SPRING 2018

LAFAYETTE COLLEGE BIOLOGY A forward-thinking program in which students collaborate with

faculty to explore the living world through the practice of reflection, scientific inquiry, and communication.

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Biology Acquires "The Octopus Meditations" by Ed Kerns

In preparing for our move into the Rockwell Integrated Science Building, the Biology Department sought to insure a suitable venue for our decade-old collection "Evolution." A series of digital images by Professor of Art Ed Kerns, these evocative panels begin with primal sludge and end with Homo sopiens, displaying a lively juxtaposition of vividly colorful and detailed cells, organisms and networks. We are glad to say we have a home for this series, acquired for Biology by Dr Wayne Leibel during his time as department head. But we are now proud and excited to announce the acquisition of another, entire collection of paintings by Clapp Professor of Art Ed Kerns. "The Octopus Meditations" is a study in the patterns and interconnections of observation, consciousness and perception shared between biology and art. "I wondered what octopus consciousness might look like," Kerns says, offering that his meditations are really about a synthetic idea" to explore not only

just what we think but what it means." Inspired over a 4+ decade career by biologists, neuroscientists, engineers and computer scientists, Ed makes art with qualities that are perceived in multiple reconnecting regions of the brain. His work exhibits a texture and dynamic vision that blends image and metacognition. At the interface of art, science and consciousness, Ed Kerns' acrylics explore patterns and networks in an abstraction of how we understand awareness and consciousness. Replete with catalogue commentary by renowned artist Daniel Hill (Pace University) artist, critic and writer Taney Roniger, and our very own Dr Elaine Reynolds, Associate Professor of Biology and Neuroscience, the collection will be launched with a gala opening. Mark your calendars for 6:00 pm on April 7 2018 at the Silk Mill's Brick and Mortar Gallery in Easton, PA. Look for more information on the website and on our FaceBook page!



"How Far Can You See in the Ocean's Echo of Telemetry?" 48 x 30 inches by Ed Kerns, "The Octopus Meditations"

Teaching Assistants: Then and Now



Conceived in 1961 by Dr Louis Stableford with just two Teaching Assistants, this program has forged a standard employed among virtually every science department on campus: hiring undergrads to assist faculty in teaching laboratories. The years have seen substantive changes in the TA program, including students serving as Supplemental Instructors, SIs to offer office hours and tutoring. With our SEA-Phages program, a wide range of lab skills are acquired by our students, who ultimately flex them as they progress through their degree program.

Former TA and a recipient of the Dr Lorraine Mineo General Biology Teaching award Andrew Sager '17 told us that being a GenBio TA "enables you to develop your role as a mentor. You become more practiced at leveraging authority with trust. Students are more willing to come to you as a TA...and that removes some of the stigma first year students mistakenly associate with asking for help." As the College expands the student body to meet its Affordability Through Growth Initiative, Biology continues to see burgeoning enrollments. This enhances the value of our TA program. Current Lab and TA Supervisor John Drummond waxes effusive: "I rely on my TAs to establish a relationship with the students in each of their labs." John is continually impressed by the dedication and enthusiasm of his TAs, citing "Who couldn't love a job like this?" As we contemplate the many changes facing our discipline, we are confident our TA program will evolve to meet the changing needs of our biology curriculum into the future. We hope those of you who were TAs might be willing to share your stories and experiences. Post to our FaceBook page or click on the link to send a private email. Maybe we can highlight your story in our next newsletter!



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Professors Eric Ho, Manuel Ospina Giraldo and Khadijah Mitchell with the newly acquired instrumentation courtesy the generosity of alumnus Don Morel.

We are extremely grateful to the college for supporting our upcoming move into the Rockwell Integrated Science Center and for funds to equip our program as well. Some highlights among our new equipment will be a new confocal microscope, entire suites of light and dissecting microscopes that can capture images on lab computers as well as tablets and cell phones (welcome to the digital age), not to mention two state-ofthe-art greenhouses, and a state-of-the-art animal facility.

However, that is just the beginning. Thanks to an incredible donation from Don Morel `79 our equipment list now also includes an Illumina sequencer, a BD FACS Melody cell sorter, and a Seahorse Analyzer allowing us to assemble one of the most sophisticated cellular and tissue analysis suites that has ever existed at a small private liberal arts college. In addition to supporting cutting-edge research, this omics core facility (supporting genomics, proteomics, metabolomics) can be used to analyze phages for

Don Morel '79 Helps Biology Establish an Omics Core

students taking our HHMI sponsored SEA PHAGES course, support our Bioinformatics (BIOL 274), Biostatistics (BIOL 270), and Precision Medicine (BIOL 278) courses with metabolomics and genomics data, and strengthen connections between Biology and Computer Science positioning biology squarely in the computational age. In addition, instrumentation in the omics core can provide a wealth of data that can be used in the future Data Visualization Center.

