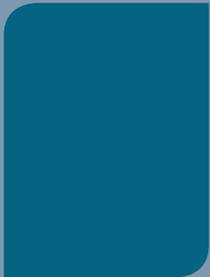




SCHOOL OF
INTEGRATIVE
PLANT SCIENCE



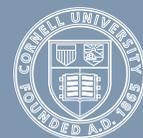
PLANT PATHOLOGY AND PLANT-MICROBE BIOLOGY



2015

ALUMNI NEWSLETTER

VOLUME 56

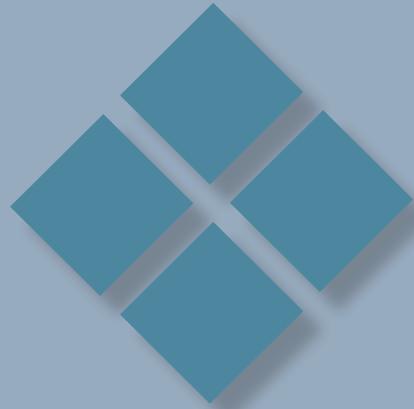


Cornell University

The rest of this page intentionally left blank

Inside this issue

Page	
1	Thanks
2	Letter from the Chair
4	Retirements
8	Alumni News
9	Remembrances
10	Faculty News
13	Teaching
16	Congratulations
19	Department Doings
21	Facilities
25	In the News
28	New Graduate Students



The layout work for this year's issue of the Alumni Newsletter was done by Dawn Dailey O'Brien. Thanks to Dawn also for pursuing and organizing contributions from alumni, faculty and staff and for compiling information regarding past and present graduate students. Thanks to Alicia Caswell for assisting Dawn in the pursuit.

Thanks to Gary Bergstrom and Alicia Caswell for proofreading. Send feedback and suggestions for future newsletters to plantpathcornell@cornell.edu

The *Alumni Newsletter* is published annually by the

Plant Pathology and Plant-Microbe
Biology Section
School of Integrative Plant Science
College of Agriculture and Life Sciences
Cornell University

July 2015

GREETINGS FROM THE CHAIR



Gary Bergstrom, Chair

Section of Plant Pathology and Plant-Microbe Biology
School of Integrative Plant Science

I've had the privilege of serving as chair for a full year now in what is a time of many changes within our beloved Cornell. Those on our campuses and alums around the world have enjoyed the many events held in celebration of Cornell's Sesquicentennial (150 years since the founding in 1865 by visionaries Ezra Cornell and Andrew Dickson White). This was topped off by a remarkable Charter Day weekend in April. If you haven't done so, you should view the Charter Day video (<http://150.cornell.edu/glorioustoview/>) which captures the essence of this unique American and global university which is both elite and inclusive; I predict it will give you goosebumps as it did for me. Other big changes this month include the departure of President David Skorton (to become Secretary of the Smithsonian Institution) and the arrival of our new (and first woman) President Elizabeth Garrett from the University of Southern California where she served as Provost. She promises to be an excellent leader for Cornell at this transitional period when faculty renewal is so critical to counter baby boomer retirements.

Many of you have heard that the Department, along with four of our sister departments, have been transformed into the five Sections of the new School of Integrative Plant Science (aka, SIPS). If you should slip and refer to us as a Department rather than a Section, don't worry—we all do it. The College Administration had the good sense to appoint our own Alan Collmer to be the inaugural Director of SIPS. Alan has done an incredible job in uniting the broad community of Cornell plant scientists (we number nearly a third of the college total) to work together toward common goals as a new school. We have arrived at a shared vision of SIPS around the theme of *'Discovery that*

Connects' from 'Fundamental Insights' to 'Better Plants, Sustainably Grown, Serving the World'. Please know that our 'connections' with our large cadre of accomplished alumni continues to be one of our greatest strengths.

Forming the School is an ongoing process, but we have already realized benefits in a better-coordinated seminar program and in an enhanced undergraduate curriculum for plant science majors—including a long overdue concentration in Plant Pathology and Plant-Microbe Biology championed by Kathie Hodge.

The Department, along with four of our sister departments, have been transformed into the five Sections of the new School of Integrative Plant Science (aka SIPS)

By the way, the college curriculum committee has also approved undergraduate minors in Fungal Biology and Infectious Disease Biology championed by Kathie Hodge and Eric Nelson, respectively. Chris Smart is leading the coordination of extension/outreach for SIPS. One change in administrative structure is that the position of Associate Chair has been discontinued and a new position of Program Leader has been

created on the Geneva campus. I thank Wayne Wilcox for helping me transition by continuing as Associate Chair through the entirety of 2014. I am grateful that Marc Fuchs has accepted the position of Program Leader and I look forward to partnering with Marc in leading our Section forward. We congratulate Tom Burr for completing, in December 2014, ten years of distinguished service as Director of the New York State Agricultural Experiment Station. Stewart Gray has just completed five years of extraordinary service as our Director of Graduate Studies and Adam Bogdanove has assumed that role for the next three years.

We are thrilled to have recruited Sarah Pethybridge in 2014 to our Geneva campus as Assistant Professor working on vegetable pathology research and extension with an emphasis on soilborne diseases.

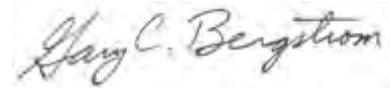
Sarah's husband Frank Hay has also begun as Senior Research Associate with specialization in nematology and disease diagnosis. Sarah and Frank are wonderful additions to our faculty.

George Abawi, Steve Beer, Sam Cartinhour, Donna Gibson, Sandy Lazarowitz, and Bob Seem retired since the last Newsletter and George Hudler will join their ranks at the end of this year. Each has had an illustrious career and we wish each well in their retirement endeavors, but what an enormous loss for our academic team! We hope an improving budget picture in the years ahead will allow us to renew our faculty ranks to at least start to fill the voids in our program left by the departure of these amazing colleagues. We also grieved the passing of emeritus professors Edward Jones and H. David Thurston—please read their remembrances.

Finally I am very pleased to report that many of our faculty, staff, and students have received wonderful awards and recognitions for their excellence in the past

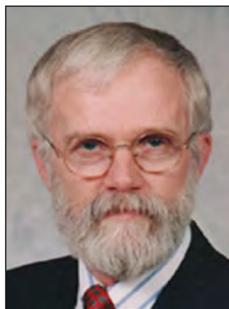
year and you can learn about several of these honors on the pages that follow.

Other than our new designation as Section, I don't think you will notice much difference in how we go about fulfilling our missions in teaching, research, and extension/outreach. Our aim continues to be the very best academic plant pathology and plant-microbe biology unit that we can be in scholarship and positive impact for our students and diverse stakeholders. We hope you will visit us in Ithaca, Geneva, Riverhead, and Highland whenever your travel brings you to the Northeast U.S. For those going to the APS Meeting in Pasadena this August, please join us at the Cornell Social (look for the familiar Big Red banner) on Sunday evening. I look forward to hearing from you in the months ahead, so please send your notes to gcb3@cornell.edu. All the best for 2015 and beyond!



Greetings from Phil Arneson (emeritus professor)

Saludos from Honduras! Despite this country's reputation for violence, we are still enjoying life here. Where we live, it is tranquilo, and we try to avoid the risky areas. We live in a rural community, El Ocotol, Yuscarán, El Paraíso, and we truly think of it as paradise. Sarah continues to volunteer in a rural clinic, and I dabble in community development and putter about the garden, orchard, and our now growing bit of forest. I no longer volunteer at Zamorano, but we maintain close ties with our friends there. Zamorano's new president, Jeff Lansdale, is a Cornell Ph.D.



Our little piece of paradise is 14 acres on a mountainside, most of which is really too steep for cultivation, although years ago it had been deforested and planted to corn and beans. Every year we plant more trees, mostly native species but also a few exotics (e.g., *Moringa oleifera*). We have terraced a bit of it and planted an orchard that now yields us mangoes, oranges, mandarin oranges, lemons, limes, grapefruit, papayas, pineapples, six varieties of bananas, and a few other assorted tropical fruits. In the shade of the orchard we have coffee—just for our own consumption.

For the third year in a row, the coffee producers in our area have been hit hard by the coffee rust. While they have lived with it since the 80s, when it first arrived in this area, it has been only the last three years that it has been truly devastating. Historically, the peak rains of September and October have been heavy late

afternoon and evening showers with beautiful, sunny mornings and early afternoons. However, the past three years the rainy season has given us day after day of cloudy, drizzly weather that has yielded below average total rainfall accumulation but ideal conditions for the development of the coffee rust.

Most of our neighbors are primarily subsistence farmers, who produce coffee as a major source of cash income. They produce coffee "organically," not as a conscious management decision, but because they cannot afford the inputs to produce coffee any other way. (They also cannot afford the fees to become "certified organic.") Because of the rust, many have opted out of coffee production altogether, but quite a few muddle on. With the first year of the current epidemic, many cut out a portion of their old, rust-susceptible varieties and began planting a resistant variety, 'Lempira.' Those plants are producing their first crop this season. Since then, two new rust-resistant varieties have become available locally.

Our 2-year-old 'Lempiras' (about a quarter of our plants) are looking pretty good this year—a small crop, but something nevertheless. Our 'Indios' are looking awful! In May we plan to remove even more of them and plant more rust-resistant varieties. We'll keep some of our 'Indios,' which might begin to do better in a mixed stand.

Well, that's the news from where we don't have to shovel snow, we don't have to scrape windshields, and we don't have any heating bills.

Saludos,
Phil

RETIREMENTS

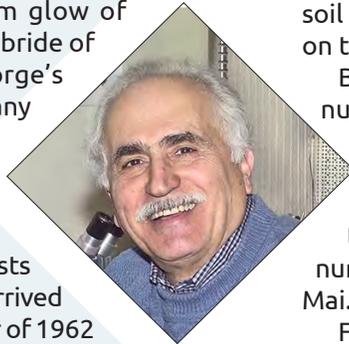
Dr. George Abawi Retires *by Herb Aldwinckle*

One hundred enthusiastic friends of George Abawi honored his long and illustrious career at Cornell with a celebratory dinner in Geneva on October 4, 2014. It was a great evening for a great member of PPPMB. Sharing in the warm glow of appreciation was Alice, George's bride of 24 years. Besides honoring George's career, the evening gave his many friends an opportunity to show the deep affection they hold for him.

George's association with PPPMB goes back through the mists of time to the early 60s, when he arrived in Ithaca in the hot humid summer of 1962 wearing his new wool suit. Since then George has been a member of PPPMB continuously for 53 years. First as grad student for his MSc and PhD, then Postdoctoral Fellow in Nematology, followed by accession through the faculty ranks at Geneva, becoming Full Professor in 1986. George was appointed Emeritus Professor on January 1, 2015.

