BIO 323 students, Andy Marquez ’19 (left) and Madeline Murray ’19 (right), enjoying Lake Lacawac, while collecting phytoplankton and zooplankton samples.

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MESSAGE FROM THE CHAIR

Dear Students, Alumni, Family Members, and Friends,

I hope you will enjoy the latest edition of the Biology Department newsletter. Students, faculty, and department staff members were busy and productive over the last year, as you’ll see on the following pages.

We received the wonderful news last April that Sybil Gotsch was granted tenure. Dr. Gotsch has already distinguished herself through an internationally recognized research program and excellent teaching, and we look forward to many more years of her work at F&M. The Department welcomed Harriet Okatch as a tenure-track professor of Biology. Dr. Okatch is a talented and experienced scientist whose scholarly interests address public health problems at local and global scales. The Department also welcomed J.B. Moon and Randy Schrecengost as visiting assistant professors. Dr. Moon is a landscape ecologist who teaches a lab elective in Ecology as well as BIO 110, the first course in the Biology curriculum. Dr. Schrecengost is a cancer biologist who teaches Cell Biology and an advanced lab course in Drug Discovery.

Several faculty earned research grants from federal agencies in the past year, including Janet Fischer, Mark Olson, Dave Roberts, and myself. This continues an excellent track record of research funding, illustrated by the over 1.9 million dollars in research grants awarded to Biology faculty over the last five years.

I wish you happiness and good health in 2019. Please stay in touch and drop in the next time you’re in Lancaster.

Regards,
Joe Thompson
Jessica (JB) Moon  
*Visiting Assistant Professor of Biology*

I was delighted to find out that I would be joining the Biology Department at Franklin and Marshall College as a Visiting Assistant Professor. I taught BIO 323 Ecology: Concepts and Applications this past fall; it was a privilege to interact with an exceptional group of young biologists and environmental scientists. The highlight for me was engaging with the students in weekly discussions on ecological topics, and seeing the students take on the challenge of learning R programming and bonding as research collaborators after an overnight sampling of Lake Lacawac in the Poconos. They investigated the horizontal distribution of phytoplankton and zooplankton in this oligotrophic lake, which has been browning. I am excited to see what spring holds as I lead two sections of BIO 110 Evolution, Ecology, and Heredity.

I have my Ph.D. in Ecology from The Pennsylvania State University, with a background in wetland microbial biogeochemistry. I was housed in the Geography Department during my Ph.D., so it was a natural step to study microbes using landscape-scale analyses. I am trying to understand how the larger landscape affects fine-scale spatial variability in wetlands and alters microbial functions in the carbon and nitrogen cycles. During my post-doctoral experiences, I moved further into computational ecology. So, I currently mix field studies with lab incubations and watershed modeling. In collaboration with researchers at the U.S. EPA, I also think about best practices for transferring ecological models through space and time.

I am looking forward to the future as my research interests have expanded outside of wetlands. This summer I visited Borneo’s montane rain forests, where researchers and students worked on everything from fungi to bats and insects. Our research group is studying how carbon cycling changes across a land use gradient, from old-growth forests to abandoned rubber plantations. I also received an F&M COG Grant to begin work studying connections between spatial variability in soil properties and gas flux rates in and outside of deer enclosures at Lacawac Sanctuary. In the coming months, I am excited to meet more of the F&M community and explore the potential for new research projects and collaborations.

Randy Schrecengost  
*Visiting Assistant Professor of Biology*

I joined the F&M community for Spring 2018 as a three-semester visiting professor and have had an amazing experience interacting with gifted students and being welcomed by a talented department. Previously, I spent 5 years as a Senior Research Scientist of Cancer Biology at a drug development research company in Hershey, PA. I have enjoyed applying my ‘real world experience’ to BIO 230 Cell Biology during the spring semesters and to my developed course, BIO 374 Drug Discovery. In Drug Discovery we discussed and performed preclinical studies similar to my recent experimental designs. Thanks to a lot of departmental coordination, this course also implemented an *in vivo* study that allowed students to interact with animals and gain hands-on preclinical experience of drug development.

My research interests revolve around understanding mechanisms that promote aggressive cancer progression. Over the summer, Julianna King ’20 and Aaron Kim ’20 joined me in investigating the ability of NMYC, an oncogene that drives pediatric neuroblastoma, to be regulated through the ubiquitin/proteasome pathway. Utilizing cellular mouse and human models, we explored this regulation through molecular and biochemical assays. It was a great experience to be on campus during the summer and have more interactions with summer researchers. Research will continue this spring with Claire Charpentier ’19 initiating a BIO 490 project and several additional student volunteers.

My first professional teaching foray has been a learning experience. For example, I began my semester in business casual attire. However, one week of multiple labs (and noticing the volume of faculty flannel) quickly relaxed my wardrobe. I also learned that the Biology department is full of encouraging and generous faculty. Although initially timid in reaching out for aid, the collegial environment has given me confidence to ask to borrow and borrow and borrow more research supplies.
Colleen Lawlor ’19

Assisted Profs. Janet Fischer and Mark Olson in conducting research in the alpine lakes in Banff and Yoho National Parks. “The experience I had this summer effectively taught me what it’s like to work as a member of a scientific research team. The sense of camaraderie, mutual support, and pure intellectual enjoyment I received from working alongside a group of like-minded, intelligent individuals has led me to desire to pursue similar research in my own future career. Thus, thanks to this incredible opportunity, I now have a much better sense of the path I plan to take after I graduate from F&M.”

Sarah Mirza ’19

Spent the better part of eight weeks in the Big Horn Mountains of Wyoming working as a field assistant with Prof. Dan Ardia. “I used tree swallows (Tachycineta bicolor) to investigate the interaction between stress and environmental harshness. In years past, the team studied birds from four different sites in varying climates: McCarthy, AK (harsh), Chattanooga, TN (benign), Ithaca, NY (moderate), and Burgess Junction, WY (harsh and variable). During the Wyoming breeding season, we tracked the timing, behavior, and physiology of over 100 breeding females.”

Kyla Nitahara ’20

Animal Behavior research at Phoenix Park in Dublin, Europe’s largest enclosed park in a capital city. “I looked at the bold-shy continuum of young fawns aged 0-10 days old and whether or not certain biological responses like heart rate, kicking, and running or staying at release was correlated and repeatable. The data suggested that fawns comfortability around humans is not a learned behavior. I was able to get field research experience while exploring a great country...all thanks to the Huffnagle Grant.”

