

Biomedical Science Undergraduate Major Annual Report 2016

Biomedical Science Students Spend Winter Break Serving and Learning in Guatemala

A trip to Guatemala during winter break has changed the lives of seven BMS students.

For **Brandon Liebau**, BMS class of 2016 and current MD student at The Ohio State University, the trip developed an appreciation for health care policy and infrastructure restrictions. "The general shortage of medical personnel and facilities led to many Guatemalans [being] unable to obtain care nearby or in a timely fashion...The latest innovations don't matter if there's no place or no one to implement them," reflects Liebau.

Jenna Murray, BMS class of 2016 and current MSN student at Vanderbilt University, was impressed with the way health care workers were able to treat complex conditions with limited resources. "One physician explained that her assessment skills are some of her most important tools in diagnosing patients on a daily basis," explains Murray. "The people doing this important work inspire me to integrate global health into my career plans."

The trip was offered as an option to seniors enrolled in "Special Topics in Biomedical Science I: Immunology and Infectious Disease," a required course exclusively for BMS students in their senior year. The course covers infectious diseases, such as human immunodeficiency virus (HIV) and tuberculosis (TB), and requires the completion of a service-learning project in which the students partner with Columbus-area community organizations whose missions focus on HIV and TB epidemics.



During their stay in Guatemala, the students worked on projects at designated HIV and TB organizations. When they weren't working directly in the medical field, they were immersed in the Guatemalan culture, whether they were interacting with its people or participating in a Mayan priest ceremony.

Shu-Hua Wang, MD, MPH & TM, accompanied the students on their trip, along with Jordi Torrelles, PhD, who co-instructs the course with Jesse Kwiek, PhD. Wang said her biggest takeaway was learning how the trip impacted the students' lives and changed their perspectives, not only in their understanding of global health and the challenges that exist in developing countries like Guatemala, but in other aspects of their lives. "These lessons cannot be

taught in a classroom," Wang said. "As educators, it's rewarding to be able to make a difference like this."

Previous service-learning abroad trips in conjunction with "Special Topics in Biomedical Science I: Immunology and Infectious Disease" include Malawi (in 2013) and Guatemala (in 2014).

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Biomedical Science (BMS) Major

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The BMS annual report highlights and celebrates the accomplishments of BMS students and alumni. Previous annual reports are available on the BMS website.



THE OHIO STATE UNIVERSITY

COLLEGE OF MEDICINE

Welcome, BMS Freshmen!

Eaman Abay Columbus, OH Worthington Kilbourne High School	Naim Abubaker Gahanna, OH Lincoln High School	Ellie Anderson Woodbury, MN East Ridge High School
Colin Angell Midland, MI Herbert Henry Dow High School	Frances Avila-Soto Zanesville, OH John Glenn High School	Olivia Bley Cleves, OH Mother of Mercy High School
Maya Bode Columbus, OH Grandview Heights High School	Shivani Deshpande Dublin, OH Dublin Jerome High School	Julia Evans Lima, OH Bath High School
Nicholas Fadell Springboro, OH Archbishop Alter High School	Jacob Farr Dublin, OH Dublin Coffman High School	Melanie Lerche West Nyack, NY Clarkstown High School South
Benjamin Lipp Loveland, OH Loveland High School	Rohan Makhijani Centerville, OH Centerville High School	Lauren Mansour Loveland, OH Ursuline Academy
Megan Mansour Loveland, OH Ursuline Academy	Vincent Marzula Wexford, PA North Allegheny High School	Austin McMahon Loveland, OH Saint Xavier High School
S. Teja Parasa Powell, OH Metro High School	Alana Reese Westerville, OH Westerville North High School	Esteban Trujillo Mason, OH William Mason High School
Lauren Tucker Solon, OH Solon High School	Ryan Wilkins Cincinnati, OH Indian Hill High School	Madelynn Zhang Dublin, OH Dublin Jerome High School

Autumn 2016 Freshman Admission

Total Applicants: 161 (42% increase from 2015)