"By having our students DO science in their 1st year through SEA Phages, and not just READ about it, they gain immeasurably, putting us on par with the best biology departments in the country."

SEA Phages Continues To Make For Distinctive Learning

In the 20 years since the last revamp of our curriculum, the role of computational technologies has pervaded all major biological advances. Without advances in computation there is no human genome, no targeted cancer therapy, and no nationwide species distribution maps. Graduates who responded to a recent department survey reported they would have liked more biostatistics and bioinformatics. At the national level. curricular reform affirms the value of early research experiences - the earlier the better. So we are embarking on a number of initiatives to enhance our curriculum and support our students. Chief among these is our adoption of SEA-PHAGES: Science Education Alliance - Phage Hunters Advancing Genomic and Evolutionary Science.

This program, coordinated by the Howard Hughes Medical Institute, is designed to get first year students doing authentic science. By having our students DO science in their 1st year through SEA Phages and not just READ about it, they gain immeasurably. Lab activities are split between lab science and computational science — in the first semester, students isolate a bacteriophage that infects Mycobacterium smegmatis mc² 155 (a nonpathogenic strain) from an oncampus soil sample. Once isolated, the rest of fall semester is consumed characterizing the phage. At the end of the fall semester, students have an electron micrograph of their phage as well as a DNA restriction map. All of these phage are archived in Easton, PA and in the collection at the University of

Pittsburgh, PA. Two phages are sequenced over the interim session, and then, during spring semester students devote their efforts to annotating the genome of the sequenced phage using proprietary programs developed specifically for phage genomes. Over the past three years, a number of novel phage have been isolated, and their genomes annotated, generating 3 posters presented at the annual HHMI Janelia campus meeting. While we have two bioinformatics courses taught by Dr Eric Ho, they are not at the introductory or I 00level. Dr Ho offered that, "Students with traditional introductory biology background tend shy away from them, thinking perhaps they need to be better "prepared." This is the gap that PHAGES is designed to fill."



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Roger Newton '72 Supports Biology Thesis Students

We are extremely grateful for Roger Newton's '72 generous support for Biology Honors Thesis Students. From the Class of 2017 seven seniors earned Departmental Honors. Among them, Samantha **Gleich** is seeking her PhD at the University of Maryland in Marine and Estuarine Science, Sze Cheng is pursuing her doctorate at the University of Minnesota in Molecular, Cellular, Developmental Biology and Genetics while simultaneously earning a Masters in Biomedical Informatics and Computational Biology. Jennifer Minnick

attends Salus Universiity School of Optometry and **Carli Jones** is at Johns Hopkins is seeking her PhD in Pathobiology, Erika Hernandez is working on her MS in Tropical Biodiversity and Ecosystems, and Marisa Rossi was employed at Olympic National Park. In short, all have moved on to bigger and better things. Our first December graduate in some time, Catie Newsom-Stewart defended her Honors Thesis successfully and is working in a stem cell research lab at the Washington University in St Louis. We have another great group of thesis

candidates this year. All members of the *Class of 2018* are pictured and, from left to right, include *Emily Lynch* investigating habitat fragmentation, *Juliana Ventresca* examining invasive crabs in the Hudson-Raritan Bay, *Fatma Esra Demirhan* researching freshwater mussel abundance an distribution in Bushkill Creek, *Tasnia Hassan* who examines crossregulation between signaling cascades in tumor cells, and *Ellen Armour* who is seeking to understand how immune challenge affects oxidative physiology in house sparrows.



Biology Curriculum Undergoing Re-Vision and Change!

