

BIOLOGY

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LAFAYETTE

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ANNA EDLUND EXPLORES THE MYSTERIES OF POLLINATION

Anna Edlund, as Lafayette's resident developmental biology professor, usually studies the creation of life. But her most recent breakthrough—one that could solve a mystery that has long baffled scientists—is about destruction.

Destruction of the seemingly indestructible, in fact. For more than a century, scientists have been stumped by the durability of pollen grain walls. Each microscopic pollen grain sculpture contains plant sperm cells and is covered with the mysterious substance called sporopollenin.

Sporopollenin doesn't biodegrade. Ever. A vat of hydrofluoric acid, so powerful it can degrade rocks to sludge, might as well be a warm bath to a pollen grain. They are so durable that practically all of the pollen grains plants have ever produced in the history of the planet are still here.

The sperm inside each miniscule fortress is delivered to the flower at pollination, when it escapes the grain through an aperture. Or so common thinking has it.

"I got very excited a few years ago," Edlund says. "I found a plant that can actually degrade sporopollenin right after pollination."

Edlund discovered that in *Arabidopsis thaliana* (an alpine cress plant with tiny white flowers) a nice round hole is degraded in the pollen grain walls to allow the sperm to escape.

Edlund and three student researchers—biology majors **Christian Mendoza '16** (Rockville, Md.) and **Brooke Callahan '16** (Ambler, Pa.) and chemical engineering major **Christine Hartl '17** (Morris Plains, N.J.)—have spent the fall semester trying to figure out how *A.thaliana* accomplishes what

UNLOCKING THE SECRETS OF HUMAN DNA



Professor Eric Ho and Cory Spera '15 go over DNA models in Kunkel Hall.

In the 1600s, a scientist—no one is sure exactly who—looked through the lens of the first compound microscope and saw for the first time the hidden world within our own.

Four centuries later, **Eric Ho** says the discovery of next generation sequencing is just like that. A "hidden genomic landscape has been revealed with tremendous resolution," says the assistant professor of biology.

Ho's application of the latest technology in the study of the building blocks of life—which rapidly gives researchers snapshots of genomic sequences—is one of three areas of groundbreaking study he's pursuing. Ho's work with Lafayette students is offering the world a clearer picture of the inner-workings of Lyme disease; helping doctors better match drugs to cancer patients; understand the genetic connection between viruses and hosts; and learn about how genetic codes affect evolution.

Maureen Carey '14 partnered with Ho to study the molecular pathways affected by Lyme disease infection in mice.

Preliminary results show that Lyme

infection interrupted 13 and 5 molecular pathways in heart and brain tissues, respectively. Carey and Ho are preparing their work for submission to a methodology journal.

A biology graduate, Carey is now pursuing a Ph.D. in infectious diseases at the University of Virginia.

Noelle Kosarek '16 (Kinnelon, N.J.), a biology major, worked with Ho to develop a computer program that queries Food and Drug Administration databases of cancer drugs and clinical trials. The final product of Kosarek's work will match a drug either already sold on the market or still in clinical development for all of a patient's cancer subtypes, dividing them by genomes.

"He's a fantastic professor," Kosarek says of Ho. "He's a super supportive research professor. Even when it gets frustrating, he's extremely patient with me."

Two students partnered with Ho on the biological uses of codons—the genetic codes organisms use to create proteins. Ho is primarily interested in understanding

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LAFAYETTE
COLLEGE

FROM THE DEPARTMENT HEAD



This has been another productive year for the Biology Department. We taught 33 courses, supervised five honors theses, and if you include

the academic year, interim and summer sessions there were 82 different students who conducted research with us. We proudly recognize Prof. Michael Butler who won the Aaron O. Hoff Student Government Superior Teaching Award. We also congratulate **Corey Spera '15** winner of the Pepper Prize; our third Pepper prize winner in the last three years.

Our HHMI sponsored Science Horizons Program has been successful with respect to retention in STEM; 90 percent of students in our first two cohorts declared a STEM major. The program has also been successful in getting students involved in research earlier. Over the past three years, we've mentored 58 first-year students in research over the January interim sessions. We also mentored 24 rising sophomores in summer research compared to six rising sophomores during the three years prior to our HHMI grant. Furthermore, we are providing more students from underrepresented populations with research experiences.