Laura Green ’19

Alongside Prof. Sybil Gotsch in researching epiphytes that grow in the Monteverde Cloud Forest Reserve in Costa Rica. “This experience continued to foster my interest in plant biology and ecology. The ability to work with Professor Gotsch and many other talented researchers for the second summer in a row has allowed me to continue learning a great deal and practicing my skills. I now feel much more confident in my abilities as a researcher and hope to continue doing research at F&M and beyond.”
to over 50 parents and guardians at a stand at ROOTS Market in Manheim. Nick Shupin says of his experience “It was especially rewarding to be able to provide information about lead testing of both children and homes to parents who were previously not knowledgeable on the dangers of lead and the lead epidemic in Lancaster.” The team spent some time (morning and afternoon) at Brightside Opportunity Center speaking with parents/guardians about lead poisoning. Okatch’s team also partnered with Lancaster Mayor Danene Sorace’s office to host a block party (and sponsor a bouncy house) on Howard Avenue, one of the oldest streets in Lancaster City. “One grandmother was so eager to keep her grandchildren safe that she wanted to test the paint on her walls and window sills for lead that day… We were happy to give her a lead test kit and many more resources,” Emily Ritchey reflects.

**Reflections from Lake Lacawac**
**By Andy Marquez ’19**

Lacawac is a 52-acre glacial lake located in the heart of Lacawac Sanctuary, an area dedicated to the preservation of Lake Lacawac, its watershed, the surrounding forest, and several historic buildings. The Sanctuary’s mission is to promote well-being and healthy living through nature, and its positivity was infectious. Despite its isolation from human development and encroachment, this lake is experiencing “browning,” caused by dissolved organic matter entering the waters from the surrounding landscape. Regional changes in climate are thought to be the major cause of this browning.

Upon arriving at the lake, we were greeted by a welcoming cabin-style home. Walking into the house was like stepping into a time-machine — teleporting visitors to the early 20th century. Although we left campus early in the morning, the class excitement began to rise as we hiked through the sanctuary’s trails that were decorated with bright orange newts.

The weather that day was perfect for sampling; it was bright and sunny, with only partial cloud cover. After taking some time to settle in, the class split up into groups, collected our gear, and distributed ourselves throughout Lake Lacawac in rowboats. We were out on the lake for hours, collecting zooplankton, phytoplankton, and water quality measurements at over 38 stations spatially distributed across the lake. During the sampling time, there wasn’t much to do besides taking in the scenery, enjoying the sun, and getting to know our fellow classmates. These were some of the most fun hours I experienced my entire semester!

During the rest of our trip, we found time to process our phytoplankton samples while we cooked dinner, played card games, and went for late night hikes. The next morning, we packed up our equipment and luggage into the vans and drove back to campus laughing and listening to music the entire ride back. We got back to campus refreshed and ready to continue learning about phytoplankton distribution in a classroom setting. Professor J.B. Moon reflected: “Something special happened on that lake; the students paddled out as individuals, but paddled back as members of a budding research team. They combined their individual strengths, to collect, analyze and interpret a valuable dataset that will be used by future classes and researchers that visit the Sanctuary.”

**Student Highlights**

**F&M students launch an awareness campaign during National Lead Poisoning Prevention Week**

National Lead Poisoning Prevention Week, October 22-26, 2018, was an opportunity to increase awareness about lead poisoning and reduce childhood lead exposure. Pennsylvania has the second highest rate of child lead poisoning in the country, Lancaster County is one of the most heavily affected because lead paint is common in pre-1978 buildings, which are prevalent in Lancaster. Professor Harriet Okatch’s student research team has spent over a year conducting interviews with community members and professionals about lead poisoning and the federal funding available for home remediation. To participate in National Lead Poisoning Prevention Week, six students (Madeline Kuon ’20, Emily Ritchey ’20, Nick Shupin ’20, Sarabeth Erdman ’19, Emma Joy Fitzelle-Jones ’19, Najeda Regis ’21 and Kylie Givler ’19) traveled around Lancaster County with Professor Okatch to spread awareness about this important public health issue. They distributed information (in the form of flyers and personal conversation) to over 50 parents and guardians at a stand at ROOTS Market in Manheim. Nick Shupin says of his experience “It was especially rewarding to be able to provide information about lead testing of both children and homes to parents who were previously not knowledgeable on the dangers of lead and the lead epidemic in Lancaster.” The team spent some time (morning and afternoon) at Brightside Opportunity Center speaking with parents/guardians about lead poisoning. Okatch’s team also partnered with Lancaster Mayor Danene Sorace’s office to host a block party (and sponsor a bouncy house) on Howard Avenue, one of the oldest streets in Lancaster City. “One grandmother was so eager to keep her grandchildren safe that she wanted to test the paint on her walls and window sills for lead that day… We were happy to give her a lead test kit and many more resources,” Emily Ritchey reflects.
Evolving The Way We Learn About Pathogens

By Kristen Colon ’19

This past fall I had the pleasure of taking BIO 371: Evolutionary Disease Biology with Professor Mena-Ali. What I thought was going to be a traditional course on the progression of diseases over time, turned into one of the most intellectually stimulating classes I’ve taken here at Franklin & Marshall College. The course focused on the ecological and evolutionary facets of disease-causing agents and the interactions with their hosts. We explored concepts such as host-pathogen coevolution, resistance, virulence, and even pathogen-to-pathogen interactions. Although the lecture took place at 8:30 AM, it was more than worth the early wake-up call! With a perfect balance of lecture and discussion, I was always engaged and ready to learn. We explored the fields of ecology, microbiology, and even genetics. We didn’t just read about host-pathogen interactions. We talked about them, observed them, and even attempted to quantify them in the lab.

Professor Mena-Ali developed this class to be collaborative. My thoughts were always valued, and even when I wasn’t correct, I never felt discouraged about participating. My classmates and I had the autonomy to pick our own literature discussions, research paper topics, and even collaborative studies. Early on in the semester, we took a field trip to Baker Campus, where we collected soil, water, and tree leaves for analyses. Our goal was to test these samples for potential pathogenic organisms. Through a series of isolation, incubation and observational procedures, we tracked the results for weeks. I always found myself looking forward to lab time because the projects we often tackled were personalized to our interests. Though the course work was intellectually challenging, I found this advanced my learning and didn’t hinder it. This, of course, I can only attribute to the professor. Professor Mena-Ali has crafted this course for those who love biology and want to learn.

Honors and Awards

Jennifer Deasy ‘18
Functional studies of rare neurogenetic disorders
(Adviser: Dr. Robert Jinks)

Lindsay N. Williams ‘18
Evaluation of etiology and effects of oxidative stress in long bone development in Ts65Dn and Dp(16)1Yey mouse models for Down syndrome
(Adviser: Dr. Clara Moore)

Carl & Ellen Pike Biology Senior Award
Lindsay Williams ‘18

Huffnagle Scholarship Fund Award
Laura J. Green ’19
Colleen M. Lawlor ’19
Sarah S. Mirza ’20
Kyla Nitahara ’20

Michelle Ann Kayal Memorial Scholarship Award
Enrico Calvanese ’20
Silvanys (Laurel) Rodriguez ’20

Bradford S. Kline Memorial Prize
Glenn T. Robbins ’19

Charles N. Stewart Award in Neuroscience
Danelee Thorpe ’18

Roger and Elizabeth Thompson Award in Animal Behavior
Lindsey M. Engelbert ’18
Yosvany Rodriguez ’18

Isaac E. Roberts Prize
Anna T. Hess ’19

Students in BIO 325 Marine Biology survey invertebrate animals of the sandy beach at Stone Harbor, NJ, in September 2018.