It seems a never-ending mantra that faculty wish students had stronger statistical skills, and often, Independent Research and Honors Thesis students find themselves wishing the same! Our last external review felt the same, and urged Biology to look forward and become more discipline-centered to equip our students better for the biology of the future. By seeking now to provide a framework for curriculum redesign, biology will be ready to launch some novel approaches in optimal synchrony with our move into the Rockwell Integrated Science Center. To begin, we surveyed our peer institutions and used those data to inform our department-wide conversations. After lively consideration, we ultimately developed a 'bookend'

structure with a four-course requirement, around which students build the remainder of their program. Effective with Fall 2019 and our inaugural semester in the Rockwell Integrated Sciences Center, biology majors will begin with a fall semester of Biology 111, an introduction to organismal, ecological and evolutionary biology, with a robust research project that continues throughout the lab. In the spring semester, majors will continue with Biology 112 covering topics of cell biology, genetics, and inheritance. We expect that the SEA-Phages laboratory approach will be employed for all first year biology students in their second semester. During fall of sophomore year, majors will complete the new Biology 113 in introductory quantitative biology. A blend of computation, statistics, modeling and data visualization, this newly conceived course will fill gaps in our curriculum to serve our graduates in an ever-evolving scientific world. Thereafter students will select from an array of courses that build on this triad. The remaining requirement will be Biology 490: Capstone in Biology. The Capstone course was piloted successfully in 2013 and 2014. Structured around the 'Big Ideas in Biology' from the national initiative of 'Vision and Change' the capstone functions in a seminar and problem -based format and is restricted to the final semester of senior year. In this way it will provide an opportunity for students to consolidate and integrate their learning.

"...we ultimately developed a 'bookend' structure with a four-course requirement, around which students build the remainder of their program"

Alumni Milestones:

Andrew Sager '17 is at Novartis as a Cell Processing Specialist for Cell and Gene Therapies, working with cutting edge CART immunotherapy. Caroline McCauley '17 is a Research Associate in the department of Microbiology at NYU School of Medicine studying drug therapy efficacies using computational methods. Bryan Bonuomo '86 completed a successful career with both the US Army 25 years in corporate HR but has launched his own executive coaching practice Patonce Partners, LLC, in Greensboro NC. Biology majors hit milestones in the match for medical residencies including **Zachary** Winthrop '13 who will train in pediatrics at Boston Children's Hospital and Erica Gennaro '14 who heads to George Washington University Hospital for internal medicine. Tiffany Kimmel '13 is completing her DDS at University of Michigan School of Dentistry, and Shannon Lenahan '15 began at University of Pennsylvania for Veterinary Medicine. Elisa Bussemer Crapanzano '97 and husband Sebastian 'Benny' Crapanzano '97

(who majored in economics) have established a scholarship to support students with financial need at Lafayette College. **Rachel Kelley** '15 completed post-Baccalaureate Nursing at MCPHS University-Worcester and is now a cardiac care nurse at Eliot Hospital in Manchester NH. **Carly David** '13 received her Graduate Certificate last year from University College Dublin in Clinical and Translational Research and currently works for ICON Clinical Research in Philadelphia as a Study Start-Up Associate. Dr Bridget Hilbig '10 is an Assistant Professor at Weber State University, Ogden Utah. Dr Martin Connaughton '88 is an Associate Professor and Biology Department Co-Chair at Washington College, Chestertown MD. Over the last 5 years ~60% of our majors have entered the workforce directly while ~40% have enrolled in graduate and professional schools. Send us your milestones and career events for our next newsletter!

Biology Newsletter



"Phil was instrumental in the Honors Thesis projects of no fewer than 230 student theses, and this number excludes Independent Study projects, laboratory projects, Excel, Nalven, Mellon and Course-Based Undergraduate Research (CURE)."

Saying Farewell to L. Phillip Auerbach

Shortly after the publication of our last Newsletter, we lost our long-time technician L. Philip Auerbach, whose death on September 28, 2016 from complications of lung cancer shocked and saddened us all. Since his arrival on April 25,1977 Phil attended the Biology Department with an unrivaled commitment to supporting students and faculty, serving as he did under 6 Lafayette College Presidents, and 7 Biology Department Heads. His devotion to the department was extraordinarily deep, managing everything from autoclaves to xeric rooms, and dutifully archiving with photographs nearly every event of note for 4 decades. Too often. his was the only face missing from the snapshots. He contributed to training and mentoring many of the technical staff across campus who came to other departments after him. But his work with students advancing their academic success warrants our respect. Our records extend back only to 1979, but from these, Phil was instrumental in the Honors Thesis projects of no fewer than 230 student theses, and

this number excludes Independent Study projects, laboratory projects, Excel, Nalven, Mellon and Course-Based Undergraduate Research (CURE). Students were grateful for his efforts, bestowing on him a number of Hoff Awards; we as a faculty nominated him and he was the recipient of a Distinguished Service award. His was a dedication borne of sacrifice and service as greater goods. He exhibited a curiosity for the sheer joy of figuring out a puzzle. It kept him vibrant and here on campus among his biology family, tinkering in his third floor shop just days prior to being hospitalized. Phil was a private person, but he shared his talent, skill and heart broadly. We held him in great esteem, evidenced by a presentation at the October 5, 2016 meeting of the Lafayette College Faculty. After the reading of his tribute by Professor Nancy Waters, the Faculty erupted in acclamation by applause. Professor David Shulman (Anthropology and Sociology) rose to request that the faculty formally acknowledge Phil's contributions with a standing moment of silence.