Interviewed: 49

Enrolled: 24

- Average ACT: 32.6
- Average SAT: 1420 (Critical Reading and Math)
- Average High School Class Rank: 95.5 (top 4.5%)

Merit-based Scholarships

Distinction (full cost of education): 1

Excellence (full in-state tuition): 5

Maximus (\$5,700 per year): 12

National Buckeye (\$11,400 per year): 4

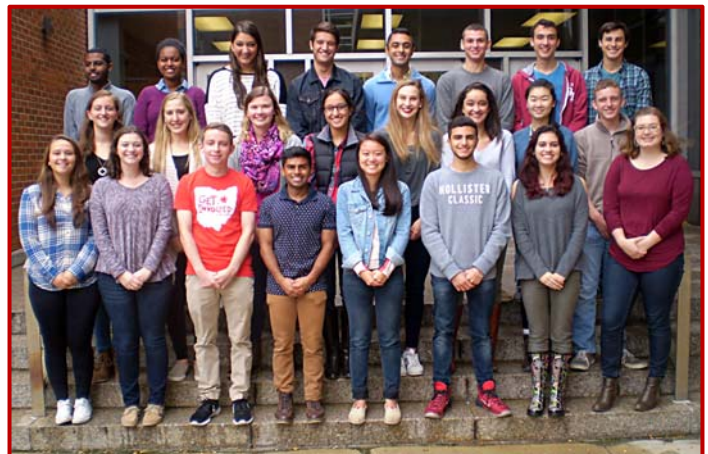
OSU Matching Grant (\$1,800): 1

President's Affordability Grant (\$1,000 per year): 3

Provost (\$2,850 per year): 4

Trustees (\$1,900 per year): 1

Based on their academic excellence in high school and ACT/SAT scores, all BMS freshmen were awarded at least one merit-based scholarship. For details about Ohio State's merit-based scholarships, go to meritawards.osu.edu.



Autumn 2016 Enrollment at The Ohio State University

Total Enrollment: 66,046

Columbus Campus: 59,482

Undergraduate (Columbus): 45,831

Freshmen (Columbus): 7,885

Average ACT: 29.1

Average SAT (Critical Reading and Math): 1271

For additional information on enrollment at Ohio State, go to enrollmentservices.osu.edu.

Congratulations, BMS Class of 2016!



**Members of the Class of 2016
(hometown and post-graduation pursuits)**

D. Maxwell Banaszak Victor, NY MSMS: Northwestern University	Andrew Branstetter Solon, OH MD: The Ohio State University
Lauren Chen Bay Village, OH MD: The Ohio State University	Langston Hughes Dublin, OH MD: The Ohio State University
George Koutras Columbus, OH Gap year; applying to MD and DO programs	Brandon Liebau Canton, OH MD: The Ohio State University
Matthew Lordo Columbus, OH MD-PhD: The Ohio State University	Daniel Moussa Hilliard, OH MD: Cleveland Clinic Lerner College of Medicine
Jenna Murray Moon Township, PA MSN: Vanderbilt University	Jared Pradarelli Muskego, WI Gap year; applying to DPT programs
Mayuran Ravindran Pickerington, OH MD: The Ohio State University	Rebecca Rings Delaware, OH MD: The Ohio State University
Ethan Schimmoeller Fort Jennings, OH MD: University of Cincinnati	R. Connor Schmenk Kalida, OH DDS: The Ohio State University
Sonia Tandon Beavercreek, OH MPH: Emory University	

Degree Awarded: Bachelor of Science in Health and Rehabilitation Sciences

Latin Honors: 13

- Cum laude (3.500-3.699): 4
- Magna cum laude (3.700-3.899): 4
- Summa cum laude (3.900-4.000): 5

Honors in the School of Health and Rehabilitation Sciences (SHRS): 15

- With Honors (completed SHRS Honors Program): 11
- With Honors Research Distinction (completed SHRS Honors Program and Thesis): 4

➤ This is the highest honor bestowed upon an undergraduate student.