During the three years prior to our HHMI grant 12 of our summer research students were from underrepresented populations and this number increased to 21 students during the first three years of our grant.

We are proud to be offering the HHMI Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science (SEA PHAGES) course this year to some freshman science majors. We've made a four year commitment to this program which will allow a subset of first-year students enrolled in General Biology to conduct a two semester research project focused on bacteriophage genomics.

In addition to highlighting current biology faculty, this newsletter also highlights the incredible career of Bernie Fried. The library recently put together a bibliography of his work which includes 668 publications. We are very excited about the College's Capital Campaign which includes plans for a new home for biology; the Integrated Science Center. We are hoping to move into the building in 2019 which would be 50 years after we moved into Kunkel Hall (see the last page for a picture of Kunkel Hall under construction). As always we love hearing about the great things you are doing so please keep in touch.

(HUMAN DNA continued from page 1)

biases—any codon can be used to create amino acids, but organisms naturally pick one type of genetic code over another.

Anna Peterson '15 studied the correlation between viruses and their human hosts—specifically the HIV virus and the human papillomavirus. Viruses, Ho says, use their host's molecular machinery to create proteins. "Thus, we hypothesize that the usage of codons by viruses should adhere to their host in order to enhance virulence," he says.

Peterson and Ho developed a computer program to parse and analyze DNA sequences from human and viruses. Their research, which they presented results at the National Conference of Undergraduate Research at Eastern Washington University in April 2015, found that a

subset of codons share high correlation.

Rammy Elrafei '16 (Franklin Lakes, N.J.) a biology major, worked with Ho on codons preservation through evolution. As species evolve, they use many of the same amino acids to produce their proteins.

Ho and Elrafei were attempting to learn whether the genetic codes organisms use also evolve. "The findings of this study are important in expanding our understanding of selective pressure" one of the drivers of natural selection, Ho says. Elrafei developed a computer program to analyze the genomic sequences from a number of species to determine whether the genes remained the same. He presented his results at the Lehigh Valley Ecology and Evolution Symposium in April 2015. ■

BERNIE FRIED: A SCHOLAR-MENTOR FOR MORE THAN 35 YEARS

While his pace may be a bit slower these days, **Bernard "Bernie" Fried**, professor emeritus of biology, exhibits the same mental dexterity and razor-sharp focus that made him a mainstay fixture in Kunkel Hall for the last 50-plus years. His eyes still alight with pleasure in discussing his latest manuscript revision, or sharing the most recent update from a former student, or describing a remembered cruise with his wife, Grace.

Over his career of 37 years that encompassed not only tenure and promotion, but appointment as department head in biology and culminating in a prestigious chaired professorship, The Gideon R. and Alice L. Kreider Professor of Biology, Bernie has amassed an unparalleled range of grants and scholarly awards that supported his work on trematodes and gastropods, including those of critical medical significance.

Bernie arrived at Lafayette in 1963 as an assistant professor, where he developed and taught courses ranging from Biological Concepts, a biology course for non-majors, to introductory General Biology and Invertebrate Biology, as well as techniques and specialty courses like histology and parasitology.

In her comments to *The Chronicle of Higher Education*, former Provost and Professor Emeritus of English **June Schleuter** wrote of Bernie's intense and sustained scholarly interests by drawing on a letter from an alumnus asking "Who else could make the travels of *Necator americanus* (the common intestinal hookworm) seem like it should be a Steven Spielberg movie?"

Indeed, Bernie's work has been featured in the popular media on the Discovery Channel. But for a parasitologist, no accolade of respect could match the honor of being namesake to a newly-discovered species. And the international scientific community has accorded Dr. Fried's



work such respect that not one, nor two, but actually three such species stand in testimony to his continued, dedicated study of these invertebrate parasitic worms: *Echinostoma friedi*, *Fessisensis friedi*, and *Cercaria friedi*.

With his retirement in May of 2000, Bernie has not yet slowed his scholarly pace—at least count his CV spans nearly 4 dozen pages of scholarly citation...excluding perhaps thousands of abstracts and myriad book reviews. His credentials boast a prolific 600+ academic articles and dozens of books, many with his long-time colleague, friend and similarly luminary collaborator, **Joseph Sherma**, Larkin Professor Emeritus of Chemistry.

