Ohio State under Dr. Stephen Kolb focusing on proteins and degradation pathways. At SiTraN, we studied the same disease from a genetic approach. Working from both angles allowed me to understand the mechanisms of motor neuron disease at a much deeper level. I even had the opportunity to present my first research poster on my work at SiTraN at the Fall Undergraduate Research Forum in September. While I was in England, I spent most of my weekends traveling to different cities like Cambridge, Torquay, and London to explore

amazing cultural and historical sites. I even got to travel to Barcelona to meet up with another BMS student and meet my pen-pal of the last seven years in Glasgow! Overall, the educational and cultural experiences I had this summer made those nine weeks the most exciting of my life!

Summer 2013 Experiences



Mark Rudolph (Class of 2014) - **Germany**

I participated in the Research Internships in Science and Engineering (RISE) program in Heidelberg, Germany. The RISE program is sponsored by the German Academic Exchange Service and gives 300 students from the US, Canada, and the UK the opportunity to work at a leading German institution. I spent 10 weeks working at the German Cancer Research Center studying the role of the SWI/SNF complex in pediatric medulloblastoma. Members of a specific subtype of medulloblastoma harbor specific mutations in this complex, and we were interested in what effect these mutations had on disease progression.

The summer spent in Germany was a valuable contribution to my education and continued undergraduate career in cancer research. The internship gave me the opportunity to learn new techniques, solidify previously learned ones, and expand my understanding of oncology. Outside of the laboratory, I participated in a two-week German language course in Berlin. During the weekends, I was able to travel around Germany and surrounding countries. The RISE program was an ideal mix of scientific and cultural exploration, and I would highly recommend any interested students to apply!



Christine Fung (Class of 2014) - **Laos**

I enrolled in the Summer Study Abroad in Laos program. For five weeks, I took Lao language and history classes at the Lao-American College in Vientiane, Laos. During my free time, I volunteered at Handicrafts from the Heart, an organization helping women from the Hmong minority group get access to education and sell handmade souvenirs to tourists. Several of the other students and I organized the storefront and merchandise to increase sales. I also had the opportunity to meet with a microbiologist at the Mahosot International Hospital and sit in on his meeting with the Lao doctors. The doctors were presenting cases to the microbiology lab and receiving test results for their patients. It was really interesting to see how similar the process was to case presentations in America, yet how different the patient demographics and outcomes were. My experience in Laos challenged me by forcing me to quickly

adapt to unfamiliar surroundings without a strong grasp of the language. I learned to work in a completely different culture, but also saw the similarities between the Lao students and my friends in the US. Seeing how the international doctors worked with their Lao counterparts and learning about their grand plans to expand healthcare access in the rural parts of the country influenced me to consider a future career in international medicine.

Grever Internship Hits the big 5-0!



During the summer of 2013, seven Biomedical Science students participated in a summer internship sponsored by Dr. Michael Grever, Chair of the Department of Internal Medicine at The Ohio State University Wexner Medical Center. This year marked a milestone for the program; since its inception in 2006, fifty BMS students have participated in the internship.

The Grever Internship allows students to shadow residents as they go on rounds and meet with patients and their families. They hear all conversations that occur between the physician and the patient, as well as conversations within the medical team. They can also witness surgeries and other procedures.

The internship is not limited to physician shadowing; the students also spend part of their day working in their research lab. The internship allows students to not only learn more about life as a physician, but how it is similar and different than life as a researcher. While most students who do the internship go on to medical school, some have determined that medicine is not the right fit for them. These students have gone on to pursue careers in research, pharmacy, and business. Regardless, all students who participate say it was one of the most valuable experiences of their college years.