To our knowledge, Phil may have been the only technician to have been accorded this accolade in the history of the College. Phil was memorialized in an open campus service held on Friday, December 2, 2016 Coordinated by our secretary Lisa Pezzino, attendees ranged from campus and beyond came to celebrate his life and career. Moving recollections were offered by Emeritus **Professor** Chuck Holliday, former Dean of the Faculty and **Provost Dr** Wendy Hill, Dr Glenn Rall '85, Dr Catherine Barthelmez Granzow '86 among many other former students. Other "biology family" in attendance included Emeriti **Professors** Bernie Fried, Shyamal Maiumdar. Ioe Sherma (Chemistry), Dr Amith Majumdar '95, Heather Martis Hilfiker '95. All members of the Department contributed to a poem now immortalized in a plaque on Kunkel's third floor wall. We presented to Phil's widow Laura Millward Auerbach a signed copy of a plaque, and assured her that it is destined to accompany the department on its move to the Integrated Science Center.



Congratulations to 3 of our amazing students who presented their work in November 2017 at the American Biomedical Research Conference for Minority Students in Phoenix AZ! All 3 spent time during summer 2017 in labs both on campus and afar. Silvia Chilel -Martin '19 presented work done in Dr Kurt's lab entitled "Investigation of the Innate Immune Response to Cancer 12-72 Hours After Injection," employing qPCR and flow cytometry techniques. Alexis Randall '19 contributed to that work, but

also presented a poster jointly supervised by Dr McCreary Waters and Dr Caslake. "Microbes and Mud: Preliminary Results on Bacterial Resistance to Cadmium in Merrill Creek and BoRit Ecosystems" follows up on prior collaborations with Dr John Freeman from East Stroudsburg University, as well as building upon findings of Honors Research alumni Skye Harris '02 and Christine Williams '03 on mercury in Onondaga Lake. That research along with this project earned support by the David R Nal-

American Biomedical Research Conference for Minority Students

ven '88 Memorial Fellowship in ecology. Xaviera Thomas '19 joined the lab of Peter Vitiello '02 at Sanford Research University of South Dakota on "Thioredoxin-I Regulation is Required for Hypothalamic Signaling and Perinatal Growth." Participation at ABRCMS for all 3 students and Dr Waters (as chaperone and project PI) was made possible through our Science Horizons Summer Fellows program https://biology.lafayette.edu/ undergraduate-research/ science-horizons/) and grants

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Biology Welcomes New Members to the Department

Recent additions to the Biology Department include **Kevin Farrell**, our new Departmental Technician, our Instructional Support Specialist **Dr Faith Olszewski** and our Visiting Post-Doc-Now-Assistant Professor **Dr Khadijah Mitchell**.

Kevin may be new to Biology but he is quite familiar with the College, His superior performance in the Engineering Division for more than a decade made him the perfect choice for assuming the current and new duties needed as Biology transitions in to the RISC. Kevin has guickly assumed a pivotal role in the everyday life of the department and we couldn't be happier. Dr Faith Olszewski was hired in a permanent staff position in Biology. A plant physiologist by training Dr Faith connects with tenure track faculty to enhance their course teaching, for example, providing directions on analysis tips and presentation tools. During Spring semester 2018 she is teaching a special topics course on plant physiology to augment our curriculum. Finally, Dr Mitchell arrived as a Visiting Post-Doc in 2016 but

her skills and enthusiasm to augment our suite of molecularfocused coursework, as well as fill our needs for healthrelated offerings made it obvious that she would contribute to the mission of the Department and the College. Her area of specialty includes racial disparities in health care and treatment along with epigenomics of lung cancer. We extend a warm welcome to our expanding 'Biology Family' and encourage you to do the same!