George has been active in research, extension, and teaching for his whole Cornell career. His research focused primarily on determining the biology and ecology of soilborne pathogens (both pathogenic fungi and plant-parasitic nematodes) that impact the production of vegetable and food legume crops. His work on the management of plant diseases have followed the strategies and approaches of IPM. In his research George especially emphasized microbial interactions, soil health issues and sustainable practices for disease and crop management.

In extension and outreach George concentrated on delivering the latest background information available on the diagnosis and management of plant diseases impacting vegetable and food legume production in NY to extension educators, growers and other agricultural industry providers. This included training of extension educators, consultants and interested growers in conducting on-farm assessment of soil infestations with disease organisms and using the information in



deciding on the need for management. In recent years George became especially interested in soil health and sustainable soil management practices, and his outreach efforts focused on increasing the literacy in soil health issues through organizing field days, hands-on training sessions and special workshops.

Besides being an excellent and caring mentor to numerous grad students, either as major or minor committee member, George also classroom lectured on soilborne diseases and nematology. He was very committed to maintaining Cornell's traditional strength in nematology, a feeling nurtured by his good friend and mentor, the late Bill Mai.

Following a sabbatical at CIAT in Cali, Colombia, George committed substantial effort to International Agriculture and was appointed an International Professor. To this end George made many international trips, especially for a cereal project in India, Nepal and Bangladesh, and a bean project in Ecuador. His tales from some of these trips made for interesting listening.

George is a 50+ year member of APS, and has served the society loyally and intensively. He headed the APS Foundation and initiated several new programs. His APS career culminated in his being elected President (2014). Not bad for that young man from Baghdad in his wool suit!

In recent years George became especially interested in soil health and sustainable soil management practices



George Abawi speaks at 2014 APS meeting

Dr. Donna Gibson Retires

Dr. Donna Gibson, a long time adjunct professor of PPPMB retired as scientist and Research Leader of the Biological Integrated Pest Management Research Unit in November 2014, after more than 31 years of service to ARS. Dr. Gibson provided strong and able leadership to the Biological Integrated Pest Management Research Unit for 11 years, since 2003. During her tenure, the Research Unit expanded its research portfolio into several important new areas, including molecular mechanisms of nematode interactions with plants, biocontrol of invasive weeds, the metabolomics of fungal interactions with insect pests, and the proteomics of insect transmission of viruses in plants. We will miss Dr. Gibson's many contributions to PPPMB.



Gardening at the Holley Center—Donna always headed up our efforts to beautify the front Courtyard of our building as she is a knowledgeable and expert gardener.

Dr. Sandy Lazarowitz Retires

Professor Sandy Lazarowitz retired this year after 17 years in our Department. Sandy's distinguished career in virus-host interactions began when, as an undergraduate math major at MIT, she was awarded an NSF fellowship to work on Bacteriophage f1 with Robert Webster at Cold Spring Harbor Laboratory. As a PhD student investigating influenza, Sandy was mentored by Purnell Choppin at The Rockefeller University, then continued her training at Johns Hopkins University School of Medicine studying SV40, first as a postdoctoral fellow, then as a research associate, with Daniel Nathans. Sandy moved to the Department of Embryology, Carnegie Institution in 1982 as staff associate, then accepted an appointment as associate professor in the Department of Microbiology, University of Illinois in 1989. She retired from Illinois in 1998 as full professor in both the Department of Microbiology and the Department of Cell and Structural Biology prior to her move to Cornell.



Sandy, ardent about science education, had a lengthy association with the Howard Hughes Program for Undergraduate Life Science Education and K-12 Outreach, first as Director at Illinois from 1992-1998, then at Cornell from 2001-2004. During her tenure as Director, she was very successful in garnering funding from the Howard Hughes Medical Institute and in shaping and reshaping science education and outreach. In addition to her many activities in the Field of Plant Pathology and Plant-Microbe Biology, Sandy was active in the Program in Virology at Cornell, including teaching an upper level undergraduate virology class

and a graduate virology class with colleagues in the Veterinary College.

Sandy was influential in promoting the development of the Cornell Imaging and Microscopy facility, which serves many students and faculty on campus. She also spearheaded the planning and equipping of the Plant Growth Chamber Facility in Weill Hall, a valuable resource to all campus plant biologists. Her efforts were instrumental in the planning of the Plant Functional Genomics Facility in Weill Hall, which finally this year should become operational with the hiring of a director.

Sandy's research program has been supported throughout her career by grants from the NIH, NSF, and USDA. She has often been tapped to serve on review committees for these granting agencies due to her broad perspective on science and her ability to penetrate to the critical points in a research proposal. Seminal publications in *PNAS*, *The Plant Cell*, *Virology*, *EMBO*, *J. Virology*, and *Plant Physiology* attest to her research prowess and include the recent cutting-edge report in *Current Biology* by Levy et al., 'Synaptotagmin SYTA forms ER-plasma membrane junctions that are recruited to plasmodesmata for plant virus movement'. A fitting high note for Sandy, whose dedication to rigorous scholarship is without peer.

In 2014 Sandy was appointed visiting professor in the Department of Biochemistry and Cell Biology, Stony Brook University, and intends to continue this productive association in the future, as well as maintain emeritus status at Cornell.

Retirement of Professor Robert C. Seem *by David Gadoury*

Robert C. Seem retired from the Section of Plant Pathology and Plant-Microbe Biology on 1 January 2015 after 40 years of service. He arrived at the New York State Agricultural Experiment Station as a newly minted PhD from Penn State University in 1975, and joined what was then Cornell's Department of Plant Pathology at Geneva. He was promoted to associate professor in 1981, and to professor in 1998. He served as the Associate Director of the New York State Agricultural Experiment Station at Geneva from 1990 to 2003, and as Interim Director of the Station from 2004 to 2005. Bob was elected a Fellow of the American Phytopathological Society in 2004, one of the profession's highest honors.

During Bob's tenure as Associate Director of the Experiment Station at Geneva, land acquisition and field facilities improvement proceeded unabated, and land available for experimental plantings expanded to nearly 1000 acres; including better planning through implementation of a geographic information systems (GIS). Additionally, Bob was a principle guiding force for the development of the first research park associated with an agricultural experiment station: Cornell's Technology Farm (<http://thetechnologyfarm.com/>). As the president of the Park Corporation, Bob was instrumental in the NSF-funded Finger Lakes New Knowledge Fusion project, and new technologies to identify pathogens and monitor environmental variations in agricultural fields. The Technology Farm also embarked on an outreach effort with the goal of creating a well-informed community equipped to make educated decisions about issues related to biotechnology, genetically modified organisms, and nanotechnology.

Bob's faculty research program was devoted to the study of quantitative epidemiology, pathogen biology and pathogen ecology. In his own words, he was an applied plant pathologist who worked to control fruit and vegetable diseases, with an emphasis on the development of decision support systems ranging from

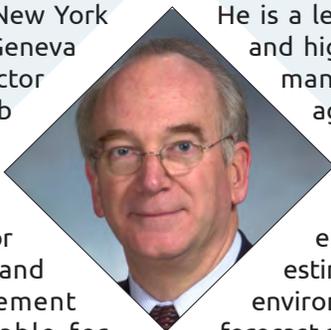
simple models of disease to sophisticated simulation models. Bob was also a widely-known authority in the application of precision agriculture technologies to plant disease management, particularly high resolution environmental monitoring and weather forecasts. He is widely respected for his creative and inclusive approaches to research, and for his applications of new technologies to solving problems.

He is a leading authority in the application of GIS and high-resolution weather forecasting to the management of plant diseases. Along with agricultural meteorologists, he has tested the utility and accuracy of high-resolution forecasts to accommodate specific crop diseases, and has created and verified energy balance models that provide better estimates of surface wetness duration: a critical environmental factor used to drive many disease forecast systems.

Bob was not only a highly-respected researcher, he was exceptionally good at assembling collaborative groups of like-minded scientists. A key example is his coordination of a series of successful international workshops on grape vine downy and powdery mildews.

Bob was a skilled mentor of graduate students and new faculty. His former PhD students are now professorial faculty in some of the top departments in the world, including the Land Grant Universities of Georgia, Kansas, Washington, and the National Agricultural University of Norway. In addition to his work at Cornell, Bob mentored graduate students at Penn State, the University of Adelaide, the Agricultural University of Wageningen, and the Agricultural University of Norway. His lab has served as the research base for visiting students and faculty from Italy, Germany, France, Brazil, South Korea, India, China, Japan, Australia, Norway, and Sri Lanka.

Many of Bob's friends and colleagues gathered to wish him a long and happy retirement at a party held in his honor on 16 May 2015 at the Geneva Country Club.



Before Cornell



After Cornell

ALUMNI NEWS

Nancy Keller (M.S.1985, Ph.D. 1990)

Nancy Keller, Gary Bergstrom's first graduate student continues to excel. Nancy, Professor of Mycology at the University of Wisconsin–Madison has been appointed to Wisconsin Alumni Research Foundation (WARF) named professorships in 2014. The appointments include \$75,000 in research support from WARF over five years. Her research is on the genetic regulation of metabolism and fungal development, focusing on the virulence of the human pathogen *Aspergillus fumigatus*.

http://www.news.wisc.edu/22658?utm_source=iUW&utm_medium=email&utm_campaign=iUW2014-04-03

Mike Hampson (Ph.D. 1969)

Mike writes from St. Johns, Newfoundland, Canada "I've been long-time out of the plant path field since I retired. There were serious changes in the Government Department, and I took the opportunity to put the government behind me. I was the only Plant Pathologist in this Province; the federal government decided that the problem (potato wart disease) was no longer a problem. You know what governments are, no doubt! Since retiring I have published in a magazine devoted to Jazz Music, taken to playing piano and wind instruments, and attending fitness classes, I also formed a jazz band which has recently dissolved after thirty years!

To those who remember me—Hi!"

Maryann Borsick Herman (Ph.D. 2008)

In the summer of 2014 Maryann, former student of Chris Smart, received tenure and promotion to associate professor of Biology at Saint John Fisher College in Rochester, NY.

Don Pfister (Ph.D. 1971)

In March 2014 Don wrote "I am in my last months of serving as Interim Dean of Harvard College, the undergraduate college at Harvard. At the end of this stint I will take a leave and catch-up on all my work at the Farlow Library and Herbarium and then resume teaching in the department of Organismic and Evolutionary Biology at Harvard. I continue to work on cup-fungi, along with several other projects, and enjoy field work in Chilean and Argentine Patagonia."

Satoshi Inoue (M.S. 1993, Ph.D. 1997)

Dr. Satoshi Inoue, a graduate student from 1990 to 1997 has written an affectionate memoir of his Master's degree era with Professor Jim Aist in the then Department of Plant Pathology. Satoshi, now Director of the Forage Seed Department, Kaneko Seeds CO LTD, Japan, is an ardent alum and his affection for the Department, Cornell, and Ithaca is palpable, despite the Japanese text. Stay tuned for part 2, the PhD years with Olen Yoder, Gillian Turgeon, and Jim Aist!