Elizabeth Butler ’19 and Glenn Robbins ’19 collecting crayfish near Tucquan Glen

Students in BIO 325 Marine Biology use dissecting microscopes to examine feeding behavior of Aiptasia sea anemones.
Danielle Antoine '20 Temperature sensitivity of cytosolic malate dehydrogenase in the coral *Acropora millepora* and its algal symbionts (Fields)

Taryn Asklof '18 Developing microsatellite markers to determine genetic diversity of *Pythophthora vexans* (Blair)

Shaquo Bailey '19 Functional studies of DDX3X in syndromic intellectual disability (Jinks)

Anna Ming Bauer '18 Analysis of hybridization events in *Pythium* sp. using flow cytometry (Blair)

Renée Bicaba '19 Ecophysiological strategies of epiphytes to limit water loss (Gotsch)

Lauren Bowser '18 The natural history of GM3 synthase deficiency in the Old Order Amish of North America (Jinks)

Enrico Calvanese '20 Quantifying the relationship of DNA methylation and expression levels of defense related genes triggered by herbivory in *Solanum dulcamara* (Mena-Ali)

Stuart Cattel '19 Exploration of a novel mutation connected to microcephaly and intellectual disability (Humphries)

Rachel Clifford '18 Thermostability of phosphoglucone isomerase in the coral *Acropora millepora* and *Symbiodinium* C and D as an explanation for coral bleaching (Fields)

Victoria Daly '19 The effect of soil pH on invasive *Amur corktree* (*Phellodendron amurense*) seed germination (Sipe)

Nina Dashti-Gibson '20 Patterns of apoptosis during long bone skeletogenesis in *Dp(16)1Yey* mouse model for Down syndrome (Moore)

Danae Diaz '18 The effect of micro-plastic consumption on Rotifer reproductive success (Thompson)

Kaele Drezwiecki '18 Assessing the pathophysiological impact of dominant mutations associated with Congenial Diaphragmatic Hernia (Jinks)

Ariel Eraso '18 Effects of changes in enzyme stability on thermotolerance of the coral-algae symbiosis (Fields)

Emily Erickson '18 The mechanistic role of β-catenin binding sites on Axin in Wg/Wnt regulation (Roberts)

Madison Evans '19 Investigation of the immune response in the *Dp(16)1Yey* mouse model for Down syndrome (Moore)

Briana Ferguson '18 Drought tolerance of epiphytes along an elevation gradient in Monteverde, Costa Rica (Gotsch)

Minjun Feng '19 Transcriptional regulation of master regulatory genes expression in Arabidopsis embryo maturation (Jinks)

Ian Finnegan '18 Functional studies of a recessive mutation associated with high frequency sensorineural hearing loss (Jinks)

Ruby Fries '20 Ecology of Alpine lakes (Fischer/Olson)

Saliyah George '18 Acculturation: Refugees’ health care satisfaction (Ardia)

Laura Green '19 Variation in epiphytic adaptations to mitigate water loss across a gradient in microclimatic (Gotsch)

Lucas Groff '19 Cannibalistic copepod caper: an investigation of the unusual phenology of *Hesperodiaptomus arcticus* in alpine lakes (Fischer)

Holly Hurst '19 Functional and behavioral studies of Cradd knockout mice (Jinks)

Addie Irvin '18 Forest mammal composition, richness, and diversity in forest fragments (Ardia)

Kenneth Jordan '18 Coral bleaching due to phosphoglucone isomerase and glucose-6-phosphate dehydrogenase thermal sensitivity (Fields)

Matt Krause '19 *Drosophila melanogaster* as a model organism to explore the role of APC within the Wnt signaling pathway (Roberts)

Eric Lang '18 Development of a PCR-based assay for the parasitic pathogen OE on regal and monarch butterflies (Blair/Howard)

Garrett Largoza '18 Investigation of the length-force relationship in the obliquely-striated muscles of the Clam Worm (Thompson)

Colleen Lawlor '19 Distribution and abundance of *Daphnia* in Canadian Rocky Mountains (Fischer/Blair)

Reanna Leoni '18 Structural, functional, and behavioral studies of a mouse model of syndromic intellectual disability (Jinks)

Leah Lopez '20 Biochemical responses to rapidly changing temperature in coral and *Symbiodinium* of different clades (Fields)

Joseph McGrath '19 The length-active force relationship of obliquely striated muscles of a Polychaete worm, *Nereisvirens* (Thompson)

Claire Mendelson '18 Global women’s health: Explicating sociopolitical determinants and trends (Everett)

Carmen Navia '18 Possible redundancy of β-catenin binding sites on APC and Axin involved in Wnt signaling (Roberts)

Triet Minh Nguyen '20 Do de novo mutations in a gene encoding a mitochondrial housekeeping protein布鲁顿破坏反应代谢会修复呼吸和细胞迁移，以及成骨性膈沟畸形导致的异位

Ariek Norford '18 Morphological variation and ultraviolet radiation defenses in *Helisoma trivolvis*: implications for potential plasticity in tolerance (Olson)

Paige Notarianni '18 Investigating gene repression mediated by DNA methylation in *Pythophthora* sp. using bisulfite sequencing techniques (Blair)

Diana Pena '20 Temperature sensitivity in *Symbiodinium* D, *Symbiodinium* C and *A. millepora* Glucose-6-phosphate dehydrogenase (GGPDH) (Fields)

Arum Ramkissoon '18 Anthropogenic factors affecting local mammal biodiversity in Lancaster County (Ardia)

Samantha Riccio '18 Integrating evolution in the North Museum curriculum (Ardia)

Glenn Robbins '19 Pathogen Load of *Aphanomyces astaci* and other water molds in dynamic Pennsylvanian river ecosystems (Blair)

Yossanny Rodriguez '19 Factors affecting the red fox population in Lancaster, PA (Ardia)

Warren Saengtawesin '19 Assessing the effect of localized water and pathogen stress on potential cross talk defense responses in *Solannum dulcamara* (Mena-Ali)

Riley Secor '19 Analysis of the nectar profile of *Asclepias syriaca* and *Asclepias curassavica* (Howard)