Thank you to the thesis advisors: James Jontes, PhD (Brandon Liebau), Sarmila Majumder, PhD (Matthew Lordo), Jonathan Godbout, PhD (Daniel Moussa), and Ajit Chaudhari, PhD (Jared Pradarelli)

Summer 2016 Experiences

During the summer, many BMS students remain on campus to work in their research labs and/or take courses. However, some BMS students take advantage of special opportunities to conduct research, provide service, or serve as interns, both domestically and abroad.

Emily Durbak: Brazil



"I received a grant through Ohio State's Undergraduate Research Office to visit São Carlos, Brazil, where my lab has a partner site at the Universidade Federal de São Carlos. Dr. Jill Heathcock, my research mentor, plans to start a new project with them; so, I was there to get a better grasp on what changes need to be made to ensure uniformity and communication across sites. I was able to sit in on many different projects and tour a clinic and a hospital in the city. I learned a lot about research and health care delivery in a socialized system. I stayed with a physical therapy student who showed me how to live (and eat!) like a Brazilian student. At the end of the trip, I spent a few days in Rio for the 2016 Summer Olympics. Among the Olympics, Zika virus outbreak, and presidential impeachment, it was an extremely interesting time to be in Brazil and gave me a much broader perspective of the world that I hope to continue expanding throughout my career."

Mason Fisher: Vanderbilt University

"I participated in the Vanderbilt University Department of Anesthesiology Summer Internship Program. This internship provided me the opportunity to participate in a clinical research project under my mentor, Dr. Frederic 'Josh' Billings, a critical care anesthesiologist at the Vanderbilt University Medical Center. My assigned project focused on looking at the effect of oxygen administration on organ injury in patients having cardiac surgery. I collected various cardiac and blood samples from patients undergoing cardiac surgery and used data collected from surgery to analyze how oxygen levels varied throughout surgery in the patients. I also performed various cognitive tests on patients in the days following the operation. I then presented these findings at the conclusion of the internship. Through this internship, I was able to further strengthen my love for medicine, form strong relationships with professionals in the medical field, and gain invaluable clinical experience interacting with patients and their families. In my free time, I took advantage of the wide range of activities that Nashville, Tennessee has to offer - I went to some iconic Nashville eateries to experience southern cuisine, attended several different concerts, and visited Nashville's Broadway."



Alexander Lacey: DAAD RISE Program - Germany



"I conducted research in Munich, Germany at the Max Planck Institute of Psychiatry as part of the DAAD RISE Program, which brings students from the U.S., Canada, and the UK to Germany for summer research internships in many areas of science. My summer began with a two week intensive language course, in which I learned some of the basics of the German language and culture and met peers from all around the world. Then, I began my ten week internship at the Max Planck Institute. My project involved analyzing the data from a handful of already-conducted clinical trials to determine whether baseline gene expression and methylation levels can effectively predict the extent to which an individual has experienced childhood trauma (essentially, can a doctor take blood from a patient and learn about whether or not they have been abused in the past?). This project allowed me to develop expertise in a variety of methods within data science, including linear regression, machine learning, and data visualization, along with greatly improving my ability to code. Most importantly, this internship enabled me to develop a less naïve perspective on the daily process of scientific research, particularly in dealing with the reality that many things don't work out the first time (or at all). Beyond the science itself, I learned so much about Germany in my free time. I would often ride my bike around Munich for hours, just taking in everything. I learned to live like a local in a completely new place, which has given me a worldview that I never really had. During the weekends, I traveled with various friends to different cities, including Amsterdam, Paris, Rome, Florence, Berlin, Heidelberg, Frankfurt, Salzburg, Vienna, Prague, Bratislava, and Budapest, which broadened my perspective on what it means to live in a globalized world. This experience - the things I've learned, the places I've been, and the friends I've made along the way - have made a lasting impact on me, and none of it would have been possible without the generous support of Dr. John Gunn and Mr. Steven Mouseses."

Summer 2016 Experiences (cont'd.)