From Satoshi:

'I have published the book titled "Survival for My Master of Science (M.S.) in Plant Pathology at Cornell in Ivy League" in Japanese language to introduce the department and Cornell University to Japanese people. It is the memoir of my graduate student days from 1990 to 1993 describing my days to survive to obtain my Master's degree. I wish many students in Japan should read it and take a way to Cornell.'

The book is available through BookWay Global <https://bookway-global.com> in the world and BookWay and Amazon Japan in Japan.



Satoshi Inoue and Gillian Turgeon when Gillian visited Tokyo University of Agriculture and Technology (TUAT) in February 2014

REMEMBRANCES

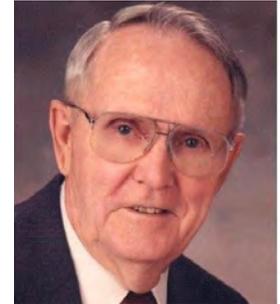
H. David Thurston

Professor Emeritus H. David Thurston, 87, passed away at his home in Ithaca on September 26, 2014 after a short illness. David was a native of South Dakota. Following completion of his Ph.D. from the University of Minnesota, David joined the Rockefeller Foundation in Colombia as Director of their Plant Pathology Program. While in Colombia, he was promoted to the director of the Rockefeller Potato Program in 1963, and to director of Plant Sciences of the Colombian Agriculture Institute in 1965. David joined Cornell University in 1967 as Professor of Plant Pathology and International Agriculture. David showed exceptional leadership in training graduate students to deal with plant disease problems of the tropics and developing countries. He developed and taught a graduate course on plant diseases in tropical agricultural development. David's life and career were celebrated at an event on campus that was captured in a video (<https://youtu.be/1gARNCDkWts>). David is survived by his wife, Betty, and his three sons and their families, including son Dave who is a longtime employee of PPPMB.



Edward D. Jones

Professor Emeritus Ed Jones, 94, passed away in St. Paul, MN on May 13, 2014. A native of Wisconsin, Ed received his Ph.D. from the University of Wisconsin, and joined the Cornell faculty in 1958 as Assistant Professor of Plant Pathology. Ed was instrumental in the development of Cornell's Uihlein Farm in Lake Placid. He pioneered the development of disease-free foundation potato seed stocks by tissue culture, and his protocols have been replicated around the world. He became the first Henry and Mildred Uihlein Professor at Cornell in 1987. He chronicled the history of the Uihlein Farm with a book published in 2001. A career-long member of the Potato Association of America (PAA), Ed chaired the Potato Certification Committee that developed the standards for the first National Seed Potato Guide. He served as president of PAA in 1983–84 and was named an Honorary Life Member in 1986. Ed is survived by his wife, Barbara, and their two daughters and two sons and their families.



Cathy Heidenreich

Cathy Heidenreich died from injuries sustained from an automobile accident on 16 December 2014. Cathy was a long-time member of both the Departments of Horticulture and Plant Pathology at Cornell. She received her Bachelors from the University of Rochester as a French Language honors scholar, and an MS in Plant Pathology from SUNY ESF in 1986. After graduating from SUNY ESF, she began work as a laboratory and field technician at the NY State Agricultural Experiment Station in Geneva, and later added responsibilities on the Ithaca campus. Cathy was an integral part of several research and outreach programs, including those of Gary Harmon, Martin Goffinet, and Marvin Pritts (Horticultural Sciences), and Thomas Burr, Kerik Cox, and Robert Seem (Plant Pathology). She shared authorship of several publications generated during this



time. She was an exceptional technician. She was also a very smart researcher. In 2007 Cathy was appointed as an Extension Support Specialist in Horticulture with responsibilities in berry crops. Cathy's work covered the gamut of berry production: diseases, insect pests, nutrition, and business management. Through her writings in the New York Berry Newsletter she became known to several thousand subscribers across the US and internationally. But those who knew Cathy best will remember that she was also one of the kindest people you would ever meet. Cathy had the quality of making you a better person, just by her presence in the room, and we truly miss her. Cathy was also a founding member of the Geneva Arboretum Association. In remembrance of her, Cathy's many friends and colleagues from throughout the region recently funded, developed, and dedicated an extensive garden in her memory. The garden, which includes benches, tables, and many of her favorite flowering bulbs, trees and shrubs, can be seen on the Castle St side of Barton Lab at the New York State Agricultural Experiment Station in Geneva.

FACULTY NEWS

News from the Cox Lab

2015 is a productive year for the Cox Lab. My graduate student Sara Villani is approaching the end of her Ph.D. program and has been hired by North Carolina State University to join the faculty of the Department of Plant Pathology to start a program on diseases of apples and ornamentals. Her thesis focuses on understanding practical resistance to fungicides in the apple scab pathogen *Venturia inaequalis*. For the last two years, Sara has been mentoring Katrin Ayer from William Smith College as she works on a project to define differential cultivar response to practical fungicide resistance.



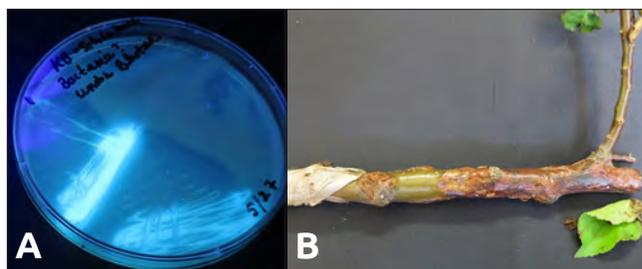
Microbiology research being conducted by Sara Villani, and Katrin Ayer (William Smith College)

My other graduate student, Kiersten Bekoscke has completed her third year of study and is beginning to prepare her thesis chapters for publication. Kiersten works on the dynamics of agricultural antibiotic use in the fire blight pathogen *Erwinia amylovora*. For the last two years, Kiersten has been mentoring Catherine Miller from William Smith College with her investigations into the impact of streptomycin and kasugamycin applications on epiphytic bacteria in the apple phyllosphere.



Kiersten Bekoscke and Erin Miller (William Smith College) working on CRISPR strain tracking in CLC workbench.

More excitingly, Sara, Katrin, and I are working with extension specialists and entomologists in NY and Ohio to better understand the role of fungi and bacteria in the black stem borer decline complex threatening young apple and ornamental plantings throughout NY and the Northeastern US. In regards to our apple scab fungicide resistance monitoring efforts, we have just completed our ninth year of offering these free services to NY stakeholders. In collaboration with NYS IPM, NYS Agriculture and Markets, and the apple research and development board, we have completed five years of surveying to establish the prevalence of antibiotic and copper resistance in populations of the fire blight pathogen *Erwinia amylovora* in NY.



(A) Fluorescent *pseudomonad* isolated from the blistered tissues of apple tissue (B) associated with the tunneling of the black stem borer *Xylosandrus germanus*.

News from the Fry Lab

Giovanna Danies Turano completed her Ph.D. in the 2015 spring semester and has taken a postdoctoral position with Silvia Restrepo at the Universidad de los Andes (UniAndes) in Bogota, Colombia. Giovanna made several insightful contributions to our understanding of the population genetics of *Phytophthora infestans* in her thesis research. Among these was that she identified that a population of *P. infestans* collected in 2010 and 2011 in an area centered around central New York was most likely a recombinant population with clonal lineage US22 as one of the parents. This population is the second documented recombinant population to be identified in the USA. The first was in the Pacific Northwest in the early 1990s. However, the dominant situation remains that the *P. infestans* population in the USA remains primarily clonal. Giovanna is helping students in the Restrepo Lab and also continuing work on the population genetics of *Phytophthora infestans*. During her graduate studies, Giovanna recognized that she has a very strong desire to enhance the educational opportunities for disadvantaged youth in Colombia, and one of her first activities was to introduce a group of undergraduates from UniAndes to their summer intern positions in research labs at Cornell. These internships

has been strongly supported by Silvia Restrepo, (who was a postdoc in the Fry Lab in the late 1990s and in the Smart Lab in the early 2000s). Silvia is currently the Vice President for Research at UniAndes.



Giovanna Danies Turano and Bill Fry

Still very active in the lab are Ian Small and Sean Patev, current grad students, and Kevin Myers who has been supporting everyone for the last 15 years. Ian is improving a Decision Support System (DSS) for the late blight disease, and he is also quantifying the effects of diverse uses of the system. The DSS has been named (BlightPro), and is available for use in near real time on the web. Sean has been working on host resistance to late blight and on a system to silence genes in *P. infestans*. An interesting wrinkle is that he's also working with transgenic TMV (from Peter Palukaitis) because this virus has been demonstrated capable of infecting *Phytophthora* spp. Kevin has become well known by most of the persons working on late blight in the United States because he has very accurately and rapidly identified clonal lineages in samples sent by them. He has also done isolations from hundreds of these samples and has subsequently provided pure cultures to many collaborators.



The Fry lab group photo

Bill's second term as department chair (2011–2014) concluded in June 2014, and he moved to phased retirement on 1 July 2014. Bill continues to teach introductory plant pathology (fall term), and last year was wonderfully supported by grad students Maryn Carlson and Andy Read. The three of them were fortunate to benefit from the guidance and assistance of Mary McKellar (Teaching Lab Coordinator). It's a fun course. Bill and eight other faculty participated in a revision of a graduate course: "Biology of Plant Pathogens" in the spring term 2015.

News from the Hudler Lab

George has been on administrative leave since February 1, 2015 and will officially retire on December 31 but that doesn't seem to be having much effect on his presence in the classroom. This past fall semester saw him starting a new course focused on willow trees and their contributions to human well being. In stark contrast to his long-running "Magical Mushroom" class (which is now being led by Kathie Hodge), only 15 students were allowed to register for P1Pa 2900—"A Celebration of Inquiry; The Wonder of Willow". Participants began by learning about the natural history of willow trees, how to identify different local species, how they grow and reproduce, what insect and disease problems threaten their health, and how the trees defend themselves. As the story unfolded with enthusiastic participation from a number of Cornell colleagues, the story eventually turned to a primitive human who happens to discover that chewing on a willow twig caused some of his aches and pains to subside. And that discovery took the class into the study of pain in the human body. What is it and what was in that willow twig that affected pain sensation? From there, the fascinating pharmacological and political history of aspirin unfolded through a series of more readings, laboratory demonstrations, and presentations. As the class moved to conclusion, the students spent a delightful afternoon with a local artist who specializes in living sculptures (yes, with emphasis on shaping planted willows to make arches and towers) and English willow basket weaving. By all accounts, the course was a big hit and George was so pleased with the way it all worked out that he's decided to continue with it for at least another year; perhaps longer. Stay tuned.