To describe this collaboration as fruitful is a woeful understatement. Bernie and Joe together have generated to date 158 publications in over 25 different journals with 82 different undergraduate co-authors. Among these mentored students, Bernie counts professionals of virtually all walks of life—doctors, dentists, professors, forensic pathologists, genetic counselors, teachers, MBAs, attorneys—we in the Biology Department have not yet begun to catalog his prodigious impact among alumni.

Among those is **Karen (Le Sage) Johnson '10** who returned in July 2013 recently to join in the festivities for Bernie's 80th birthday

celebration. In securing her position with the Department of Justice, Karen credits her success to the four publications in peer-reviewed journals that arose from Bernie's tutelage.

"I came to think of him and his wife Grace as family," she says. "(His) personal and vested interest in all of the students that he mentored... had a direct impact in finding a rewarding career."

A research/laboratory suite was endowed in his honor by former student **R. Marshall Austin '71**, who acknowledged that Bernie's guidance was critical to helping launch his own career.

Tyler Saxton '08 "...marveled at (Dr. Fried's) seemingly boundless energy and true love of discovery. (His) mind was constantly working and thinking of new experiments...I am thankful for his guidance and...without Dr. Fried, I would not be where I am today."

The feeling is clearly mutual. When we asked Bernie recently how he would describe the major accomplishment of his career, he replied without hesitation, "My numerous publications in refereed journals with those students who have worked closely with me throughout my many years at the college."

While working through some recent medical issues Bernie hopes and expects to continue his work as soon as they are resolved. We have it on good authority that Bernie has just placed an order of snails for his spring 2016 studies. We hope you will join us as we doff our collective hats to Dr. Bernie Fried, and applaud his determined commitment to his scholarly passion.

We would like to encourage all alumni to share with us any tales of how Bernie's tutelage helped shape their education. You may contact Professor Nancy Waters at watersn@lafayette.edu or Professor and Department Head Robert Kurt at kurtr@lafayette.edu if you want to contribute your own story. We would love to hear from you! ■

MILESTONES IN BIOLOGY

As part of looking to our past in preparing for our future, we in the Biology Department thought it time to recognize a number of milestone events. For example, 2016 marks the 100 year anniversary of General Biology as our first requirement in biology at Lafayette College.

Currently offered by all of the faculty in rotation from year to year, our introductory sequence forms the foundation for our majors. But it also serves as one of the chief ways in which non-biology majors can meet their requirement in the Common Course

of Study (CCS) for a natural science course with a laboratory. The two courses cover the biomolecular and cellular basis of life (BIOL 101) and then move into the organismal and systems match between structure and function, culminating with ecology and conservation (BIOL 102). Embedded throughout both is our commitment to the role that evolution plays in shaping our science.

In addition to the HHMI-supported Sea-Phages laboratory section (see *News from the Department Head*) the general biology laboratories

are coordinated all year-long by our very own **John Drummond**, who manages our cadre of student teaching assistants, a program originally conceived by the late Professor Emeritus **Louis Stableford**. This year, the lecture component was offered in the fall by Professor **Bob Kurt**, while Professor **Nancy Waters** holds the reins on the spring semester.

A second milestone, this year is the 100th anniversary of the graduation of Philip Hench, our Nobel Prize Laureate in Physiology or Medicine (see *Alumni Updates section*). ■



PHIL AUERBACH, technician III, continues his never ending crusade to keep Kunkel Hall and our equipment functional for our teaching and research programs. In addition to keeping things working, he somehow still finds time to get us everything we need, where, and when we need it; constantly moving microscopes, incubators, supplies, etc. around the building. He also continues to support field work. You may find him out on the boat one day or in Metzgar Fields helping install bird houses on another day. He is truly extraordinary. Thanks for all you do Phil.



MIKE BUTLER taught Human Physiology during the fall semester, and Physiology of Extreme Animals and Behavioral Ecology during the spring semester. He supervised four independent study students during both fall and spring, and four summer researchers. Butler had three manuscripts accepted for publication, and gave an oral presentation and presented two posters at two separate professional meetings. He served as chair of the Early Professionals Committee of the American Ornithologists' Union, and as a representative for both the Alcohol and Other Drugs Standing Committee and the Student Life Committee. He was also the 2015 recipient of the Aaron O. Hoff Student Government Superior Teaching Award.