Sarah Schannauer '18 Genetic diversity of *Speyeria idalia* in Lebanon County PA (Blair)

Stivale '19 Phenotypic plasticity in ultraviolet radiation tolerance of freshwater snails (Olson)

Jessi Stover '18 Behavioral, structural and functional studies to investigate intellectual disability in CRADD knockout mice (Jinks)

Matthew Tancer '18 Mixed general linear modeling of the white-tailed deer population in Lancaster County, PA (Ardia)

Lindsay Williams '18 Evaluation of etiologic and effects of oxidative stress in long bone development in *Ts65Dn* and *Dp(16)1Yey* mouse models for Down syndrome (Moore)

Anastasia Woods '18 Breastfeeding duration and the baby-friendly initiative: An evaluation of barriers to breastfeeding (Everett)

Wenlong Zhang '18 Analysis of temperature sensitivity of clades C and D of the coral symbiont *Symbiodinium* (Fields)
Daniel Ardia

It was an excellent year. I started my sabbatical—the family and I moved to Denmark for the fall, where research writing, urban ecology, and culture are the priorities. I was promoted to Professor in the spring, which was great news and a humbling honor. The summer of 2018 was spent in the field in Wyoming with Yosvany Rodriguez ’18 and Sarah Mirza ’20. This field project is wrapping up and moving onto the analysis phase. My research efforts are split between completing manuscripts on the forest mammal project, swallow field work, and chickadee winter survival, as well as continued field work on urban ecology. I hope to add bat surveys to our urban-rural gradient research next year. Former students, you are missed! Keep in touch.

Jaime Blair

The Blair Lab graduated five seniors in 2018: congratulations to Taryn Asklof, Anna Ming Bauer, Eric Lang, Paige Notarianni, and Sarah Schannauer! You will be missed! Luckily we kicked off our summer research right after graduation with two new students, Elizabeth Butler ’19 and Glenn Robbins ’19. We were back in the water this summer, picking up on a survey of crayfish pathogens piloted back in 2015 by Hanna Aharonov ’16 and Trish Crigler ’16. Pennsylvania waterways are rapidly being colonized by the invasive rusty crayfish, and we are interested in how native oomycete species react to the presence of a new potential host. We are also particularly interested in detecting Aphanomyces astaci, the causal agent of European crayfish plague which is believed to be endemic in North America; Glenn’s BIO 490 independent research suggests that A. astaci is in fact present in the Susquehanna River watershed! Elizabeth returns to the lab this spring after a semester in New Zealand; her research will focus on oomycete detection using environmental DNA samples collected from stream water.

In other news, the Blair Lab is happy to announce the upcoming publication of our second oomycete species description, Pythium wohlseniorum, to be published in the Fungal Planet pages of the journal Persoonia. We have routinely isolated this new species from Littiz Run at Millport Conservancy, and we are proud to honor the Wohlsen family with its specific epithet. Work continues on several other new oomycete species; who will we honor next?! Keep your eyes on TheBlairLab.com for updates!

Beckley Davis

This year I am on my post-tenure sabbatical in my laboratory in LSP, where I continue to study the negative regulation of inflammation and the role of NLR proteins in immunity. Most of my work this year has been writing grants and manuscripts. Matthew Hamby ’20 volunteered in the laboratory this summer and provided some great data for the manuscript. I am hopeful that the reviews will be favorable. Most of the work in the laboratory has focused on NLRC3, which has a unique ability to inhibit several pro-inflammatory pathways. This negative regulation helps quell any aberrant inflammation that might cause tissue damage or over-zealous immune responses. I am looking forward to returning to teaching in the fall of 2019.

Janine Everett

The F&M Public Health Program continues an amazing trajectory of growth, with students and graduates who are committed to public health efforts locally and worldwide. Opportunities for engagement continue to expand, with exceptional campus/community partnerships as well as faculty across multiple departments who are offering courses and other opportunities to engage with public health research and activities.

The Public Health Program Book Club is still going strong, with plans for an exciting spring semester exploring documentaries. The Program has continued to support speakers and events, and to participate in a variety of venues on an array of public health-related topics. We are thrilled about these opportunities and look forward to increasing our outreach and contributions toward enriching the student experience.

I have been an enthusiastic early participant in the Creativity and Innovation initiative, attending training in design thinking at Stanford University and bringing that skillset back to campus for collaborative teaching efforts centered on addressing poverty-related issues in Lancaster. What an amazing experience! Students get ready, You’re bound to encounter design thinking in the classroom, and it may just change the way you think about Public Health!

Recent world events have reenergized my focus on health equity for all, and disparities/equity work is a cornerstone of everything I do at F&M. In addition to nutrition, skin biomechanics, color, injury, and digital imaging in health, I am interested in an array of equity and social justice-related topics. Stop by my office sometime and let’s talk public health over coffee. (Yes, really!)

Peter Fields

Work in the Fields lab continues to center on an examination of the symbiosis between tropical reef-building corals and the algae that live within their cells and provide the corals with most of their energy. We are interested in finding out why this symbiosis sometimes fails, in a process known as “coral bleaching,” which is often associated with anthropogenic stresses.

Four students who worked with me last year have graduated and moved on—Rachel Clifford ’18 to the Monterey Bay Aquarium Research Institute, Ariel Eraso ’18 to the National Institutes of Health, Kenneth Jordan ’18 as an educational interventionist in Miami, and River Zhang ’18 to the Rosenstiel School of Marine and Atmospheric Science at the University of Miami. I’m proud of all of you! At the same time, three new F&M students began work with me this summer, examining differing aspects of coral or algal biochemistry that might help explain the causes of coral bleaching. Danie Antoine ’20, Diana Peña ’20 and Leah Lopez ’20 also helped with the mentoring of two McCaskey high school students, Chelsea Vazquez and Deborah Mesfin who worked with us in the lab. Diana and Leah have continued on to perform research in the lab during the academic year, examining the temperature sensitivities of cytosolic malate dehydrogenase and phosphoglucose isomerase in our study species. Next year
Peter Fields (cont.)

I am looking forward to a sabbatical leave in which I plan to devote my time to extending the great work that has been done by these students over the past couple of years.

Janet Fischer

Whether I am hiking over a pass to a remote study lake or analyzing hydrology data in my office in LSP, I continue to find challenge and fulfillment in my work on the ecology of alpine lakes. Mark Olson and I were pleased to welcome Ruby Fries ’20, Luke Groff ’19, and Colleen Lawlor ’19 to our field team in the Canadian Rockies in July and August. We successfully deployed high frequency monitoring sensors in five lakes as part of our new NSF grant on resilience of alpine lakes to climate change. Our preliminary results highlight the importance of snowmelt and, consequently, we are scheming about ways to expand our sampling to capture the transition from winter to spring/summer during our sabbatical in 2019-20! Back on campus, F&M students are studying the ecology of zooplankton in our study lakes. Luke has been investigating cannibalism in copepods while Colleen is analyzing patterns of Daphnia abundance. In addition, Ruby has been making great progress on our backlog of zooplankton samples and plans to start an independent study project on zooplankton parasites in the spring. The 2018 field season was extra special because two former students, Nora Theodore ’13 and Jin Hwang ’14, returned to the mountains to get married at one of our favorite study lakes! It was truly an honor of a lifetime to be a part of that very special gathering.