Participants show off their baskets made from willow branches.

News from the Bergstrom Lab

There have been comings and goings in the Bergstrom Field Crops Pathology Lab since the last Newsletter. Research associate Marshall Hayes (worked on lignocellulose degradation by fungi) has moved to New Jersey. Visiting Scholars Pierri Spolti and Paulo Kuhnem (each worked at Cornell on aspects of the epidemiology of *Fusarium graminearum*) returned to Brazil where each completed their Ph.D. under the guidance of professor Emerson Del Ponte (an alum of the Bergstrom Lab). Pierri is currently Monsanto's Soybean Breeding Agronomic Traits Lead Scientist for the country of Brazil. Paulo is doing postdoctoral studies at Universidade do Estado de Santa Catarina. Former graduate students Christine Layton (thesis on switchgrass smut, *Tilletia maclaganii*) and Julia Crane (thesis on biological control of *Fusarium graminearum* with *Bacillus amyloliquifaciens*) received their Ph.D.s in 2014. Christine is currently employed at Monsanto Company in St. Louis, MO as a scientific liaison and technical consultant within the Technology Pipeline Solutions branch of their Information Technology organization. Following a brief postdoctoral in the Bergstrom Lab, Julia became a postdoctoral research associate in August 2014 in Dr. Amanda Gevens' lab at the University of Wisconsin-Madison.

Dr. Shawn Kenaley joined the Bergstrom Lab as research associate in 2015 and he will be working on various aspects of fungal genomics and population biology—especially on rust and smut pathogens of grasses. Alyssa Blachez joined the lab as a graduate student in 2014 and will be working on disease and mycotoxin management in malting barley from the field through the malt house. Michael Fulcher joined as a graduate student in June 2015 and will be working on disease management in organic grain crop rotations and on the population biology and genomics of *Fusarium graminearum*. Stan Kawamoto has continued working as a casual employee in the lab for several years and helping us on various projects. Research support specialist Jaime Cummings continues to anchor the research program and to manage the lab and diverse



Research support specialist Jaime Cummings rating cereals for diseases.

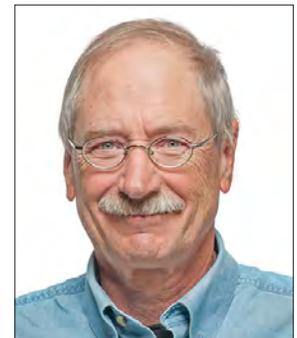
field research projects across New York State. She has primary responsibility for a number of disease survey programs in corn, soybean, and small grains with our extension educators in which Jaime provides all of the laboratory

diagnoses of specimens from our collaborators. These collaborations have yielded first reports of brown stem rot and northern stem canker in New York.

Bergstrom's program is benefitting from a renewed interest in small grains production in New York State which is coming from an explosive growth and consumer interest in craft baking, brewing, and distilling with locally produced ingredients. Bergstrom is PI along with cereals breeder Mark Sorrells on a large state grant on the development of malting barley for New York. He also participates with Sorrells and others on a grant from the New World Foundation to rejuvenate small grains production in the Hudson River Valley; and on a grant, with Sorrells, agronomist Bill Cox, and economist Miguel Gomez, from the Genesee Valley Region Market Authority to look at transitioning to organic grain production in western New York.

News from the Collmer Lab

The Collmer Lab continues to work on the mechanisms by which type III effectors and the phytotoxin coronatine promote the virulence of *Pseudomonas syringae* pv. *tomato* DC3000. One highlight for this year was the participation by Research Associates Suma Chakravarthy and Hailei Wei in the 9th International Conference on *Pseudomonas syringae* and Related Pathogens in Málaga, Spain. Other highlights come from graduate student alums near and afar. Magdalen Lindeberg is continuing at Cornell as a co-PI, bacterial genomicist and web resource developer on the NSF Plant Genome Research Program project (with Greg Martin and other co-PIs at BTI and North Carolina State University),



and she is also a member of the leadership team of the new School of Integrative Plant Science, focusing on communications and development. Jay Worley is now a Postdoctoral Scientist with the University of Maryland and FDA's Joint Institute for Food Safety and Applied Nutrition. Clemencia Rojas is starting a faculty position in the Department of Plant Pathology at the University of Arkansas, and Brian Kvitko is starting a faculty position in the Department of Plant Pathology at the University of Georgia. Amy Charkowski was named the Friday Chair for Vegetable Production Research at the University of Wisconsin, Madison. And, Sheng Yang is now President of the International Society for Molecular Plant-Microbe Interactions and was elected this year to the National Academy of Sciences!

TEACHING

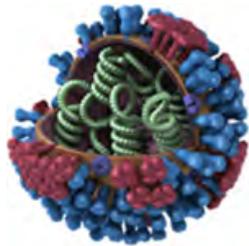
New Undergraduate Minor in Infectious Disease Biology Established

by Eric Nelson

In continuing efforts to reach an increasingly diverse group of undergraduate students and attract excellent students to our programs, we have established a new undergraduate minor in Infectious Disease Biology. Minors at Cornell are available to students in all majors across all colleges on campus. They offer students the ability to concentrate their coursework in a secondary area of interest that often complements their major.

The Infectious Disease Biology Minor is intended to provide students with a broad perspective on health and disease, the dynamic nature of host-associated microbes, an in-depth understanding of the origins and dynamics of infectious diseases, and contemporary thought about the nature of health, disease, and disease management in plants, animals, and humans. The goal is to integrate disease across hosts so that students gain a greater appreciation of disease as a unique biological process.

Whereas any undergraduate student at Cornell may enroll in the minor, this program should be especially



Virion of Influenza A virus ©
Center for Disease Control



Southern mountain yellow-legged frogs (*Rana muscosa*) killed by *Batrachochytrium dendrobatidis* Courtesy of Vance Vredenburg, San Francisco State University

complementary to the academic programs of students majoring in Animal Sciences, Biological Sciences, Biology & Society, Environmental Science and Sustainability, Human Biology, Health and Society, Natural Resources, or Plant Sciences.

For more details of this new undergraduate minor, please visit our section web page at: <http://pppmb.cals.cornell.edu/undergraduate/minors/infectious-disease-biology-minor>

An Undergraduate Minor in Fungal Biology, too by Kathie Hodge

Every year we are contacted by undergrads who want a “degree in mycology,” but we have never had a very focused option to suggest. Now we do. Starting in Fall 2015, Cornell undergrads can enroll in our new Minor in Fungal Biology. It underlines our history and breadth in the study of fungi. The Fungal Biology Minor gives students a broad introduction to fungi, their lifestyles and biology, and their roles in ecosystems and human affairs. The 13 credits required for the minor can be added to many different programs of study, like Biological Engineering, Food Science, Natural Resources, and any pre-med major. The world needs more people who really know fungi, and we hope this will help.

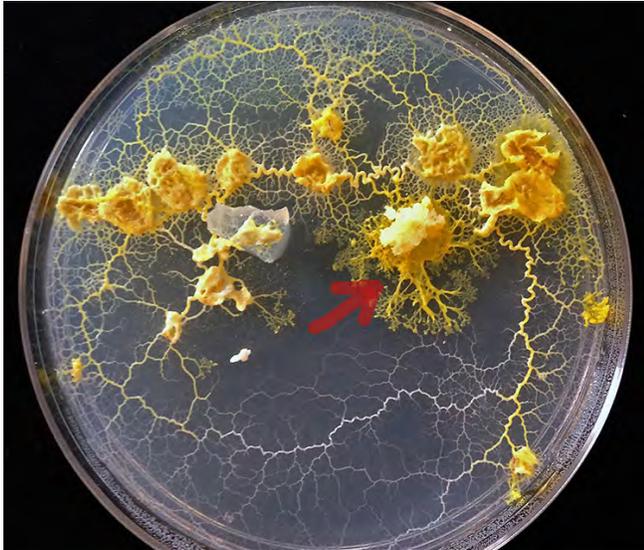


What could be more beautiful than powdery mildew on horse chestnut?
© Kathie Hodge

You can now follow Cornell Fungi on Facebook!



<https://www.facebook.com/CornellFungi>



Slime mold plasmodium eating birthday cake. Yum. © Kathie Hodge

Microbial Friends & Foes REU Summer Site *by Teresa Pawlowska*

PPPMB was awarded an NSF grant to host a Research Experience for Undergraduates (REU) Summer Site over a period of three years. The Microbial Friends & Foes program is directed by Teresa Pawlowska and Michael Milgroom. In 2014, ten undergraduate students from across the country worked in Ithaca labs during ten weeks of summer. In addition to individual research experiences, students took advantage of a lecture series presented by the PPPMB faculty and participated in professional development activities offered by the Cornell Office of Undergraduate Biology. In weekly Synthesis Panels, students interacted as a group to develop a conceptual framework uniting their projects. The program culminated with a poster session allowing the participants to share their experiences with PPPMB members. For more information about Microbial Friends & Foes, visit: <http://reu.pppmb.cals.cornell.edu/>.

PPPMB AND UNIVERSITY WEB SITES

Plant Pathology & Plant-Microbe Biology
www.pppmb.cals.cornell.edu/

Plant Disease Diagnostic Clinic
plantclinic.cornell.edu/

Cornell Mushroom Blog
blog.mycology.cornell.edu/

Branching Out Newsletter
branchingout.cornell.edu/

Extension Publications
pppmb.cals.cornell.edu/extension-outreach/extension-publications

CUP Herbarium
<http://www.plantpath.cornell.edu/CUPpages/>

CUP Photograph Collection
<http://cupp.mycology.cornell.edu/>

Department Photo Lab
www.plantpath.cornell.edu/PhotoLab/index.html

Faculty Web Pages
pppmb.cals.cornell.edu/people/faculty

Glossary of Technical Terms
<http://www.plantpath.cornell.edu/glossary/>

Smokin' Doc Thurston's Greatest Hits
<http://www.tropag-fieldtrip.cornell.edu/docthurston/smokinhome.html>

Vegetable Diseases
vegetablemndonline.ppath.cornell.edu/

Get outside and play! The Plant Pathology/Entomology Field Course

by David Gadoury

Eleven years ago, graduate students in Plant Pathology approached the faculty to request more exposure to the practical side of plant disease management. The faculty responded by organizing a series of eight all-day field trips where the students toured vegetable and fruit farms, golf courses and greenhouses, and forests and field crops. They met Extension educators, growers, farm managers, regional specialists of every sort, private consultants, and industry scientists. This initial trial offering was expanded to include Entomology grad students and faculty, and an expanded focus on arthropod pests in 2005. This was the genesis of PPPMB/ENTOM 4190: Agricultural Application of Plant Health Concepts, or as it is more commonly known: "The Field Course".