LAURIE CASLAKE taught Molecular Genetics and Capstone in Biology in the fall and Microbiology in the spring. She supervised four research students in the fall, four students in interim (all supported by the HHMI grant), and three students in the spring. The College's EXCEL program supported research efforts of a summer student. Research results from several projects were presented in poster format at the Annual Meeting of the Pennsylvania Academy of Science and two students traveled to New Orleans to present their research results at the American Society for Microbiology meeting. Caslake spent the last academic year as Chair of the Governance Committee, served as acting head of biology in the spring, and is enjoying sabbatical this academic year.



JAMES DEARWORTH James Dearworth's courses included Comparative Vertebrate Anatomy and Anatomy of Vision. He also co-taught the Interdisciplinary Seminars in Life Sciences: Symposia on Biomedicine, Bioengineering, Biochemistry, and Environmental Science with Yih-Choung Yu, associate professor of electrical and computer engineering. He supervised one neuroscience honor student and several other research students. Their projects used the red-eared slider turtle to investigate behavioral/hormonal measures correlated with circadian rhythms, retinal activities by calcium imaging, and location of mRNA in its eye for melanopsin, a photopigment that drives circadian rhythms and slow pupil responses. He also has expanded his ecology work surveying population of turtles at Lacawac Sanctuary, a nature preserve, ecological field research station, and public environmental education facility in the Pocono Mountains.



JOHN DRUMMOND, general biology laboratory coordinator, taught eight laboratory sections in the fall and six in the spring while also supervising 16 teaching assistants who helped facilitate the labs. In Sept. 2014, he was invited to speak as part of the Fall Lecture Series at Hawk Mountain Sanctuary in Kempton, Pa. The title of the talk was Monarch Migration: A Natural Wonder at Risk. He also traveled to nature centers and garden clubs in the spring of 2015 to speak about monarchs.



ANNA EDLUND taught General Biology, in the fall. In the spring, she was on leave. Edlund supervised one honors thesis student and three other independent research students. She also worked with two EXCEL students over the summer. Edlund submitted two articles, both with student coauthors. She reviewed several scholarly articles, and served on the steering committee of an NSF grant. She presented a student co-authored poster at the Annual Pollen Research Coordination Network Meeting and American Society for Plant Biology Meeting in Minneapolis, Minn. Her service to the College included membership on the Faculty

Compensation Committee, and her outreach included two summer weeks teaching biology near Mysore, India, to Tibetan Buddhist monks, through the Emory Tibet Science Initiative.



ERIC HO taught Introduction to Bioinformatics, Introduction to Computational Science, and Biomedical Informatics. He was involved in the application for the HHMI SEA-Phages program. Three biology and one mathematics students worked with him on different research projects. Their findings were presented at NCUR, the annual Pennsylvania Academy of Science conference, and Lehigh Valley Ecology and Evolution symposium. He published a research article in PLoS ONE, was a panel speaker at a career meeting at Rutgers University, and gave a research talk at the Great Lakes Bioinformatics Conference. Ho was appointed to the Health Professions Advisory Committee, served as a mentor of the HHMI Science Horizons program, and has been serving in the program committee of 2016 Asia Pacific Bioinformatics Conference.



CHUCK HOLLIDAY is currently testing the hypothesis that it is possible to become satiated with birding and continues to revel in the joys of international birding trips. He birded in Ecuador, Taiwan, Arizona, the U.S. Rockies and southern Brazil this year and in 2016 he hopes to bird in Guatemala, Borneo, South Africa, Australia, and New Guinea. He was also able to catch many trout while in the Rockies this summer and, as of August, had 20 lbs. of trout in his home freezer. Holliday sends his very best regards to all of his former students and urges them to remember that Calvin Coolidge was correct when he said, "Persistence and determination alone are omnipotent."



ROBERT KURT taught FYS (Your immune system: friend or foe?) during the fall semester, and was on sabbatical in the spring semester. Kurt supervised five independent research students in the fall and spring semesters, and one honors thesis student. Five research students presented their work at the Pennsylvania Academy of Science meeting, and two students presented

their work at the national meeting for the American Association of Cancer Research.



WAYNE LEIBEL continued to offer his courses in Evolution and Evolutionary Genetics, advising and mentoring students and participating in the Honors Program. He had published three articles on cichlid fish, and attended the annual convention of the American Cichlid Association in Louisville, Ky. He continues on as associate/technical editor for their publication, *Journal of the American Cichlid Association*, and is a member of the Board of Trustees. He also continues as chair of the Guy D. Jordan Endowment which awards small grants for cichlid research, primarily to graduate students, and continues on as editor of the quarterly magazine, *Cichlid News*.