Sophia Maharry: Senegal



"To better combine my interests in medicine and French, I spent five weeks in Senegal as part of the Francophone Africa: Between Tradition and Modernity program with 27 Ohio State students in various majors. I stayed with a host family, a college-aged tenant, and one other Ohio State student. Three days a week, we took a course in Wolof (the regional language of Senegal) and had guest lecturers discuss various aspects of Senegalese history and culture, with French colonization acting as an overarching theme. Several of us spent our free time on Thursdays sitting in on lectures (all in French) at the University of Dakar School of Medicine and shadowing pediatric oncologists, nephrologists, and hematologists. On weekends, our entire group took a bus to another city or village in Senegal, where I was amazed by the diverse landscapes and stunning beauty of the country. We were also each paired with Senegalese college students and given opportunities to explore Dakar with them. While studying abroad in Senegal is definitely off the beaten path, it was such an incredible experience; in fact, I'm already making plans to return and, hopefully, to conduct my own research there."

Maria Riley: Australia and Fiji

"I traveled with other Ohio State students to Australia and Fiji. The trip was a month long and sponsored by Ohio State's Outdoor Adventure Center. The structure of our daily activities was geared toward empowering students to embrace their own unique group leadership style. Each day, we took on the responsibilities associated with leading the group. These responsibilities included planning meals and ensuring the group stayed together, all while keeping the group morale high. We traveled around Australia and Fiji and were immersed in its culture; however, we also took time to appreciate the natural wildlife and landscape that sets these countries apart from the rest of the world. In Australia, we took daylong excursions to hike the Blue Mountains and explore the Great Barrier Reef. In Fiji, we spent time on the mainland then traveled by ferry to Kadavu Island, which is untouched by western lifestyle. On this island, we stayed in an indigenous village, whose members guided us around the island. Being led by native Fijians enabled us to experience Fiji through their eyes, which was a truly incredible experience. We made bread from scratch, witnessed native ceremonies, and experienced the vast wildlife that most foreigners do not get to see. Through this trip, I grew not just as a leader but also in my understanding of the world. I had conversations with a diverse group of people which led to lasting connections. My experience in Australia and Fiji was a trip of a lifetime!"



Updates on the BMS Class of 2012

The class of 2012 is the fourth graduating class from the BMS major. Listed below are education/career updates from the members of this class.

Katherine Bingmer: Graduated from the College of Medicine at The Ohio State University; completing general surgery residency at Case Western Reserve University

Emily Cason: Graduated from Rollins School of Public Health at Emory University; employed as an epidemiologist at Florida Department of Health in Nassau County; published in *Journal of Diabetes Science and Technology* and *Journal of Natural Products*

Claire Dolan: Graduated from Boonshoft School of Medicine at Wright State University; completing internal medicine residency at University Hospitals Cleveland Medical Center in "Leadership in Academic Medicine" track

Jordan Gales: Completing final year of MD-MS program at Cleveland Clinic Lerner College of Medicine; applying to internal medicine residency programs

Kelsey Gray: Continuing PhD in Genetics and Molecular Biology at the University of North Carolina - Chapel Hill; published in *RNA Biology* and *PLOS Genetics*

Thomas Kaffenberger: Completing final year of MD program at University of Pittsburgh; applying to otolaryngology residency programs; published in *Laryngoscope*, *Head and Neck*, and *Annals of Otolaryngology and Rhinology*

Xin (Lily) Liu: Graduated from the Harvard School of Dental Medicine; completing general dentistry residency at Fenway Health in Boston, MA

May Matsunami: Graduated from the College of Pharmacy at The Ohio State University; completing managed care pharmacy residency at Humana, Inc.; published in *American Journal of Pharmaceutical Education*

Bridget McMurray: Graduated from the College of Optometry at The Ohio State University; employed as an optometrist at Dr. Beal and Associates in Beachwood, OH

Jamie (Barnum) Roderer: Graduated with MS in Molecular, Cellular, and Developmental Biology from The Ohio State University; employed by Summit Academy