The Field Course quickly became an integral part of the experience offered to the interns in the Summer Scholars program. In 2015, enrollment in the Field



Extension Specialist Judson Reid guides the class through a visit to a high-tunnel and field planting of diverse vegetable and fruit crops in Penn Yan, NY.

The summer scholars program by Chris Smart and David Gadoury

About the same time that the Field Course was getting started, the plant pathology faculty at Geneva developed and promoted the Geneva Summer Scholars program (<http://www.scholars.pppmb.cals.cornell.edu/>). Building from an initial enrollment of 10 undergraduate interns in 2009, this program has developed to encompass four disciplines (Plant Pathology and Plant-Microbe Biology; Entomology; Horticulture; and Food Science). The program has been very successful, as over 80% of the students have entered plant science graduate degree programs or now have careers in the agriculture/plant science fields. To date, there are 10 Cornell graduate students that were part of the summer scholars program—which is in its 7th year.

The summer scholars undergraduate internship program on the Geneva campus continues to thrive. With about 25 students each year (about 12 per year in

course included 10 graduate and 19 undergraduate students.

Each meeting of the Field Course is led by a team of disciplinary experts. That team changes to match the thematic crop of each session. Most sessions begin at Barton Lab at Cornell's New York State Agricultural Experiment Station in Geneva with a brief overview in a classroom setting to provide background information and context for the forthcoming tour. In less than an hour, the class is on their way to one of several stops where they will learn firsthand about the challenges of growing crops, managing pests and diseases, and the marketing side of agriculture. For many students, this can be their first exposure to production, protection, processing, and marketing of food crops. For all involved, it is a rare opportunity to see a remarkable diversity of crops and meet some of the most knowledgeable people associated with their production.



Turfgrass consultant Rod Ferrentino demonstrates various sampling methods used to assess pest levels as a basis for integrated pest management at the Cavalry Club golf course in Manlius, NY.

PPPMB) we are full to capacity! Students are involved in lab and field projects and seem to enjoy working and playing in upstate NY. A highlight is visiting the Ithaca campus and learning about graduate programs.



2014 Summer Scholars program participants

CONGRATULATIONS

2014 Awards & Honors

Hudler and Gray named 2014 APS Fellows



George Hudler and Stewart Gray were named American Phytopathological Society (APS) Fellows in honor of their significant contributions to the

science of plant pathology.

George's APS Fellow Award description:

<http://www.apsnet.org/members/awards/Fellows/Pages/HudlerGeorgeW.aspx>

Stewart's APS Fellow Award description:

<http://www.apsnet.org/members/awards/Fellows/Pages/GrayStewartM.aspx>

William Fry



Bill received the CALS Excellence in the Teaching, Advising, and Mentoring of Graduate and Professional Students. This award recognizes faculty members who serve as inspiring role models, champion graduate and professional student interests, and go above and beyond in their commitment to furthering their students' personal and professional success.

Megan Hall

Megan was awarded Best Viticulture Poster at the National Meeting of the American Society of Enology and Viticulture for her poster "Improving Our Understanding of Sour Rot Etiology and Management Techniques"



Michelle Cilia



Michelle received the Herbert L. Rothbart ARS Early Career Scientist of the Year Award for 2014. For more information see <http://bti.cornell.edu/news/congratulations-michelle-cilia/>

In addition, in 2014 Michelle received the APS Schroth Faces of the Future Award. The 2014 virology symposium was designed to acknowledge the "up and comers" in virology.

2014 APS Student Travel Awards

- **Tien Tran** (*Roger C. Pearson student travel award*)
- **Giovanna Danies** (*Stephen A Johnston student travel award*)
- **Ian Small** and **Matthew Tancos** (*I.E. Melhus Graduate Student Award*)



Tien Tran



Giovanna Danies



Ian Small



Matt Tancos

George Hudler



George Hudler was presented with the Outstanding CALS Faculty Award by the CALS Alumni Association at their annual banquet on October 24. George was recognized for his epic contributions to teaching, extension, research and administrative leadership. See

<http://cals.cornell.edu/get-involved/alumni/leadership-and-recognition/oaa/george-hudler/>

Margery Daughtrey

Margery Daughtrey received the CALS Individual Award for Outstanding Accomplishments in Extension/Outreach for her tireless dedication to greenhouse-grown ornamental plant growers, her relevant and productive applied research program, and her outstanding record of responsiveness to the growers she serves.



Giovanna Danies and Liz Brauer

Both Giovanna and Liz were recipients of the McClintock



Award. This honors the late Barbara McClintock, who won the Nobel Prize for work that she began as a postdoctoral plant geneticist at Cornell in the

1920s. Primary consideration is given to a graduate student's background and potential. Students must also have completed at least two years of their M.S./Ph.D. or Ph.D. program, and made unique and outstanding contributions in research and teaching.

2014 Awards & Honors continued...

Alan Collmer



Alan received the CALS Award for Career Accomplishment for his outstanding and lengthy record of research accomplishments that has produced tremendous insights into molecular mechanisms of plant pathogenesis, and for the many recognitions he has earned as a result.

Meg McGrath



Meg received the USDA 2014 IR-4 Program's SOAR Award for excellent Service, Outreach, Altruism, and Research efforts. This award recognizes individuals who promote and support IR-4 and its mission to provide growers with registrations of new and expanded pest management tools.

2015 Awards & Honors

Dawn Dailey O'Brien



Dawn received the Long Island Arboricultural Association Award for continued dedication and education to the green industry for her many years of publishing *Branching Out*, an integrated pest management newsletter for trees and shrubs which is published during the growing season for tree care professionals in the Northeast.

Megan Hall

Megan received the Frederick Dreer Award from the Horticulture Section of SIPS. This Award allows a student to spend four months to up to a year abroad pursuing his or her interests related to horticulture. Megan will receive a \$10,000 scholarship that will enable her to spend 6 months in Tasmania continuing her research on sour rot under the guidance of Wayne Wilcox. <http://hort.cals.cornell.edu/undergraduate/scholarships-and-recognitions/dreer-award>



For the second year in a row, Megan won a Best Student Viticulture Presentation award for her work on management of sour rot of grapes at the June 2015 meeting of the American Society for Enology and Viticulture.

Maria Harrison



Maria has been named as the 2015 recipient the Cornell CALS Faculty Excellence in Undergraduate Research Mentoring Award. This award is based on nominations from CALS seniors. It recognizes Maria's excellent mentoring of students engaged in undergraduate research.

Jonathan Gonzalez

Jonathan has been selected to receive a 2015 National Science Foundation Graduate Research Fellowship which includes stipend support for 36 months.



Shiyan Chen



Dr. Shiyan Chen is a recipient of the 2015 APS Schroth Faces of the Future Award and will present her research in a Symposium at the APS Meeting in Pasadena this August. The 2015 nematology symposium was designed to acknowledge the "up and comers" in nematology.

Wayne Wilcox

Wayne received the Outstanding Achievement Award for 2015 from the Eastern Section of the American Society for Enology and Viticulture. His work is valued by the grape industry and colleagues alike for its impact. For information on the award see <http://nysaes.tumblr.com/>



Alyssa Blachez

Alyssa has received a Cornell CALS Alumni Association Award in support of her travel to the Fusarium Workshop in Manhattan, Kansas in June.



Donna Gibson



Donna received the Thomas Jefferson Professional Achievement Alumni Award from her undergraduate alma mater, Longwood University. This award recognizes alumni who have distinguished themselves as significant contributors to their profession, who stand above their peers, and who are recognized within their profession as leaders and role models for future generations of citizen leaders. See <http://magazine.longwood.edu/article/sports-service-stocks-and-science/>

2015 Awards & Honors continued...

Michael Milgroom and Eric Nelson



Michael Milgroom and Eric Nelson will jointly receive the Excellence in Teaching Award in recognition of their dynamic synergistic approach and shared

innovations in teaching of “Biology of Infectious Disease” and “Infectious Disease Ecology and Evolution”, such as providing a wonderfully interactive learning opportunity for students, incorporating flipped classrooms, and primary research literature. They are also recognized for many other significant contributions to the plant science community, incorporating insights gained from years of teaching disease ecology into modern collaborative approaches. See <http://www.apsnet.org/members/awards/ExcellenceTeaching/Pages/EricNelsonandMichaelMilgroom.aspx>

Kiersten Bekoscke and Zach Hansen



Kiersten and Zach have been selected as recipients of the I.E. Melhus Graduate Student Award and each will make a presentation on their thesis research at the 15th Melhus Graduate Student Symposium at the APS Annual Meeting.

Rebecca Nelson



Rebecca received the APS Excellence in International Service Award. This award recognizes outstanding contributions to plant pathology by APS members for countries other than their own. See <http://www.apsnet.org/members/awards/InternationalService/Pages/RebeccaNelson.aspx>

2015 APS Student Travel Awards



Mariko Alexander (*The Kyung Soo / Evanthia D. and D.G. Kontaxis Travel Award*)



Washington da Silva (*Robert W. Fulton Travel Award*)



Max Fishman (*Tsune Kosuge Travel Award*)



Adrienne Gorny (*Stephen A. Johnston Travel Award*)



Matt Tancos (*The Arthur Kelman Travel Award*)

Congratulations to Our Newest Alumni

2014

Amara Dunn	Ph.D.	May
John Gottula	Ph.D.	May
Tiffany Jamann	Ph.D.	May
Lisa Jones	Ph.D.	May
Hanh Lam	Ph.D.	August

2015

Ellen Crocker	Ph.D.	May
Giovanna Danies Turano	Ph.D.	May
Samuel Mutiga	Ph.D.	August
Shan Qi	M.S.	August

Congratulations to Those Students Who Have Passed Their 'A' Exams

2014

Zachariah Hansen	May	Smart
Milton (Mickey) Drott	May	Milgroom
Kiersten Bekoscke	August	Cox
Max Fishman	September	Filiatrault
Jose Vargas	September	Perry
Ian Small	October	Fry
Sara Villani	November	Cox

2015

Mariko Alexander	January	Cilia
Megan Hall	May	Wilcox
Washington DaSilva	June	Gray

DEPARTMENT DOINGS

PPPMB Graduate Students Form Zymology Club

Zachariah Hansen

The Zymology Club was founded in September 2014 by Jose Vargas and Zach Hansen, both PPPMB graduate students with a shared interest in beer brewing. The club began as a way for Vargas and Hansen to share their enthusiasm for homebrewing with other graduate students, staff, and faculty across the five sections of SIPS. The club owes its early success to several other members including graduate students Rachel Kreis, Christine Kraus, Ian Small, Max Fishman, and Christine Diepenbrock, as well as Mary McKellar, PPPMB teaching support specialist, and Gary Bergstrom, the Zymology Club's faculty advisor.