Sybil Gotsch

My students and I study how plant communities are affected by changes in climate and the ecosystem services that plant communities provide. We conduct our research in the Tropical Montane Cloud Forest in Costa Rica as well as in the urban landscape in Lancaster. Our tropical research efforts are focused on understanding how decreases in water availability will affect a vulnerable community of plants that reside high in tree canopies (i.e. epiphytes). Locally, we are exploring the ability of different street trees to provide ecosystem benefits including water and particulate interception.

I spent most of last spring recovering from a back surgery to repair two fractures that I had on a lumbar vertebrae (L5). Thankfully, my postdoc Cameron Williams was able to keep our research progressing. This autumn, I received a supplemental award to my NSF grant which will enable me to train on a new technique to determine drought resistance and will fund field seasons in Costa Rica and Northern California while I am on sabbatical next year. Briana Ferguson ’18, Laura Green ’19 and Renee Bicaba ’19 all traveled to the field with me this past summer and I am happy to report that we completed a project on the ecological strategies of epiphytes that began in 2013! Renee is conducting BIO 490 research this fall, while both Laura and Karisa Liu ’20 will conduct independent research in the spring. Lastly, two papers have come out this year, one in New Phytologist and another in Plant, Cell & Environment.

Heather Hoffmann

My Intro to Public Health sections (PBH-251 A and B) focused on the social determinants of health. Christina Duncan, Executive Director of Milagro House, gave our class an overview of the educational programs at Milagro House that help break the cycle of poverty. Students applied what they learned in the office of Delaware Governor John Carney (Caroline DeSantis ’19), at the Philadelphia Department of Emergency Preparedness (Alexandra Hickey ’21), at the Vietnam Red Cross Society (Minh Nguyen ’19), and at Milagro House (Isabella Malcolm ’20). While teaching I completed my work as lead editor of the book Integrated Vignettes, which launches on Amazon in January 2019. It incorporates humanistic patient vignettes with discussions of human disease that integrate basic science and clinical medicine.

Aaron Howard

Another year of teaching and research is in the books! This fall I have continued my deep dive into the F&M Biology core courses by teaching Biostatistics (BIO 210) and Principles of Physiology and Development (BIO 220). This upcoming spring, I am once again happily tackling Principles of Evolution, Ecology, and Heredity (BIO 110). As I’ve said before, being such a large part of F&M students’ journeys into the field of biology is an honor.

This summer I started a brand new research project investigating how florivory (the consumption of flowers as food) influences the behavior of pollinators that visit flowers of the Common Milkweed plant and how the modified behavior subsequently influences the movement of pollen from one plant to another. I am excited to see where this study goes in the future. I started this project with my student Riley Secor ’19, who has been working with me for three years now. Unfortunately, he is graduating in the spring. He will be missed. Riley is also working on a study of the nectar chemistry of two milkweed plants. We hope to wrap that project up in the spring. I have also just concluded a study quantifying the significant influence that climate change has had on the flowering of the Common Milkweed plant. I hope to expand that project to include additional species in the near future.

Pablo Jenik

2018 was another somewhat schizophrenic year. The spring and the summer were the second half of my first post-tenure sabbatical year. This was a productive time, wrapping up and writing up a project investigating the control of the timing of seed maturation in the mustard plant, Arabidopsis thaliana. There’s been some back and forth with reviewers on this manuscript but, keep your fingers crossed, it appears to be getting close to publication. This paper will include two F&M students as co-authors, John O’Neill ’15 and Kristen Colon ’19. During the summer, I was joined again in the lab by Kevin
Ruiz ‘20 (a Posse Scholar). He finished up all the experiments related to a long-drawn study on the role of two related proteins during seed and seedling development. The fall semester meant going back to teaching, doing two sections of BIO 305 Genetics, my staple core course. It took some time to get readjusted to the routine of the semester after the sabbatical! MinJun Feng ‘19 returned to the lab for a two-semester BIO 490 Independent Study. She is continuing a project studying the promoter of a gene known to be involved in seed development. In the meantime, I’ve been dreaming of other interesting projects that I could start, now that I have the security of tenure, including an exploration of the processes we are interested in (seed maturation) in other species.

Robert Jinks

My students and I investigate the cellular and molecular pathophysiology associated with rare neurodevelopmental disorders. Since our collaboration with the Clinic for Special Children began in 2010, we have published the genetic basis of, and supporting functional studies for, 12 rare neurodevelopmental disorders and 1 significant risk allele for bipolar disorder. Twenty-eight F&M undergraduate students served as co-authors on these papers. Twenty-five of the 28 chose careers in healthcare and biomedical research: 12 are currently enrolled in US MD programs, two in MD/Ph.D. programs, 12 are pursuing biomedical research or graduate school in public health. Our papers are cited frequently and have led to the diagnosis of several additional cases outside of Plain populations for many of the diseases we study. We collaborate with investigators from 14 major medical schools and children's hospitals in the US, Canada, and UK. Our functional studies of the disease genes we have published provided new insights into the roles of their wild-type proteins in fundamental biological processes including cell cycle, DNA damage repair during brain development, and neuronal and synaptic pruning during cortical development. This successful collaboration, between a pediatric clinic engaging in university-level rare disease gene discovery and a small liberal arts college laboratory focused on translational research, is unique.

Jorge Mena-Ali

Another year goes by, a mix of the familiar and the new, but never a dull moment. This year I hit sort of a milestone: my tenth consecutive year teaching at F&M! Somehow that seems impossible, but then I think back to all the amazing students that have passed through our doors, labs, and classroom, and I feel truly honored to have known them (you know who you all are!). This fall, I taught my Evolutionary Disease Biology course again after six years, a very intense but extremely fun class to teach. Along the way, we keep working in the lab, focusing on various aspects of the ecological and evolutionary dynamics of plant reproductive strategies. Warren Saengtawesin ‘19 and Enrico Calvanese ‘20 continue to advance our comparative study of inbreeding and herbivory in the bittersweet (Solanum dulcamara); they got the chance to present a summary of their results from their summer work at the Pennsylvania Botany Symposium at Penn State. It was also my fourth time participating in the College Prep program over the summer, teaching a group of excellent rising high school seniors about the influence of genetic determinism on our understanding of two topicaly relevant social constructs, gender and race (so much fun!). And just to mix things up a bit, I was involved in organizing and executing F&M's 2018 Day of Dialogue - an exhausting but very rewarding initiative to continue important conversations on campus.

