



The Pathogen

Department of Plant Pathology, University of Wisconsin-Madison

August, 2006

Guatemala: Badgers dig into tropical agriculture

Most college classes end with stressful studying for a daunting final exam. If you're lucky, you might get away with a take-home exam or a final paper. But for the students in **Plant Pathology 875: Tropical Plant Diseases**, the class ended with a field trip thousands of miles from Madison.

The seminar was taught by professors **Caitilyn Allen** and **Doug Maxwell** and focused on economically important crops that grow in the tropics. As part of an international exchange with the University of San Carlos in Guatemala, Caitilyn and Doug organized the trip to complement and illustrate topics they taught in the classroom last fall.

Mapi Marquez, a first-year Ph.D. student in **Amy Charkowski's** lab, was one of the 10 students to attend the



Potatoes growing on the hillside in the Alta Verapaz region



Taken on the "Cloud Forest" hike, most of the PP875 Tropical Plant Pathology class with their Guatemalan host, Dr. Luis Mejia. Barrett Gruber (front); row 2, L-R Muthu Venkateshwaran, Emily Auth, Jennifer Clifford, Terri Hughes, Courtney Jahn, Mapi Marquez Villavicencio; back row, L-R Luis Mejia, Mindy Salus, Caitilyn Allen; not pictured Doug Maxwell, Emily Mueller, Zomary Flores Cruz.

like, and especially for our purposes, the major diseases that impact the cultivation of those crops," he says.

The group left January 1 and spent 12 days traveling to different parts of Guatemala. Among the places they visited were large export cash crop plantations, subsistence farms, a vegetable co-op, the Copan Mayan Ruins and Chichicastenango, the largest marketplace in Guatemala.

The students also had the opportunity to see the experimental field plots for a project that Caitilyn and Doug are working on to develop sustainable strategies for tomato production.

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trip, "The main purpose was to relate everything we learned in class about tropical diseases with a real situation in one of the Central American countries," she says.

Barrett Gruber, second-year Ph.D student in the **McManus** lab, says the trip helped him to appreciate the things he learned about during the seminar because it allowed him to take what he learned in the classroom and see how it is applied in the real world.

"Our trip to Guatemala really gave us first-hand experience of how these crops are grown, what they look



Mapi translating for Vidal Veber, the milpa manager for the village of San Juan Obispo. Milpa is a crop growing system that is based on intercropping (maize, beans, squash primarily but this one had citrus, nespéro, and coffee as well). Some agronomists feel that it is a sustainable method of growing crops.

Notes from the Chair

For the last several years our department has gathered in May to recognize and celebrate our achievements over the past year. Many of these awards and honors are described elsewhere in this newsletter, and they serve to emphasize the outstanding level of talent that resides in our department. A department, of course, is not just a collection of individuals, and we can indeed say that ours is a department that is greater than the sum of its parts.



When you list some of our collective achievements, you find some truly remarkable outcomes. Take teaching, for example. At the graduate level, we house programs that serve as national models for teaching and mentoring. At the undergraduate level, we advise more than 20% of the CALS students in the Biology Major, a higher percentage than any other department in the college, and we are ranked third in the college in terms of teaching effort. These numbers say that we are doing a lot; we are also doing it well -- among our current faculty we've received seven awards for teaching excellence.

How about extension? We hold *dozens* of awards for our activities in this realm, and county extension agents rate our extension faculty well above the average of other extension faculty in the college. We have pioneered numerous advances, including computer software and web sites that are superb tools for growers working to manage and prevent disease. We have saved growers literally millions of dollars through more effective control strategies and our extension work has an impact regionally, nationally, and internationally.

We also have a strong sense of commitment to service to our profession and to our institution. Our faculty and staff have played, and continue to play, major roles as college and campus leaders, in addition to our participation at the national and international level. This ranges from our activities in APS to service on numerous editorial boards and in international symposia.

Finally, a few statistics about research: last year we brought in almost a million dollars of *new* grant money. We lead all the other college departments in terms of grant applications, and we also lead the entire college in terms of the nonfederal, extramural grant monies that we garner on an annual basis. Among the plant departments we are the leader both in terms of numbers of grant dollars, and in terms of the number of dollars *per faculty*. This might not be too surprising: last year alone we published more than 120 journal articles.