Since its first meeting in 2014, the club has brewed several styles of beer including India pale ale, oatmeal stout, amber, and Belgian. Club members have

Club members have also added cheese making to their activities

also added cheese making to their activities, crafting both feta and brie cheeses. Club members have been

involved with undergraduate outreach, conducting two brewing demonstrations for Kathie Hodge's Magical Mushrooms, Mischievous Molds course during the spring 2015 semester. In May, 2015 the club toured The Farmhouse Brewery, Tioga County's first malthouse and brewery. Farmhouse Brewery owners Marty Mattrazzo

and Natalie Mattrazzo showed great hospitality during the club's tour of the malthouse and brewery, and club members enjoyed the opportunity to sample some of the brewery's craft ales following the tour. The Zymology Club would like to thank Marty and Natalie again for their hospitality, as well as Gary Bergstrom for setting up the tour. Thanks to all Zymology Club members for making our inaugural year a success. Here's to many more!

Zymology

[zahy-mol-uh-jee]

noun

1. the chemistry of fermentation



An undergraduate student (far left) learns about fermentation from Zymology Club members Christine Diepenbrock (left) and Rachel Kreis (right) during a brewing demonstration for Kathie Hodge's undergraduate course *Magical Mushrooms, Mischievous Molds*.



Club members on a tour of the malthouse at The Farmhouse Brewery: (left to right) Rachel Kreis, Zach Hansen, Marty Mattrazzo (Farmhouse Brewery), Christine Diepenbrock, Alyssa Blachez, and Gary Bergstrom. (Missing from photo) Ian Small.



Zymology Club members (left to right) Christine Diepenbrock, Alyssa Blachez, and Christine Kraus monitor the progress of a brie during a June 2015 club meeting.

Halloween Party



Pumpkins carved by PPPMB graduate students during the 2014 Plant Path GSA Halloween Party

Ugly sweater party



The plant pathology, plant breeding, and SAGES graduate students held a ugly sweater themed holiday party in December 2014

Chili Cook-Off



The "bunny chow" chili was a big hit at the chili cook-off in March 2015. No bunnies were harmed in the making of their vegetarian chili!

Bowling night

Graduate students from the newly formed School of Integrated Plant Sciences got together in May 2015 for a night of fun at Helen Newman Bowling Lanes. This event was spearheaded by the Plant Pathology GSA and resulted in the gathering of many graduate students across different sections.



2014 APS-CPS Joint Meeting

Photos by Bruce Challgren, PhotoPixels.com, Minneapolis, Minnesota



FACILITIES

Herbarium Notes by *Scott LaGreca (Curator) and Kathie Hodge (Director)*

CUP is one of the largest fungal herbaria in North America. We can't tell you exactly how many specimens we hold because there's never been a full inventory. Lately, like other collections around the world, we've been engaged in the arduous process of databasing information on our specimens. Unlocking these data on the diversity and distribution of fungi sheds light on many different kinds of questions: How have mushrooms responded to climate change? When were certain plant diseases first widely found? Where are the "hotspots" of fungal biodiversity?

Recently, we've been able to secure significant support from the National Science Foundation for a handful of different projects that capture CUP specimen data and make it accessible. Sounds simple, but it's not a quick or easy process. For example, data for our 6,000 North American lichen specimens just became available after five years of work. The effort for this project relied on volunteers **Doug Murray**, who helped repacket specimens, and **Betsy Crispell**, who databased and packed them in boxes. Curator **Scott LaGreca** and Honorary Curator of Lichens **Robert Dirig** loaded up a van and drove the boxes down to the New York Botanical Garden, where specimen labels were imaged. Our "herbarium on wheels" was quite a hit! After the specimens were retrieved in August, we threw a party to celebrate the end of the project. You can browse our lichen specimens online at lichenportal.org—our part in a collaborative NSF-funded project: *North American Lichens and Bryophytes*.



Anna E. Jenkins Honorary Curator of Lichens **Robert Dirig** posing with some of our lichen specimens, all packed for their trip to New York Botanical Garden, April 2014. (Photo by Scott LaGreca)

Part of our NSF funding for digitizing *Atkinson's Fungi* allowed us to scan the 8,000 historic prints of our George F. Atkinson photograph collection. You can now browse these (mostly mushroom) photos taken in the late 1800s through 1918 online. We recently added another 164 photographs donated by PPPMB alumnus Dr. **Rob Williams** (see inset).



The Robert J. Williams Photograph Collection

Dr. Rob Williams worked with Professor Dave Thurston at Cornell in the early 1980s. Now, after a distinguished career in International Agriculture, Rob has retired in Wales, and thought to make a set of his unique images available to posterity. The images come from Rob's many years working in International Agriculture, and focus on tropical food crops and their pathogens. This particular image shows the striking impact of smut on resistant and susceptible cultivars of pearl millet. Rob selected and scanned each image and compiled data on disease, host, country, and other information, allowing us to incorporate his photos in our large image collection. We're very grateful; we know others will be too.

CUP is particularly rich in type specimens—valuable taxonomic vouchers, each the first of its kind to be described and named. Now, for the first time ever, images and data for our 7,000 types are available online, via both MyCoPortal (mycoportal.org) and Shared Shelf. This work—the sole effort of Curatorial Assistant **Angie Macias** (CALs '15)—was completed

continued on next page...

Herbarium continued...

with funds from yet another, NSF-funded collaboration, *The Macrofungi Collections Consortium*. This grant also allowed us to completely database the personal herbarium of Emeritus Director **Dick Korf**—a collection rich in cup fungi, including many types and detailed anatomical notes. The upload of his 4,725 specimens to MyCoPortal coincided with a very happy occasion: Dick's 90th birthday this past May!

Collections-Based Research

Museums like CUP have a key role to play in bringing researchers together with primary source materials—namely, biological specimens. “Collections-based research” employs data derived from specimens to answer research questions on any number of topics, from climate change to epidemiology. At CUP, we study specimens to address questions about the diversity and evolution of fungi. Not only does specimen data help build science, but each and every use of our herbarium adds to the scientific value of our specimens in the form of DNA sequences, photographs, microscope slides, and anatomical notes.

Curator **Scott LaGreca** pursued a number of exciting, collections-based research projects over the past year. In May 2014, he was a Visiting Scholar at the herbarium of the Field Museum in Chicago for two weeks, working on the molecular systematics of the lichen genus *Ramalina*, with a special emphasis on the European *Ramalina siliquosa* chemotype complex. The Visiting Scholarship paid for Scott's travel, while NSF funds awarded to Field Museum Botany Chair (and 2012 PPPMB visitor) **H. Thorsten Lumbsch** paid for lab supplies. After returning from Chicago, he finished a major revision of the lichen flora of Bermuda, based mainly on specimens deposited in CUP. This research was published in *Evansia*, the journal Scott edits for The American Bryological and Lichenological Society. Later that summer, Scott presented a poster on CUP's recent NSF-funded digitization efforts at the annual meeting of the Society for the Preservation of Natural History Collections in Cardiff, Wales.

Honorary Curator **Robert Dirig** published a number of collections-based research articles on plants and their butterfly associates, as well as an article on the distribution of the False Earthstar, *Astraeus hygrometricus*, in New York State, based on CUP specimens. Most of his articles were published in *Solidago*, the newsletter of the Finger Lakes Native Plant Society, which Bob continues to edit.

Distinguished Herbarium Visitors

Three grandchildren of the late **Plant Pathology Professor Forest Milo Blodgett** visited CUP in April 2014. One of them, Sue Blodgett—Chair of the Entomology Department at Iowa State—took scans

of photographs of her grandfather, as well as copies of his scientific papers. **Jennifer Wilkinson**, Assistant Curator of the National Fungus Herbarium of Canada (official herbarium acronym: DAOM), visited CUP in July 2014 to learn about CUP's herbarium database, Specify. Assistant Professor **Matthew Kasson** from West Virginia University (Morgantown) visited last October to sample *Cryphonectria parasitica* specimens for his research on Chestnut Blight. Dr. Kasson will soon be advising our recent graduate **Angie Macias**, who is joining his lab as a master's student this coming fall.

Visitors Welcome

The Cornell Plant Pathology Herbarium is located at 214 Gallus Road, about two miles from central campus. All are welcome to visit and see the collection, now decorated with exhibition panels from our 2013 *Focus on Fungus* exhibition. If you can't visit us in person, then visit us online at: <http://www.plantpath.cornell.edu/CUPpages/index.html>

We also invite you to follow us on Facebook! (“Like” our new Cornell Fungi page: www.facebook.com/CornellFungi)

2014 Herbarium Vital Statistics (January–December 2014)

Fourteen loans totaling 5,783 specimens were sent from CUP in 2014, and two gifts totaling 16 specimens were accessioned from other institutions. 157 staff collections were added to the collections. Two loans totaling 66 specimens were received for study by Scott LaGreca. At least four scientific articles citing our specimens were published in 2014. Over 30,000 specimen images were uploaded to mycoportal, lichenportal and Shared Shelf. About 30 inquiries (requests for information) were answered by CUP staff. Exactly 144 visitors, including students, academics, and seven tour groups, visited CUP in 2014.

You can find our photograph collections here: <http://www.plantpath.cornell.edu/CUPpages/CUPphotos.html>

Our specimen data and some photos are here: <http://mycoportal.org>

Cornell's Plant Disease Diagnostic Clinic Receives Two Specialty Crop Block Grants for Special Projects *by Karen Snover-Clift*

The Cornell University, Plant Disease Diagnostic Clinic (PDDC) received two Specialty Crop Block Grants (SCBG) from the NYS Department of Agriculture and Markets for two year projects that enabled the PDDC staff to expand some of the identification capabilities of the Clinic and broadened our knowledge of some key pathogens found in New York.

Phytophthora project

The first, two year project began in 2013 and will conclude in the fall of 2015. It focuses on some additional work applied to the *Phytophthora ramorum* survey samples that are submitted to the Clinic annually. The project has three main objectives; 1) Survey for *Phytophthora kernoviae* in *P. ramorum* samples, 2) Determine the *Phytophthora* species present in samples that contain a Phytophthora other than the target species (*P. ramorum*), and 3) Determine if currently used, commercially available test kits are providing consistent results.

We started this project by working on the third objective since it is the first step of our procedure for processing *P. ramorum* suspect samples. We compared immunostrip technology with enzyme-linked immunosorbent plate assays (ELISA) for generic Phytophthora identification. Over the years, we have used both of these tests at various times but have not had the opportunity to run side by side comparisons that would provide definitive answers on the validity of using one over the other. The immunostrips are very convenient when we have a low number of samples and the ELISA plates are much more useful when we process larger groups of samples so they both have their place in the laboratory. We tested 136 samples using the tests. In 132 tests the results were the same—either both positive or both negative. In four samples we received mixed results, the Immunostrip gave a negative answer when the ELISA produce a positive result. This would be a problem if a significant samples was submitted and not tested further if the immunostrip indicated a false negative result when in fact it was positive.