Kirk Miller

I was on sabbatical last academic year; what a lovely year. Now I'm back to work teaching and that's lovely, too; I missed it. I completed analysis and wrote three papers last year. One on a longitudinal study of Amish women's mental health measures and pregnancy outcomes; that paper has been sitting on a co-author's desk since July. Obviously, a year of great success. Overthinking and perfectionism have ground confidence to a halt. But I am floating above the problem. I'm starting work with a couple of independent study students next semester on data from all Lancaster County births over five years: over 35,000 births. Not exactly big data but biggish data. If anything goes wrong it's their fault.

Clara Moore

I am delighted to have completed my three-year term as Chair of the Biology Department this year. Being Chair is often a humbling and all-consuming responsibility; the papers that have been rejected by 3 journals so far. A second paper on a health needs assessment of five Pennsylvania Plain settlements; that paper has been rejected by 2 journals so far. And I finished a third paper on the effect of the Nickel Mines shooting on Amish women's mental health measures and pregnancy outcomes; that paper has been sitting on a co-author's desk since July. Obviously, a year of great success. Overthinking and perfectionism have ground confidence to a halt. But I am floating above the problem. I'm starting work with a couple of independent study students next semester on data from all Lancaster County births over five years: over 35,000 births. Not exactly big data but biggish data. If anything goes wrong it's their fault.

Harriet Okatch

I started the tenure track position this year full of excitement and grateful for the opportunity to work with such amazing faculty and wonderful students. I continue to work on lead poisoning prevention in Lancaster. Madeline Kuon ‘20
and Emily Ritchey ’20 returned to the study team and we welcomed five additional members, Nick Shupin ’20, Emma Fitzelle-Jones ’19, Sarabeth Erdman ’19, Najeda Regis ’20, and Kylie Givler ’20 who are completing qualitative data analysis to understand the factors that contribute to high lead poisoning levels in Lancaster. We will present this work in April at the Global Health & Innovation Conference at Yale University. Midway through the semester, HoiYun Lam ‘22 and Anuj Ghirnmy ’22 joined the team and are currently making preparations for the spring research project “Determining the levels of lead in spicess;” spicess have emerged as a potential source of lead exposure.

Besides the research, the team also actively engages with the Lancaster community to increase awareness on lead poisoning in Lancaster. This year engagement efforts including distributing flyers and speaking to individuals and families at the Roots market, the Brightside Opportunity Center, the Howard avenue Block Party and Fulton Elementary School. With respect to the HIV/AIDS research, Hilina Giday ’19, and Thang Ton ’20 continue their individual projects conducting secondary analysis of quantitative data collected from HIV infected patients in Botswana. In the Fall, I taught Epidemiology and I am looking forward to teaching Global Maternal Health in the Spring.

Mark Olson

Despite being (or at least feeling like) an old dog, I’ve been taught some new tricks this past year. I have learned much about the college admissions process, as our daughter Rachel is now a high school senior looking to the next stage. Attending open houses and going on college tours at other schools has certainly changed my perspective, both as a parent and a teacher. I also taught a new course, entitled “How and Why We Run” in Fall 2018. This course has introduced me to a whole new body of research on the physical, emotional, and cognitive benefits of running, and entrenched my confirmation bias that running is the best activity ever. Ariek Norford ’18 and Avery Stivale ’19 addressed new questions about the induction of UV defenses in snails, and Ariek’s research received honors in environmental science. On the research side, Janet Fischer and I are using a new approach involving high-frequency monitoring sensors to examine fine-scale variation in water transparency following spring snowmelt and summer precipitation. Thanks to the tireless efforts of Hackman Scholars Ruby Fries ’20, Luke Groff ’19 and Colleen Lawlor ’19, our summer field season was very productive. We also left our sensors in situ until fall break to collect data through the ice-free season. To our surprise, several early winter came and some of our study lakes were already frozen over by the time we arrived. We still got the sensors but it was a bit of an adventure.

Ellie Rice

I continue to direct the Quantitative & Science Center, which grows into its fifth year. The center currently has more than 60 tutors supporting 30 courses in 9 departments. In fall 2018, the center had more than 3800 visits from more than 600 different students. We launched our "QuEST" program this year (Quantitative Extra Study Time); a renamed version that merges the best of SI and PPW. The Bio team has been led by Maddy Evans ’19 and Sara Dutra ’19 with tutoring and QuEST leadership from Sarah Burgess ’19, Elizabeth Butler ’19, Enrico Calvanese ’20, Katherine Campbell ’20, Parinaz Dastoor ’21, Robyn Dudrick ’19, Hannah Fink ’20, Stephanie Liu ’20, Anthony O’Donnell ’19, Yiwen (Sally) Qian ’19, Thang Ton ’20, Carly Whalen ’19, Lindsay Williams ’18, and Rachel Wylie ’20.

We’ve enjoyed geographic freedom this year. We spent the fall in Copenhagen immersing ourselves in another culture while I learned the "foreign language" of R. I continue to serve on the board of AAAS’s Science in the Classroom project, which makes annotated versions of Science papers available for undergraduate and high school classrooms.

David Roberts

Research in my lab is focused on elucidating the mechanistic role of the tumor suppressor, APC, in Wnt signaling and colorectal cancer. We’re in the second year of our new NIH grant that will test the mechanistic role of β-catenin binding sites on APC and another APC partner (Axin). It’s an exciting time because we’ve finished generating most of the transgenic flies and are finally getting some data! Our preliminary results suggest that β-catenin binding sites on APC and Axin are redundant, but that docking β-catenin in the complex is not sufficient for function. Matt Krause ’19, Sonia Hafiz ’20, and Josh Cropaanzo ’20 are hard at work doing hatch rates and cuticle preps on fly embryos to decipher the mysteries of this protein complex.

This fall I also taught Cancer Biology for the fifth time, and we continued our attempts at using CRISPR technology to GFP-tag endogenous proteins in Drosophila S2 cells. We all learned a ton (including me!), and genomic PCRs suggest we now have CRISPR working. It will still take some tweaking, but it’s definitely a start! We also performed RNAi to investigate the hypothesis that a-catenin is a core member of the β-catenin destruction complex, but in contrast to published results we discovered that it is not. Surprisingly though, increased β-catenin signaling resulted in elevated a-catenin protein levels, and future classes of Cancer Biology will have the opportunity to investigate how this occurs at the molecular level.