MANUEL OSPINA-GIRALDO taught Phytopathology and Molecular Genetics, and supervised five independent research students. Ospina-Giraldo also supervised three EXCEL scholars, all funded by external grants. Some of the student research conducted this year was presented at the Pennsylvania Academy of Science, the American Phytopathological Society, and the Oomycete Molecular Genetics Network meetings, and resulted in four published abstracts. Ospina-Giraldo served on the Biotechnology and Bioengineering Advisory Committee. Additionally, he advised 21 students. With funding from a federal grant, Ospina-Giraldo attended and supported the travel of his summer EXCEL students to the Bioinformatics Workshop at Virginia Tech.



LISA PEZZINO is in her second year with the Biology Department. Not only does biology continue to grow on her, but she has been getting accustomed to the creepy insects that sometimes visit her office. Lisa maintains the department's many needs and likes working with her faculty and students. Lisa is a team player.



ELAINE REYNOLDS taught Neurobiology and Aging and Age-related Disease in the fall and Intro and Advanced Neuroscience in the spring. She supervised eight research students. Reynolds coauthored a paper published in *Neurochemistry International*, and presented posters at SfN, the Drosophila Research Conference, the PAS meeting, and the LVSfN meeting. She and students also presented at the annual CBLR expo. Reynolds collaborated with **Michael Hadley** on two art installations, one at the Easton Farmer's Market entitled *The Gratuitous Gram* and the other at the School of the Art Institute of Chicago entitled *Promise Foods*. Reynolds was Acting Head of the Neuroscience Program, and on the board of the Faculty for Undergraduate Neuroscience and the *Journal for Undergraduate Neuroscience Education*.



DANIEL STROMBOM taught Biological Modeling, and Collective Phenomena in Animal Groups in the spring. He mentored two HHMI Science Horizons students over winter interim session and the results were presented by the students at the Pennsylvania Academy of Science meeting. Over the summer he mentored a Nalven scholar. He had two articles published, submitted two additional manuscripts, and presented ongoing work on switching behavior in moving animal groups at the Pennsylvania Academy of Science meeting. He also collaborated with Prof. Butler to infuse Behavioral Ecology with a computational modeling activity.



In fall, **MEGAN ROTHENBERGER** taught Conservation Biology, and in spring, she taught Introductory Biology and Edible Ethics. During the academic year, Rothenberger supervised two honors thesis students in biology as well as five other students in various independent research projects. Five of these research students presented original research at the Pennsylvania Academy of Sciences meeting in April. Service to the college included memberships on the Environmental Science & Environmental Studies Advisory Committee and Academic Progress Committee.



In fall, **NANCY WATERS** taught Advanced Aquatic Ecology using the 'floating lab' pontoon boat at Merrill Creek Reservoir. In spring, she taught Environmental Biology. She mentored two research students. Results of student research in Biology 332 were presented during the Merrill Creek Reservoir Invitational Program, formed the basis of an independent research project, and a summer Excel Scholar. As Faculty Health Professions Advisor, she advised dozens of potential applicants for health professions schools, along with more than 100 students with interests in medical fields, and an innumerable number of alumni. Her compilation of poetry continues under review. Waters was recognized by her alma mater, Saint Francis University for her commitment to undergraduate teaching, mentoring and scholarship by conferral of their Distinguished Alumna Award in Education. ■

MEET OUR NEWEST MEMBER



ANASTASIA THÉVENIN joins the department after working as a postdoctoral researcher at Yale Medical School and more recently, as an adjunct faculty and researcher at Lehigh University. She received her B.S. degree in biomedical science from Lynchburg College and a Ph.D. in biochemistry from the University of Delaware. Anastasia's research focuses on understanding how protein phosphorylation affects protein trafficking and protein-protein interactions, both in cells and in vitro. Project one aims to understand how phosphorylation affects activity and degradation of gap junctions. Project two focusses on monitoring trafficking and degradation of a cancer targeting peptide. This peptide can be linked to drugs or fluorescent molecules and can be inserted into cells under acidic pH conditions. Acidic pH is the cornerstone of tumors, making this peptide a great drug delivery system. At Lafayette, she is teaching Molecular Genetics with laboratory and two 300-level seminar courses: Fall semester—Cell signaling in health and disease; Spring semester—Cancer biology. ■

Thanks to those who keep us updated. We would love to know how you are, what you are up to, and ways you have used your biology knowledge in your careers or everyday life.