If you're wondering why I happen to have some of these data at hand, I'm preparing for my first meeting with our new dean. Starting August 1, the dean of the College of Agricultural and Life Sciences will be Molly Jahn. A plant geneticist from Cornell, Molly has a distinguished record in the area of breeding crops for resistance to viruses and has directed a very large program with emphases ranging from quite basic to quite applied. I was lucky to serve on the search and screen committee that interviewed her, and I believe that she has the energy and vision to lead our college to new and exciting ventures. These are exciting times, and I am confident that our department will play a critical role in the future shape of the college and university.

Please read on to learn more about some of the things that have been happening here. You'll see that we have a terrific group of hard-working, dedicated individuals working at the forefront of our discipline and I hope that this gives you the feeling, which I have, of a strong sense of pride in being associated with our department.

On Wisconsin!

Murray

Murray Clayton



On the web!



www.plantpath.wisc.edu



www.cals.wisc.edu



www.wisc.edu

Featured Alumni of the Department

Cindy Morris and Philippe Nicot (PhDs, 1985)



Cindy and Philippe in a da-peng (plastic covered greenhouse) in the Beijing vegetable production region in 1988 (from: Morris and Nicot P.C. 1988. Plant Pathology in the People's Republic of China: Getting the job done. Plant Disease 72:648-660).



... and almost 20 years later (June 2006) outside of the quarantine/isolation greenhouse being built at INRA's Plant Pathology research unit in Avignon.

Cindy writes:

Philippe and I were among Prof. **Doug Rouse's** first graduate students in the 1980's. After obtaining our PhD's in 1985, we headed off for postdoctoral research work in the Plant Protection department of Beijing Agricultural University (BAU, currently China Agricultural University). We each had received a grant from the National Academy of Sciences program for scholarly exchange with the People's Republic of China. In addition to these one-year grants, we obtained a series of various research and teaching positions at BAU, through which we stayed in China for four years. This estrangement from the so-called cutting-edge of first world science was a huge career risk in the eyes of some of our colleagues and mentors. But luck often smiles our way, and we both harnessed full-time positions as research scientists at the Plant Pathology research unit of the French National Agronomic Research Institute (INRA) near Avignon in 1989 – where we have been since.

The move to China was clearly a result of our experiences as graduate students in Madison. Firstly, the UW-Madison Plant Pathology Department at Madison received innumerable foreign visitors and students (including Philippe!). Among them were many Chinese, including the couple Professor Di Yuan-Bo, head of the BAU Plant Protection Dept., and Professor Xu Xiao-Hua, a researcher in the BAU Microbiology Department, with whom we became friends. This perked our interest in China, an interest that had already been cultivated by the voyages and sagas of **Arthur Kelman** and **Paul Williams**. We were curious about China's science and agriculture. By the end of our graduate studies we were anxious to do research in a cultural, infrastructural and political context that was completely different from what we had experienced in the US. Dr. Kelman encouraged us to apply to the NAS program and Professors Di and Xu offered their labs as hosts for our research.

In China we conducted research on bacterial (Cindy) and fungal (Philippe) pathogens typical of the vegetable production belt around Beijing, advised graduate students and taught scientific English. We were well-immersed in Chinese culture and in our relationships with our students, colleagues and the farmers in whose fields we conducted experiments. In this pre-email era and with limited resources for international travel, we maintained our contact with the scientific world abroad via the many visitors to the Plant Protection Department. We also helped organize an international plant pathology symposium in Beijing in 1988, and attended the International Plant Pathology Symposium in Kyoto in 1988. At that meeting we encountered the French scientists who, unbeknown to us, would hire us at INRA a year later.

In early 1989, Philippe received a telex (remember those?) from one of the French colleagues we met in Kyoto announcing the opening of two positions in INRA's Plant Pathology Department – one in bacteriology, one in mycology, both at the same location. Such opportunities for us were not going to arise often, and Philippe had always hoped to return to France to live and work. We said our good-byes to China under tumultuous and distressing conditions five days after the massacre at Tian-An-Men Square in June 1989 and headed for job interviews in France.