Timothy Sipe

Three students worked on different projects in my lab this year. Victoria Daly ’19 completed a Bio 390 on the effects of substrate and pH on seed germination by Amur cork tree (Phellodendron amurense). Emily Lindback ’20 continued her volunteer research on the low-light photosynthetic performance of bee tree (Tetradium danielli), with a particular focus on stomatal opening and closing rates in response to changes in light.

Quinn Fox ’19 has been examining comparative performance by dominant tree species (red maple, Acer rubrum; tulip poplar, Liriodendron tulipifera) over a 75-year period at Allee Memorial Forest in Indiana. She completed the first phase of the work during a Bio 390 in fall 2017. We traveled to our field site in September to measure the diameter, height, crown size, and crown class (competitive position) of 204 maple and poplar trees. Quinn will connect these data to previous tree-ring analyses during a Bio 490 next spring.
I taught Bio 110 and continued serving as a co-PI on a Teagle Foundation grant supporting the reciprocal integration of business and liberal arts education in collaboration with colleagues at F&M, Bucknell and Penn. I was on sabbatical during the fall term and spent most of the time working on several data sets while staying at a lake cabin in northern Minnesota. This included writing about deer browse impacts on juvenile trees while watching deer browse on juvenile trees in front of the cabin—an unusual mix of irony and inspiration.

**Stephanie Stoehr**

As many of you know, I wear two hats at F&M. I serve as the College’s Biosafety Officer and I teach several courses in the Biology Department. In my biosafety role, I ensure that our research programs and teaching laboratories are operating within NIH and CDC regulations. To this end, I review research proposals and provide biosafety training to faculty, staff and students. This is a fantastic opportunity for me to learn about the research that our students are conducting at F&M.

The field of biosafety is ever-changing and constantly evolving. New gene editing technologies are advancing the field of science at lightning speed and biosafety professionals are struggling to keep up. In the past year, I’ve attended conferences with representatives from the U.S. Dept of Defense and the CDC. At these talks, we’ve discussed the implications of gene editing technologies and the challenges that these applications present to the field of biosafety. Many of my students enjoy hearing about my biosafety experiences. Please feel free to chat with me if this field of science interests you!

In addition to serving as the Biosafety Officer, I teach the Microbiology curriculum at F&M. My Microbiology students know that I’m fascinated by microbial-host interactions, especially in the context of human disease. More specifically, I’m interested in understanding the mechanisms by which Hepatitis B and Hepatitis C infections cause metabolic imbalances and liver cancer in patients.

When I’m not on campus, I enjoy watching my kids play soccer and volleyball. I’m also an avid runner.

**Joseph Thompson**

The past year was super busy but, as always, lots of fun. I had the good fortune to have some excellent students do research in my laboratory, including Liam Casey (BFN ’20), Danae Diaz (BFA ’18), Camille Estrin (BIO ’20), Hallie Keatly (BFN ’18), Garrett Largoza (BMB ’18), and J.C. McGrath (BIO ’19). I had two manuscripts accepted for publication, including one co-authored with F&M grad Kari Taylor-Burt (BMB ’10), and submitted another one with former F&M grads, Scott LaValva (BMB ’15) and Matt Loiacono (BIO ’15), as co-authors. My good friend, mentor, and research collaborator, William Kier (UNC-Chapel Hill), and I were awarded another NSF grant. This one will allow us to continue bringing F&M students to the University of Maine’s Darling Marine Center to study the muscle physiology and biomechanics of marine invertebrates. If you find yourself in Lancaster, please do stop by the lab to say “hi” as lab alum Abby Haba (BIO ’15) did last year.

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**An excellent track record of research funding continues...**

**NSF Award for Janet Fischer and Mark Olson**

Congratulations to Janet and Mark for their successful $199,977 three-year NSF RUI grant titled “Resilience of mountain lakes across a gradient of glacial retreat and vegetation advance.” This grant supports the continued treks for Mark, Janet and F&M students to collect samples and data from the alpine lakes in the Canadian Rocky Mountains during the summer with analysis throughout the academic year.

**NSF Award for Sybil Gotsch**

Congratulations to Sybil for her $76K supplemental award to her current NSF grant. The funds will allow her to receive training in a new method to quantify “plant vulnerability to xylem embolism in leaves and small stems” during her sabbatical next year.

**NSF Award for Joseph Thompson**

Joe Thompson won a three-year $289,000 NSF award, in collaboration with a colleague at the University of North Carolina-Chapel Hill, titled “Obliquely striated muscle: A soft-bodied invertebrate solution for tuning length-force ratios.”

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Professor Roberts is meticulous in planning all levels of detail for how he will present complicated content, actively engage students and accurately assess their learning. With detailed explanations, exquisite drawings and professional insights, students are drawn in as even the most advanced and complex concepts in Biology become approachable.

Whether teaching Cell Biology or Multi-Drug Resistance, Cancer Biology or The Science of Health, Professor Roberts’ aim is for students to become informed, knowledgeable citizens, with science and non-science students alike learning to discern evidence-based arguments relating to science, medicine, health and the environment that impacts their lives.
(Roberts Lindback Award continued)

Student-centered research is the primary goal of his research program that probes the signaling pathways corrupted in cancer cells, work that has earned two-thirds of a million dollars in federal funding. He has great aptitude for developing complex, yet elegant experimental studies to define critical aspects of the signaling pathways in both human and fruit fly systems. The fruit fly model organism Drosophila melanogaster, with the power of genetic manipulation and molecular tools, is an often-utilized choice among cell biologists. Professor Roberts masters this model system to maximize output from a small lab of undergraduates, thereby becoming a representative of the potential for success with top-notch research at an undergraduate liberal arts institution.

Students treasure the opportunity to work with Professor Roberts, as his reputation as a brilliant yet patient and humble scientist makes for a model of a personable, successful scientist. As they mature as scientists, students have opportunities to contribute to conference presentations and journal publications as full collaborators in experiences that set their paths for future careers.

His indelible impact is felt across campus and beyond. He contributed to successful institutional grant applications to the Howard Hughes Medical Institute for Translational Medicine, NIH BRADD and NSF Major Research Instrumentation; a combined $2 million in funding. His enthusiasm for curricular enhancement and student-focused pedagogy motivated him to co-author a primer on fly genetics, give presentations on his student-driven research, as well as lead workshops on mentoring and career guidance at national conferences.

Professor Roberts’ selection to the Education Policy Committee and efforts to drive development of the F&M Biosafety Program illustrate his engagement with the critical ways the liberal arts education, especially quantitative skills and safety, place students first and educate the whole person.

His warmth and generosity are boundless, as he is an esteemed colleague and inspiring mentor to so many, and will undoubtedly continue to influence generations of F&M faculty and alumni.