ALICIA BARTLEY '12 has been working as a laboratory technician for the Reproductive Medicine Associates of New Jersey for almost three years. She is also pursuing her master's degree in biology and teaches undergraduate biology labs at William Paterson University. In her free time she loves to travel and tries to visit a new place in the U.S. and abroad every year.

BRIDGET HILBIG '10 finished her Ph.D. at University of California Riverside in 2015 and is currently doing a post-doc in plant sciences.

After Lafayette, **PRIYANKA NAIR '08** started her Ph.D. in Julie Magarian Blander's lab at the Mount Sinai School of Medicine in New York City. A primary focus of the Blander laboratory is understanding how innate immune signals influence inflammation, host defense, and adaptive immunity. In her dissertation, Priyanka identified a novel mechanism through which toll-like receptors enhance the ability of dendritic cells to activate CD8 T cell responses to microbial pathogens and cancer cells. This work was published in *Cell* in July 2014. She is currently a postdoctoral scientist at Janssen Research & Development in the Heme Oncology department, where she is studying the impact of the tumor microenvironment on various therapies. This postdoc experience is giving her a unique opportunity to do exploratory research while understanding the ins and outs of the drug discovery process.

CAROL ROESER PHELAN '87 (O.D. from SUNY Optometry in 1991) is in private practice in Warwick, N.Y.

TORI POCIUS '11 is pursuing her Ph.D. at Iowa State University in monarch ecology.

In January 2015, **MARA SHAINHEIT '03** was appointed assistant professor in the Department of Biological Sciences at

Towson University. She is very excited to have the opportunity to teach two courses that she is very enthusiastic about, Immunology and Microbiology. Additionally, she accepted her first four students into her research lab, which studies the interaction between the bacterial pathogen *Streptococcus pneumoniae* and neutrophils. Her lab's main focus is to identify proteins expressed on the bacterial cell surface that are degraded by neutrophil-derived enzymes and result in effective killing of the *S. pneumoniae*.

TOM SWAFFIELD '13 matriculated this fall to pursue his M.D. at George Washington University.

BENJAMIN TRISCUIT '14 finished a position as a naturalist at Asbury Woods Nature Center and took a job with the NYC Parks Fellowship & Conservation Corps program.

After he finished his HHMI Capstone experience in Dr. Joaquin Espinosa's lab at CU Boulder in 2014, **KYLE TUCKER '14** was hired as a research associate in Dr. Roberta Gottlieb's lab in Cedars Sinai's Heart Institute and was recently appointed as a Seahorse Respirometry Associate of the Metabolism and Mitochondrial Research Core. In Dr. Gottlieb's lab he studies: (1) the cardio-protective mechanisms of mitophagy in the context of ischemia-reperfusion (2) the impact of metabolic syndrome on the mechanisms of autophagy in the heart (3) and the cardio-protective effects of statins and the mechanism of its deleterious effects in skeletal muscle.

ANDREW WEBER '00 (Temple M.D. in 2004) works at Tommy Hamm Sr. Cancer Center in Lynn Haven Fla., where Bauer, his Jack Russell Terrier, is a regular visitor to patients.

CAROLYN ZAWISLAK '10 (PA-C from Chatham University) just accepted a physician assistant position at MD Anderson Cancer Center in Houston, Texas. ■

NOBEL LAUREATE PHILIP HENCH EXEMPLIFIED THE LAFAYETTE IDEAL



At the end of this semester, it will be 100 years since **Philip Hench, Class of 1916**, graduated with a degree in biology. He went on to become one of the College's most successful alumni after receiving the Nobel Prize in Medicine in 1950 for the discovery of the therapeutic properties of cortisone.

Though, Hench's story isn't just one of individual success. Even in 1916, it exemplifies Lafayette's focus on interdisciplinary learning and close student-faculty relationships.

As is the case with many Lafayette students, Hench found a mentor and inspiration in the classroom and laboratory. Hench credited **Beverly Waugh Kunkel**, professor of biology from 1915-1952, with sparking his passion for research.