Shauna (Collins) Schrod: Graduated from the College of Medicine at The Ohio State University; completing pediatrics residency at Nationwide Children's Hospital

Nicholas Taylor: Graduated from the College of Medicine at The Ohio State University; completing neurology residence at the University of Rochester

Igor Voronkin: Owns and operates a Mexican restaurant in Chengdu, China; developing import/export company

Research Achievements for 2015-2016

On-campus Research Fora

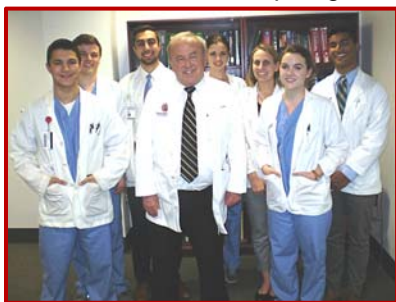
Forum	Students	Notes
Fall Student Poster Forum September 17, 2015 (undergraduateresearch.osu.edu)	Total: 12 • Seniors: 2 • Juniors: 4 • Sophomores: 6	This poster forum highlights the research conducted by undergraduate students during the summer.
Denman Undergraduate Research Forum March 30, 2016 (denman.osu.edu)	Total: 15 • Seniors: 4 • Juniors: 6 • Sophomores: 4 • Freshmen: 1	Awards: 7 • 1 st Place: 1 • 2 nd Place: 2 • 3 rd Place: 2 • 4 th Place: 2
OSUWMC Trainee Research Day April 21, 2016 (researchday.osu.edu)	Total: 5 • Seniors: 1 • Juniors: 4	Elina Misicka, BMS junior, was selected as the sole undergraduate student to present her research as part of the Allan Yates Memorial Trainee Speaker Series.

2016 Pelotonia Fellows

Student	Research Mentor	Project
Alicia Bao	Anita Hopper, PhD	The mechanism of tRNA intron turnover and the consequences of its dysfunction
Remy Powell	Steven Clinton, MD, PhD	Influence of tomato variety on the molecular signatures of prostate carcinogenesis in the TRAMP mouse model

Internal Medicine “Grever” Internship 2016

Each year, Dr. Michael Grever, Chair of Internal Medicine, runs an intensive shadowing program for seven selected BMS students (rising juniors and seniors). For a six week period (May-June), the interns divide their days between participating in rounds at the Wexner Medical Center and Nationwide Children’s Hospital and conducting research in their labs. This enables them to fully compare and contrast the clinical and research components of medicine. The Grever Internship began in 2006 and, to date, 71 BMS students have participated.



Intern/Student	Research Mentor
Matthew Davis	Jacob Yount, PhD
Emily Durbak	Jill Heathcock, PhD
Bradley Eichar	John Gunn, PhD
Hannah Harris	Ajit Chaudhari, PhD
Neil Makhijani	Gregory Lesinski, PhD, MPH
Jennifer Maskarinec	Denis Guttridge, PhD
Karan Naik	Sameek Roychowdhury, MD, PhD

John Gunn and Steven Mousetes Recognized in their Fields

Congratulations to Dr. John Gunn, BMS Faculty Director, for being elected as an American Academy of Microbiology Fellow! Fellows are elected through a highly selective peer review process, based on their records of scientific achievement and original contributions that have advanced microbiology. Each elected fellow has built an exemplary career in basic and applied research, teaching, clinical and public health, industry, or government service. In addition to Dr. Gunn’s role with the BMS major, he serves as Vice Chair for the Department of Microbial Infection and Immunity and Vice Director for the Center for Microbial Interface Biology.

Congratulations to Mr. Steven Mousetes, BMS Program Manager, for being selected as Outstanding Advisor of the Year by the Academic Advising Association of The Ohio State University and the Office of Undergraduate Education! He was selected for this award through a nomination and committee review process. In addition to Mr. Mousetes’s role with the BMS major, he provides significant university service by serving as the advisor for the Association of Class Honoraries at Ohio State and as the scholarship/academic advisor for Phi Gamma Delta.