Richard Fluck

I continue to serve on the board of directors of the Clinic for Special Children in Strasburg PA. In 2017, I began doing shoe-leather work for the Democratic Party in a suburban township, and in 2018 I campaigned door to door for Jess King, a Democratic candidate for U.S. Congress in the Pennsylvania 11th district. Largely due to the heavy campaign schedule, I did much less writing this year, but I look forward to picking that up again in 2019—with book reviews, memoir-esh pieces, and movie reviews. I very much look forward to that. However, I also will continue my political activism and am exploring my options, e.g., working with Fair Districts PA.

In 2018, I also took an online “Tree Tenders” course from Penn State Extension, took on additional pruning jobs at home, and added new crops to our home garden, including onions, peas, and sweet peas—all very gratifying. Sandy and I again saw lots of our son Jesse’s boys—Landis (14) and Elliott (11)—baseball games this year. We also visited our son Jason and his family in North Hollywood, CA; we got to see his older son Zion (9) play in two soccer games and spent time with Jason’s daughter Naayah (3) and son Ezra (1). Life goes on.

Carl Pike

Do you help out in a school or community garden? Do you have a home garden? Take a look at the revised School and Community Garden Guidebook (https://www.lightenuplancaster.org/schools) that I compiled for the community health program of Lancaster General Health. In addition to information on the how-to’s of gardening, there’s material on gardening curriculum, organizing volunteers, community support, budgeting, and planning. I continue to be involved with local tree-related groups: the Lancaster City Shade Tree Commission, the Lancaster Tree Tenders, and the F&M Campus Tree Advisory Committee. The campus arboretum is now recognized as a “Tree Campus USA” by the National Arbor Day Foundation. We’re working on a project to put signs on every species of tree on campus, with links to on-line descriptions of the trees. I’m finishing my term as a community member of the editorial board of the local newspaper. I enjoyed this work of advising on the content of the daily editorials, adding my perspectives from a career in education and science. That’s my contribution to the need for all of us trained in science to contribute to national and local debates on policy. You, our graduates, have the skills and knowledge; make your voices heard. Our 2018 travels have taken us to the north of Portugal (80 miles of walking in 12 days) and the Atlantic Coast of Ireland, a bike trip to the Burgundy area of France, and trips to Washington State to visit our granddaughters.

Kathleen Triman

During Spring 2018 I enjoyed my first opportunity to serve as a judge on behalf of Sigma Xi, the Scientific Research Honor Society, at the Intel International Science and Engineering Fair (ISEF) in Pittsburgh. The experience of meeting high school students from 81 countries was unforgettable! This summer, I was also privileged to return to the Jackson Laboratory in Bar Harbor, Maine to visit faculty with whom I had collaborated as a Visiting Investigator from 1995-2015. I look forward to hearing from students who remember me. If you come to campus during the academic year, you can contact me at 358-3948 in LSP 361 or ktriman@fandm.edu.
Faculty Publications

**Bold: F&M Biology faculty; *undergrad and post-baccalaureate research technician co-authors; † indicates a co-author who is a member of the F&M College faculty; $ indicates cover photo for journal**


**Rob Ruth ’86**

**Being thankful….**

*(Rob is an orthopedic hand surgeon in Santa Barbara, California. Personal events can necessitate reflection.)*

“I had the unfortunate experience this year of losing one of my hand surgery partners, Dr. Mark Montgomery, to the tragic debris flows in Montecito, after the wildfires that ravaged our hillsides. As I have assumed the care of his patients, I have listened to countless personal testimonies of how much they appreciated the care he provided them. I regret that he himself was not able to hear such glowing reviews while he was still with us. This experience has led me to reflect upon who has influenced my life, and while I am still able, I am taking opportunity to thank them for the role they have played.

So, thank you, Dr. Kirk Miller, for being a teacher that cared, motivated, and connected with me. Your invitation to learn has served me well in many aspects of my personal and professional life. To this day, I can still recall the learning opportunities you provided in Comparative Vertebrate Physiology class. You taught me that it is okay to be curious as we ponder the wonders of the world around us, and seek to better understand its secrets. I hope you are well and that your mind is still as keen as it was when I knew you.”

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**Liz Burmester ’10**

Liz returned to her F&M roots this year to give a seminar talk to the Biology Department. After graduating from F&M (where she researched the stress response of mussels with Peter Fields), Liz went on to receive her PhD from Boston University. Her work focused on understanding how corals cope with localized stress as well as the ecologically important symbiosis between corals and algae. Today, Liz works as a restoration ecologist with the Billion Oyster Project, a NYC-based restoration and education initiative dedicated to restoring the once-prominent ecosystem engineer (the oyster) to the NY/NJ Harbor.
Alumni News

Katherine Boas ’14

“After graduating from F&M, I began optometry school at the Pennsylvania College of Optometry at Salus University. In the summer of 2017, my passion for travel led me to Cap-Haïtien, Haiti with 15 of my optometric colleagues to provide eye care and eyewear to nearly 1,000 Haitians. Over the past 10 months, I have been out on externships, the latest 3-month rotation taking me to the Army Optometry Clinic in Oahu, Hawaii. I’m currently in my 4th and final year of optometry school and cannot wait to join both my parents and sister in private practice in Exton, PA. I plan to specialize in pediatric optometry with a strong emphasis in neuro-vision rehabilitation. I cannot thank the F&M Biology Department enough for providing me such a fantastic undergraduate experience while preparing me to pursue the career of my dreams.”

Paige Robinson ’14

Paige graduated from Philadelphia College of Osteopathic Medicine in June, after four years of medical school. She started her 3-year residency in internal medicine at Aria Health (now known as Jefferson Northeast) in Philadelphia. She graduated from F&M in Spring 2014, majored in Biochemistry & Molecular Biology, and is incredibly grateful to the biology department for helping her reach this goal.

STAY CONNECTED!

An E-newsletter is sent once a year with a link to the full newsletter copy. Please consider emailing us at jkaufman@fandm.edu with your news and pictures – OR – become a fan of the Biology Department at F&M and like us on Facebook!! We would love to know where you are and what you are doing.

Also, you can update your college information at: arecords@fandm.edu.
Seminars for SPRING 2019

JANUARY
Scott Poethig, University of Pennsylvania
Thomas Mozder, Bryn Mawr College

FEBRUARY
Pablo Jenik, Biology, Franklin & Marshall College
Brent Helliker, University of Pennsylvania

MARCH
Dustin Brisson, University of Pennsylvania

APRIL
Sander Markx, Columbia University Precision Psychiatry Program
Dustin Covell, Chemistry, Franklin & Marshall College
Cathy Drennan, MIT
Brooks Miner, Ithaca College

For additional colloquiums, along with specific dates and times, please visit our website page at: https://www.fandm.edu/biology/news-and-events

You can benefit future student research projects and our departmental seminars by supporting the Biology Department’s Undergraduate Research and Seminar Fund ...

Please visit: https://go.fandm.edu/give