"Dr. Kunkel was one of the finest teachers I ever had," Hench was quoted saying in the Oct. 27, 1950 edition of the *Lafayette* newspaper. "Some teachers have the ability to inspire. Dr. Kunkel had that effect on me."

Hench's work focused on chronic rheumatoid arthritis. Through his research, he found that arthritic people with jaundice or other bodily changes, such as pregnancy, experienced a significant decrease in their symptoms. He hypothesized that the pain-relieving substance present during these changes was actually a steroid.

He and his colleagues began testing cortisone on patients. The results were dramatic. The steroid suppresses the immune system reducing inflammation, pain, and swelling. Patients' symptoms lessened or disappeared. In some cases, complete invalids were able to walk freely on their own after treatment.

For his "achievement affecting the future welfare of mankind," Hench accepted the Noble Prize for Medicine from King Gustaf VI at the ceremony on Dec. 10, 1950 in Stockholm, Sweden. It was one of dozens of honors and awards Hench received for research during his career. ■

NALVEN FELLOWS: WE WANT TO HEAR FROM YOU!

David Nalven graduated from Lafayette in 1988 with a bachelor of arts degree, majoring in biology and minoring in geology. As part of his undergraduate education, Dave participated in the Biology Department Teaching Assistant Program, being supervised by **Lorraine Mineo** in Biology 101/102: General Biology, Professor Emeritus **Robert S. Chase** in Biology 213: Functional Vertebrate Morphology, and **Nancy McCreary Waters** in Biology 233: Limnology.

During the summer between his junior and senior year, Dave worked as a research assistant, funded primarily through a National Science Foundation grant with Prof. Waters, but with housing supplied by the College. This arrangement of SSRAs (Student Summer Research Assistantships) predated and, in fact, contributed to the model upon which the current EXCEL Scholars program is based. Data from this research appeared in peer-reviewed published abstracts of presentations made at the Pennsylvania Academy of Sciences as well as the Ecology Society of America Annual Meeting.

Upon completion of his degree, Dave was hired as an Environmental Scientist by ENSR Consulting and Engineering, spending most days out of doors, doing the ecological work he truly loved including work on a few SuperFund Site cleanups. His ENSR supervisors were so impressed with his work that they offered Dave a promotion in spring 1989, but it would have meant spending more time with clients and less time in the field. For Dave this

was a real conflict, and he shared concerns that he was 'selling out' or 'settling' for the 9-to-5 and suit-and-tie corporate image. He took a leave of absence to consider his next career move, and embarked on a cross country trip with friends and his father.

But as he returned home across the southern United States a tragic automobile accident in Texas on Aug. 8, 1989 abruptly ended his promising career as a scientist. Friends and family searched for ways to memorialize David, and began by planting a Green Mountain Linden tree on campus across Sullivan Road from Kunkel Hall of biology, beside Van Wickle Hall of geology.

Ultimately, they established an endowment for the NALVEN MEMORIAL RESEARCH FELLOWSHIP in February 1990. This fund supports primarily ecological field-oriented or environmental research for students, either during the entire summer or now occasionally during interim session. Recipients have included students mentored by more than 10 Lafayette College faculty members, in projects ranging from antibiotic- and mercury-resistant bacteria to zebra mussels and other invasive species in ecosystems. On Wednesday, June 20, 2001, a memorial plaque depicting David and naming all Nalven Fellows was unveiled to that year's recipients, Biology faculty and College staff, and Arthur Nalven, David's father and generous contributor. The plaque resides in Kunkel Hall. Each summer Arthur, along with his daughter Lisa M. Nalven Krasnow, hosts a luncheon for that year's

Nalven Fellows, their mentors and associates.

The first Nalven Fellow in 1991, **Suzanne Metzgar McMenamy '92** returned to campus as a visiting instructor, teaching courses in environmental biology and ecotoxicology. In its nearly three decade history, the fund has supported 48 students in the kind of summer experience that galvanized David's too-short career. In addition, last year the fund supported placement of a bench amidst a garden-like setting beneath the now-vibrantly full Linden tree.