Phytophthora ramorum baited leaves

The importance of objective 1 can be explained by looking to work occurring in Europe. *Phytophthora kernoviae* is found in Europe and causes similar symptoms to *P. ramorum* but apparently with much worse damage. An important factor is that *P. kernoviae* was found in Europe during their *P. ramorum* surveys. We tested 73 of the New York State samples submitted as part of the *P. ramorum* survey in 2014 using two PCR tests, ITS1 and ITS2, and all 73 produced negative results with good internal control results.

Objective 2 is in process. To date, the PDDC has processed thousands of suspect *P. ramorum* samples with only a very small number identified as *P. ramorum*. Hundreds of samples have contained other Phytophthoras that have not been identified because they were not the target of the survey and time and funding were limited, but this has meant that important information about these pathogens and their potential impact on nursery crops has not been captured. Other Phytophthoras commonly cause significant diseases in New York nurseries, but there has never been an opportunity to survey their diversity and learn about their distribution: we now have such an opportunity because we can capitalize on the samples already collected for *P. ramorum* surveys and utilize new, more affordable DNA-sequencing technology for identification. We will report these very interesting finding when the testing is complete.

Oak wilt project

The second, two year project began in 2014 and will conclude in the fall of 2016. It focuses on surveying for the oak wilt pathogen, *Ceratocystis fagacearum*. There are three main objectives; 1) Collect visual observation of symptoms on red oaks at potentially favorable sites for the establishment of oak wilt infections, 2) Determine if symptomatic samples contain the pathogen that causes oak wilt, *C. fagacearum*. The CU-PDDC laboratory staff members will attempt to isolate the pathogen on an agarose medium conducive with fungal growth. The pathogen requires a few weeks of development time to produce identifiable structures and obtain pure cultures, and 3) Determine if newly developed PCR identification techniques will provided consistent results from pure cultures and directly from plant material.

The oak wilt pathogen was first identified in upstate New York in 2008 in a neighborhood in Schenectady

The oak wilt pathogen was first identified in upstate New York in 2008 in a neighborhood in Schenectady County.



County. This was surprising to many because the nearest known infection was approximately 180 miles to the southwest in Pennsylvania. An eradication effort by the New York State Department of Environmental Conservation (NYSDEC) working with the regulatory officials at the New York State Department of Agriculture and Markets (NYSDAM) was made by removing the symptomatic trees from the area. In 2013, a homeowner from the affected neighborhood

observed wilting and leaf blight symptoms on a red oak that had appeared healthy in 2008 and therefore, was not removed during the eradication efforts. The diagnostician at the Cornell University, Plant Disease Diagnostic Clinic (CU-PDDC) isolated the oak wilt pathogen from the material submitted and advanced molecular procedures confirmed that the oak wilt pathogen was found for a second time within the neighborhood in Schenectady County. Because this potentially devastating pathogen has been identified twice in upstate NY, we feel a broader investigation is needed and searching potentially favorable sites for the oak wilt pathogen will provide reassurance among green industry members in the state that are concerned of a potential spreading or reintroduction. This project will also help us get a better understanding of the general health of red oaks across the state. It will allow us to determine if the oak wilt infection in Schenectady County was a unique situation that has been contained or if the pathogen is in other locations throughout the state and additional eradication efforts are needed. Surveying will begin during the summer months of 2015.

Cornell's Plant Disease Diagnostic Clinic Attains Nationally Recognized NPDN STAR-D Laboratory Accreditation

The Plant Disease Diagnostic Clinic (PDDC) at Cornell University in the School of Integrative Plant Sciences (SIPS) Section of Plant Pathology and Plant-Microbe Biology (PPMB), has attained NPDN STAR-D laboratory accreditation! The National Plant Diagnostic Network (NPDN) began developing a laboratory accreditation program in 2010 to bring their member laboratories to a recognized level of standards. The program was named the System for True, Accurate and Reliable Diagnostics (STAR-D) and a few volunteer laboratories (including Cornell's PDDC) started implementing the system while in development. Now an established system, accreditation through the STAR-D program signifies that a laboratory has met essential requirements and standards by demonstrating technical competence to perform testing, using reliable methodologies and equipment, and having both qualified staff and appropriate facilities.



In February of 2014, the PDDC hosted external auditors for an intensive review of their procedures and materials which spanned over a two day period. An extensive 40 plus page report was sent to the NPDN STAR-D Board for review. The Board is tasked with determining if the laboratory meets the requirements and is granted accreditation status. The Board members reviewed the PDDC documentation and after their

review, STAR-D accreditation was granted as of May 1, 2014. The term of accreditation is for a five year period with required written annual updates from the laboratory.

All the members of the laboratory worked diligently to earn this honor, especially Karen Snover-Clift (Director of the PDDC) and Sandra Jensen (Diagnostician in the PDDC). The laboratory staff spent more than three years preparing to become accredited and this achievement is the fruit of many hours of their hard work. Snover-Clift and Jensen believe that the STAR-D accreditation provides an opportunity for continual quality improvement of their plant diagnostic services to their customers. Snover-Clift is very proud of the PDDC staff and their ability to be one of the STAR-D pioneers; the PDDC is one of the first two laboratories in the nation to have achieved this distinction. She hopes attaining this accreditation will show other diagnostic facilities across the country that it is an obtainable goal and that they will begin implementing STAR-D practices in their laboratories. In doing so, we all will make a stronger, national diagnostic network.

Accreditation to STAR-D is currently a voluntary process whereby a laboratory's quality management system is periodically reviewed in detail to ensure continued technical competence and compliance with the NPDN STAR-D requirements and standard. The goal is for all NPDN laboratories to become STAR-D accredited within the next 10 years.

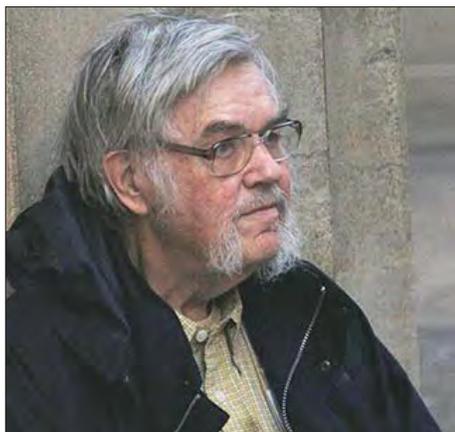
IN THE NEWS

Royall Moore's passion for fungi funds students

by John Carberry, *Cornell Chronicle*, June 17, 2015

He's remembered as a dedicated mycologist, a generous brother and a "sweet and down-to-earth" mentor – and now the late Royall Tyler Moore will be remembered by generations of Cornell students as the man who helped make their future in fungi possible.

Moore, an Ithaca-area native who worked as a post-doctoral researcher at Cornell University in the 1960s, died Aug. 17, 2014, in Northern Ireland. He bequeathed a almost \$500,000 to his former academic home to help students continue the work he loved.



Royall Moore, who died in 2014, left \$500,000 to Cornell University to be used for the study of fungi. Though he never received a degree from Cornell, he did do postdoctoral research at the university.

"It just blew me away," said Kathie Hodge, an associate professor of mycology and, since 2011, a digital pen pal of Moore's. "In his field, he was great, he was a pro. And he was just sweet and down-to-earth."

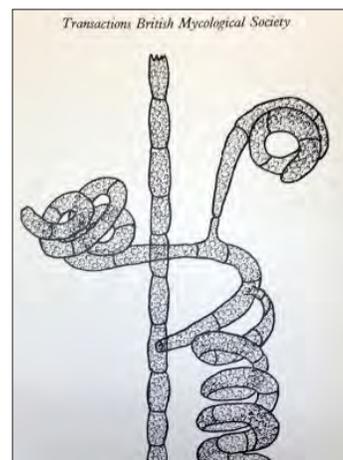
A graduate of Michigan State College and Harvard University, Moore never received a degree from Cornell, although he came from a family of Cornellians. His mother, Frances Goodnough '25, studied English and his father, Ulric Moore '25, earned a degree in dramatics before becoming a research associate at the Behavior Farm Laboratory of his brother-in-law, Howard Scott Liddell, and earning a doctorate in 1931. The same year Moore received his doctorate from Harvard, 1962, younger brother Kent Moore earned his bachelor's in fine arts high above Cayuga's waters.

"He was a good brother," said Kent, an artist who still lives and works in Ithaca. "He was sentimental, thoughtful ... the guy who always made Christmas happen."

Along with a powerful intellect and his flair for art, Kent Moore said his brother had an early passion for botany as a student at Ithaca High School. He pursued chemistry as an undergrad at Michigan State College, then began graduate work on the taxonomy of fungi at the University of Iowa before joining the Army. In

addition to working at Cornell with celebrated mycology professor Richard Korf, Royall Moore did post-doc work at the University of California, Berkeley, and was an assistant professor at North Carolina State University at Raleigh before accepting a post at Ulster University at Coleraine, Northern Ireland, in 1972.

There, Hodge said, Royall Moore built his academic legacy as a careful and steadfast chronicler of new fungi, their structure and their classification. A faculty member in Ulster's Applied Biological and Chemical Sciences School, Hodge said Royall Moore took advantage of Northern Ireland's famously fungi-friendly weather, building a catalogue of research that mycologists rely upon today. Before he



This drawing, published in 1962 and based on work Moore did at Cornell, described a new genus of fungi called *Hiospira*, which has spiral spores.

retired, Royall Moore earned a post on the editorial board of the peer-review journal *Mycologist* and the Benefactor's Medal from the British Mycology Society.

Hodge said Royall Moore's gift will be administered through the Plant Pathology and Plant-Microbe Biology section of the School of Integrated Plant Science in the College of Agriculture and Life Sciences. The precise mechanics of how the gift will be used are still being developed. But Hodge said one thing is certain: Royall Moore's desire to support students of mycology for generations to come will be honored.

Royall Moore, who died at 83, never married ("came close a couple of times") and had no children, Kent Moore said. He built his wealth by applying his careful intellect to another passion: investing. But exploring and studying the fungi around him was always Royall Moore's first love.

"This was his legacy, what he wanted," Kent said. "He loved it, and his idea was that the study of mycology might continue to benefit mankind."

John Carberry is managing editor of the College of Agriculture and Life Sciences.

\$5.5M NSF grant aims to improve rice crops with genome editing

By Krishna Ramanujan, *Cornell Chronicle*, May 5, 2015

A new project will harness the power of genome editing – a technique that allows researchers to precisely target, cut, remove and replace DNA in a living cell – to improve rice, a staple crop that feeds half the world’s people.