We were glad to host **Sam Rosen '13** in February 2018 for a lunch brown bag talk. As

an 'eco-cop' with the NJ DEP Site Remediation Program, Sam gets to blend skills honed in his AB Biology major with those from his Government & Law major and his MPA from Columbia University. Biology supported his visit along with EVST/EVSC. In September 2017 we enjoyed a visit from then-ABD, *Victoria* **'Tori' Pocius '11** about her



doctoral research on monarch butterflies and conservation efforts. Having successfully defended

masters and

her dissertation in March 2018, Dr Pocius is applying to postdoc positions and continuing her research on this iconic model species. Completing her doctorate from Cornell University while currently a visiting candidate at Duke University **Maria Liberti '13** visits the Biology Department in April 2018, speaking about her NSF supported research and patent application using metabolomics for targeting glucose metabolism in fighting cancer. We welcome

all our Alumni back to Biology to share their stories and successes! Recent Alumni Visits... When Will It Be YOU ?!?!

ABRCMS continued...

from the Faculty Academic Research Committee and the Office of Dean of Curriculum. We are proud of our students, and continue our ongoing commitment to mentoring them and helping them seek summer research experiences. **Drs Manuel Ospina Giraldo and Jim Dearworth** are guiding this years cohort of Science Horizons students. Our 2018 cast of Science Horizons Summer Fellows is in the works and we look forward to sharing with you their stories. If you have an opportunity you want to share, please feel free to contact us through the College webpage or the Department's FaceBook page.



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ON the web https://biology.lafavette.edu/

On FaceBook

https://www.facebook.com/ BiologyPards/? ref=aymt_homepage_panel

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Our Biology Department Mission

We want to share our updated educational mission, which we hold to have four components::

- To facilitate student understanding of biological concepts including their connection to other disciplines, with an emphasis on evolution as a unifying theory of living things.
- 2. To provide opportunities for students to develop critical thinking and scientific inquiry skills through analysis of scientific literature, and the practice of science in the classroom, laboratory and field.
- To foster the development of each student's ability to communicate his or her understanding of biological concepts to both science and non-science audiences.
- 4. To promote student and faculty interaction by offering small classes and by providing mentorship, advising, and research experiences

Biology Forges a New Identity: We Want Your Thoughts!

Over the years our newsletters have highlighted accomplishments of our faculty, students and staff, and we see them as a way to convey to you, our alumni and friends, the exciting initiatives we are undertaking here in good ole' Kunkel Hall. We continue to be true to the spirit of science and to our identity as a first rate biology department. We know that our alumni rank our biology program among the strongest in the College. Even as we have held off the ceiling leaks, the stalled elevator, and the well-worn, taped auditorium chairs, we are preparing to be launched into what will be our new home on campus-The **Rockwell Integrated Science** Center. Much has been made of the potentials in this facility and, as holder of the largest set of real estate in the RISC, Biology will find ourselves sharing spaces and engaging in the myriad interdisciplinary efforts that have become second nature to us all here at the College. But we also are keenly aware of our identity as a department, and our long standing strengths and place in the liberal arts tradition. Like the evolution that shapes our self-same discipline, we are embracing the dynamic change that comes with colonizing movement into new spaces and the time it affords us in interactions and engagement. Who wouldn't be



excited? Who wouldn't be just a little nervous?

As we prepare to undertake our migration, Biology faculty as a department and individuals are considering ways to enhance and strengthen our identity while we retain our critical traits and connections that make us your place to 'come home to the Hill.' We have some ideas of our own and want to share them with you. Should we host some inaugural alumni workshops, symposia or conferences? Ought we to develop a theme in our displays? Might we need to transform the lessons we have learned from our past as we anticipate the trajectory of our future? We want and need to hear from our cadre of alumni—we want your ideas, your encouragement and your innovation to help us establish ourselves in the RISC as a premier

department and one of the foundational forces on which the College will depend. We seek new ways to connect our students with one another, our alumni, and our local, regional and global communities.

So, we invite you to take a minute if you would. Browse this newsletter. Check us out online. Go to our FaceBook Page 'Biology Department at Lafayette College.' The FB page is in its infancy, but we will have expanded information on initiatives we have (or are thinking to have!) underway. More importantly, we want you to talk to us. Click on the button to send an email message, or share a post Pick up a phone or drop us a line. Tell us what you would like to see us do. Help us figure out how best to connect our alumni with our students in meaningful way.

We recall that well-put phrase by Ghandi—we want to BE the change we wish to see, in the campus and in the world. We need your help to make that difference for us. Please respond and give us your input and feedback! We appreciate your help so Biology can retain its strategic importance in the College. Thanks in advance for your aid in helping us make that difference!