However, we in the Biology Department know that David's influence extends well beyond our limited boundaries—as a member of Phi Delta Theta, David's classmates including **Paul Hackett '88** and **Christopher Neuffer '88** were instrumental in helping to get the fund established, and many have continued to support it through gifts of time, treasure and talent. Just recently, friends **Annie Schwartz '87** and **Ross Podell '88** participated with others in a Health Professions Panel co-sponsored with the Nalven family.

As we close in on a quarter century of Nalven Fellows, we in the Biology Department want to extend an invitation to all of our past recipients to contact us and let us know how you are faring. You can email Professor Waters at watersn@lafayette.edu with any updates or information. Be sure to supply your phone and mailing address, and stay on the lookout for a FaceBook event. We want to hear from you! ■

(POLLINATION continued from page 1)

scientists have so far found impossible. Their research lab is filled with microscopes and tiny glass tools for watching and moving around pollen grains. The research team has also been working to measure the infinitesimal amount of heat produced at the moment of pollination. They scour roadsides for relatives of *A. thaliana* and hold pollen "races" to see how quickly the grains can release their sperm.

After surveying some 200 species, the team has found eight that reproduce like *A. thaliana*—each able to degrade pollen grain walls.

It's important, Edlund says, because once the components of sporopollenin can be extracted, they can finally be identified. "You've got to take it apart to figure

out what it's made of," Edlund says.

Beyond the scope of her research, new knowledge of how pollination works is needed in the world of agriculture and agribusiness and could also contribute to our understanding of evolution—flowers whose pollen grains are better or faster at sperm delivery will be more fit and sire more seeds.

Edlund is already planning her next research project and hopes to turn soon toward bees and pollinators to investigate how the shapes of pollen grain walls affect attachments to the hairs and bodies of insects.

Meanwhile, she is writing a student co-authored article. The title? Remember, the process of wall degradation produces a small amount of heat? Edlund jokes it would be fun to title the paper 'Hot Sex.' ■

BIOLOGY STUDENT AWARDS AND SCHOLARS

WILLIS ROBERTS HUNT PRIZE
Mary Higgins '15

**JOSEPH WATT KUEBLER JR.
MEMORIAL PRIZE**
Cory Spera '15

**DR. LORRAINE MINEO
TEACHING ASSISTANT AWARD**
Dolcie DeGrandchamp '15
Victoria Parsons '15
Gina Rossitto '15

**NALVEN SUMMER 2015
RESEARCH FELLOWSHIPS**
Adin Kugelmass '16 Amy Scalera '17
Aaron Little '16 Mia Spitz '16

BIOLOGY AT LAFAYETTE: 1967-69

1967 H. Keffer Hartline, class of 1923, wins the Nobel Prize for Medicine. Professor Kunkel encouraged him to undertake research and Hartline's



first scientific paper concerned visual responses of land isopods. Summers at the Marine Biological Laboratory at Woods Hole added to Hartline's

biological training. After receiving his doctoral degree from Johns Hopkins in 1927, a National Research Council Fellowship enabled Hartline to study mathematics and physics to strengthen his background for future biophysical research. In 1949 Hartline accepted a position at Johns Hopkins University as professor of biophysics and chairman of the Thomas C. Jenkins department of biophysics, where he did his groundbreaking research.



1967 Robert S. Chase Jr., who joined Lafayette in 1958 as an



instructor of biology and assistant dean, is promoted to the rank of assistant professor. He is president of the Pennsylvania Academy of Sciences and a member of the American Society

of Ichthyologists and Herpetologists, and Southwestern Association of Naturalists.

1967 Bernard Fried, who joined the faculty in 1963, is granted a two-month leave to participate in a trip that acquaints him with parasitic diseases in Costa



Rica, Honduras, El Salvador, Guatemala, Mexico, and Panama. A four-year research grant of \$27,000 from the National Institutes of Health affords Fried the opportunity to pursue the study of

flatworms. Sometimes as many as eight dozen chicks are cooped in Jenks Hall, which Fried infects with the worms in order to analyze the worms' growth and development.



1969 A new \$1.5 million biology building is completed six months after Beverly Kunkel's death, and is named "Beverly Waugh Kunkel Hall." The impressive structure houses some of the most modern biological equipment available at the time. One of the distinctive features of the structure is the greenhouse located at the left front of the four-story building. School begins with more than 300 students taking biology classes. "There are not many graduate students who get as good a deal as this," says Professor Louis Stableford of the new complex, which replaces the department's old home in 103-year-old Jenks Hall.