The project, led by Cornell researchers and funded by a four-year, \$5.5 million National Science Foundation (NSF) grant as of May 1, will serve in part as proof of principle that genome editing can be used to address quantitative traits. These are traits, such as height or yield, that are expressed to varying degrees in different individuals. Very little is known about quantitative traits, as they require complex orchestration of many genes.



Video of Adam Bogdanove discussing gene editing for crop improvement in rice is available on the *Cornell Chronicle* website

Scientists are also in a race against time to double the production of cereal crops on limited arable land by 2050, when the global population could reach 9.5 billion.

The editing technique will focus on such quantitative traits in rice as disease resistance and tolerance to acidic soils. Acidic soils hinder crop growth in 40 percent of the world’s arable land, according to Cornell researchers.

“We have the ability to open the genome like a book, go to a certain chapter and a specific word and change the word or correct its spelling,” said lead scientist Adam Bogdanove, where words are the DNA sequences that make up genes. Bogdanove, a professor of plant pathology and plant-microbe biology, is principal investigator of the NSF grant and a co-creator of TALENs, a key molecular tool used in genome editing.

The researchers already have identified particular stretches of DNA as candidates for the quantitative traits of interest, Bogdanove said.

While geneticists have made many advances in DNA sequencing, one grand challenge is defining the specific functions of each DNA sequence. Statistical analyses

can determine whether particular stretches of DNA correlate with this or that trait, but the task remains to directly test whether a sequence in fact causes or contributes to a particular trait. That’s where genome editing comes in.

“We can test the hypothesis that these DNA sequences are important, and use them for crop improvement,” Bogdanove said. Traditional breeding is exceedingly difficult with quantitative traits that are linked to many genes. “Now, we don’t have to do years of breeding; we can just make the precise changes needed in a few short steps.”

For their work, the researchers will use a newly released dataset for 3,000 rice genomes, and they will test DNA sequences from this set and other rice genomes that are associated with beneficial traits. Rice geneticist Susan McCouch, a co-PI on the project, has been a key contributor to the rice genome dataset.

The genome editing technique will focus on such quantitative traits in rice as disease resistance and tolerance to acidic soils.

Along with developing a new system that employs genome editing for plant breeding, the researchers also hope to develop new lines of rice that breeders could use to address diseases and acid soils.

Additionally, the project team will develop related educational materials for middle and high school students and undergraduates, provide genome editing training workshops for plant biologists, and continually update a public project website, RiceDiversity.org.

The researchers are careful to note that genome editing should not be confused with genetic engineering; genome editing entails making precise changes, whereas genetic engineering is “akin to inserting a particular sentence somewhere at random into the book,” Bogdanove said.

Other co-PIs include Jan Leach, professor of bioagricultural sciences and pest management at Colorado State University; Erin Doyle, assistant professor of biology at Doane College; and Daniel Voytas, professor of genetics, cell biology and development at the University of Minnesota. Other Cornell team members include Jason Mezey, associate professor of biological statistics and computational biology, and Stefan Einarson, director of transnational learning.

Fungi essential for land plants live with mysterious bacteria

By Krishna Ramanujan, *Cornell Chronicle*, June 18, 2015

Soil fungi colonize roots and provide essential nutrients for the majority of the world's land plants, but new research sheds light on a class of bacteria found living within these fungi.



A plant root surrounded by arbuscular mycorrhizal fungal hyphae (branching filamentous structures, collectively called mycelium) and spores. ©T.E. Pawlowska

A Cornell study, published in May in the Proceedings of the National Academy of Sciences, found these so-called mycoplasma-related endobacteria (MRE) operate with minimal genomes, likely because their fungal hosts provide crucial services for the bacteria's survival. Furthermore, the researchers found that the bacterial genomes had acquired genes transferred from these arbuscular mycorrhizal fungi, which could help the bacteria manipulate their fungal hosts, though more study is needed.

Further understanding of these relationships has important implications for developing tools for sustainable agriculture.

"We know that the bacteria are metabolically dependent on fungus, because their genomes are highly reduced, but they also maintain mechanisms for plasticity and diversity," said Teresa Pawlowska, associate professor of plant pathology and plant-microbe biology and the paper's senior author.

The researchers found the communities of MREs found within fungi are very diverse genetically. In insects, genetically diverse bacteria are usually parasites, while friendly bacteria that share a mutually beneficial interaction with their hosts are usually homogenous, meaning they have no genetic diversity.

"We speculate they (MREs) might be parasites, because they have diverse populations," Pawlowska said. Mizue Naito, Ph.D. '14, now a postdoctoral researcher at University of California, Los Angeles, is the paper's first author. The bacteria "might be giving back something, but we don't know what that is at this point," Pawlowska said.

The association between mycorrhizae and plants is very common and very old, dating back to the early Devonian era (419 million years ago) when plants first emerged onto land. Researchers believe these fungi facilitated plants' transition to land, Pawlowska said. That's because the fungi supply plants with phosphorus, an essential nutrient that is readily available in aquatic environments but not readily available in soil.

Conventional farmers add phosphorus to the soil in fertilizers, but researchers estimate that the world's terrestrial phosphorus supply will be exhausted within the next 100 years. At the same time, modern farming practices such as tilling soil disrupt mycorrhizae, making fertilizer inputs necessary for growing crops, Pawlowska said.

For these reasons, studies such as this one are "important for developing tools for sustainable agriculture. We need to understand how these fungi interact with other organisms and since the association between bacteria and fungi is ubiquitous, we need to understand what this interaction is about," she added.

Thus far, scientists have described nearly 200 fungal species known to associate with the entire diversity of land plants. In the study, Pawlowska and colleagues analyzed three such fungi and examined their bacteria. They sequenced metagenomes that represented entire bacteria populations and found the three were different, but they each retained mechanisms that allow them to be diverse and adaptable to host conditions.

The researchers are conducting experiments to better understand the functional roles of the bacteria in the fungi. Both the host fungi and their endobacteria are very hard to grow in the lab, due to inadequate growth media, so both the fungi and bacteria were grown with plants for study.

The study was funded by the National Science Foundation and United States Department of Agriculture funds administered through the Cornell University Agricultural Experiment Station.

Scientists have described nearly 200 fungal species known to associate with the entire diversity of land plants

NEW GRADUATE STUDENTS—FALL 2014

ALYSSA BLACHEZ



Education: BS — Cornell University; Major—Biological Sciences, Ecology and Evolutionary Biology

Research Experience: Predator-prey interactions of western mosquitofish with green sunfish and Colorado potato beetles with spined sodier bugs; molecular biology of fungicide resistance in *Fusarium graminearum*

Interests: Control of diseases on malting barley in the field and in post-harvest situations.

Chairperson: Gary Bergstrom

MORGAN CARTER



Education: BS—North Carolina State University; Major—Biochemistry

Research Experience: Role of polyketide synthases in *Mycosphaerella fijiensis* pathogenesis of banana. Transcription factor control and localization in *C.*

elegans.

Interests: Bacterial and fungal effector biology; where effectors go, how they get there, what they do, and how they do it

Chairperson: Adam Bogdanove

ELIZABETH (LIBBY) CIENIEWICZ



Education: B.S. in Biology — Lebanon Valley College, PA

Research Experience: Microbial diversity along nutrient gradients in intercoastal areas; Viral suppressors of RNA silencing, particularly of grapevine viruses; and the transmission and spread of Grapevine red blotch-associated virus.

Interests: Pathogen-vector-host interactions; grapevine virus transmission and epidemiology

Chairperson: Marc Fuchs

JONATHAN GONZALEZ



Education: BS, MS — University of Vermont; Major—Biological Sciences

Research Experience: During my BS and MS I investigated the relationship between plant-symbiotic arbuscular mycorrhizal fungi (AMF; Glomeromycota) and the sex-morphs of the gynodioecious *Polemonium foliosissimum* in the field in Colorado. I also investigated the effect of AMF communities from areas of differing grazing histories on plant growth and response to simulated herbivory in the greenhouse.

Interests: I am currently investigating the role of bacteria found within AMF, on the fitness of and interactions between AMF and their plant hosts.

Chairperson: Teresa Pawlowska

ADRIENNE GORNÝ



Education: BS — Purdue University, Major—Botany

Research Experience: Genetics of maize disease resistance, management of *Alternaria brassicicola*, quantification of soilborne pathogens

Interests: Epidemiology of Northern root knot nematode on vegetables and soilborne disease risk forecasting

Chairperson: Sarah Pethybridge

ANGELA (ANNIE) KRUSE



Education: BS—University of California, Berkeley; Major—Genetics and Plant Biology

Research Experience: Characterization of protein-protein interactions between small grass resistance proteins and *Barley strip mosaic virus* using microscopy and biochemical techniques; investigating the effect of photosynthetic enzyme expression on starch and sugar production in *Arabidopsis thaliana*.

Interests: Proteomics; RNA aptamer technology; Protein-protein interactions between insect vectors and pathogens such as *Candidatus Liberibacter asiaticus*, the bacterium associated with citrus greening disease.

Chairperson: Michelle Cilia

The Future for Plant Pathology and Plant-Microbe Biology

We are building several endowment funds to support future activities. Your contributions to any of these funds will be greatly valued. You can donate directly at www.giving.cornell.edu/give/ or contact Gary Bergstrom (gcb3@cornell.edu)

Graduate Student Fund

The Section of Plant Pathology and Plant-Microbe Biology and society in general have benefited immeasurably from previous support for graduate education. Continued excellence of the graduate program in Plant Pathology and Plant-Microbe Biology at Cornell will be greatly assisted through the Graduate Student Fund. Gifts of any size are appreciated and enable the brightest minds and most dedicated individuals to work and study in plant pathology and plant-microbe biology.

Plant Pathology Excellence Fund

Income from this endowment fund will be used to facilitate important projects which otherwise would be impossible. For example, the fund will help deserving students present their thesis results at a scientific meeting; it will facilitate the development of teaching aids; and it will aid graduate student research in unfunded areas by augmenting funding for supplies and small equipment items.

Dr. Richard P. Korf Graduate Student Excellence Fund

This fund honors the many contributions Dr. Korf made in mycology and plant pathology research during his career at Cornell.

The anonymous donor wants to maximize the impact of this gift by challenging alumni and friends influenced by Dr. Korf's research and mentorship to demonstrate their gratitude by making a gift to this vital fund, which will support graduate research in mycology and plant pathology in the School of Integrative Plant Science.

NAMED GIFT OPPORTUNITIES

Endowed Professorship	\$3 million
Graduate Fellowship	\$1 million
Graduate Award	\$100k

NEWS FOR FUTURE NEWSLETTERS

We want to hear from you...

Send an e-mail to plantpathcornell@cornell.edu or write to us at:

Newsletter Committee
Plant Pathology and Plant-Microbe Biology Section
School of Integrative Plant Science
Cornell University
334 Plant Science Building
Ithaca, NY 14853