Since being hired by INRA a few weeks after our arrival in France, we have been research scientists at the Plant Pathology Research Unit at INRA's center in Montfavet, a suburb of Avignon still populated by cows and sheep and covered with fields of ray grass. Philippe has developed a program on integrated control of the gray mold pathogen, *Botrytis cinerea*, of greenhouse-grown tomatoes. He has addressed virtually all aspects of control of this disease including chemical, cultural and biological as well as discovering resistance to *Botrytis* in lines of tomato used in the breeding program of our colleagues at the plant breeding research unit at our center. For the biocontrol agent that his group has developed, a French company has secured a license agreement and is seeking registration. We'll open the bottles of champagne the day it hits the market. For the past four years, Philippe has been the director of our research unit, which is comprised of about 45 staff members and a diverse array of labs, greenhouses, experimental fields and large equipment including two electron microscopes and soon to have a quarantine/isolation greenhouse. Check out our web site at

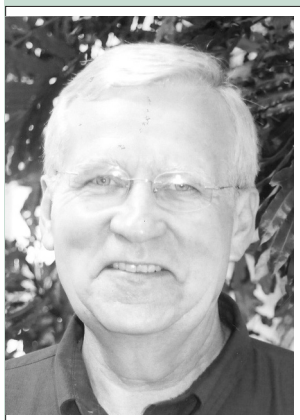
http://www.avignon.inra.fr/internet/unites/pathologie_vegetale/plant_pathology/version_index_html

His active involvement in biocontrol research over the past 15 years landed him the position of General Secretary of the West European Regional Section of the International Organisation for Biological Control (<http://www.iobc-wprs.org/>).

In contrast to Philippe, my research over the past decades has been quite directly related to the research and competencies I developed during my graduate studies at Madison. I have continued research on the beloved subject of my thesis, the ecology of epiphytic bacteria, and have been involved in organizing the phyllosphere symposia since 1995. Unresolved questions raised in that

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Focus on Faculty:



**Craig
Grau**

From his office in Russell Labs, Professor **Craig Grau** has watched hundreds of grads and undergrads earn their degree in plant pathology and taught many courses, most recently PP300, Introduction to Plant Pathology, and PP559, Diseases of Economic Crops (better known as "the summer field course" or simply "the bus course"). A few of the changes Craig has witnessed after 30 years in the department are the development of the internet and other advances in communication and their

impact on research, instruction and extension.

The latest change in his program involves a shift of focus. Where there was once more of a balance between alfalfa and soybean research, Craig says most of his time now is spent working with soybeans.

In particular, he says Wisconsin is part of a national effort to exclude and control *Phakopsora pachyrhizi*, the fungus responsible for soybean rust.

"[The effort includes] groups of scientists and educators around the country coming together and trying to map out strategies and plans to detect its movement," he says.

UW-Madison is collaborating with the USDA and universities from southern United States, where the disease was first found in November 2004. Although it has not yet been found in Wisconsin, Craig and others have been working on getting early warning systems in place to manage soybean rust, should it develop in Wisconsin and other northern states.

"We do the experiments without the pathogen at the moment, but always in anticipation; things are in place should the soybean rust fungus arrive in Wisconsin," he says, "Of course a big part of it is what can be done if it does move - especially to a state like Wisconsin."

According to Craig, the "high-risk zone" for soybean rust is about 30 degrees either side of the equator and the severity of the disease increases the closer you get to the equator.

Wisconsin's northern location offers several advantages. Not only are we farther from the high-risk zone than the Gulf States where the disease has already been discovered, but we can also use the South as a model. Craig explains, "If we see rust starting to become more active in the South, then we go to different degrees of alert," he says.

Soybean rust is a devastating disease, and according to Craig, it can result in zero yield if it hits the crop early enough. As the leading US agricultural export, soy plays an important role in our economy and balance of trade. Considering this and the many everyday uses for soy, the amount of effort that

has gone into preventing the spread of the disease is not surprising.

"I think the one that's potentially a big one that a loss of yield will really hurt, is the use of soybean for diesel," Craig says, "Soybean oil has been targeted as a very important source of oil for diesel."

Soybeans are also important to corn from a cropping system perspective because of their crucial role as nitrogen fixers in the ability to rotate and diversify crops.

Over the years, Craig has seen how changes in communication technology have improved research, outreach and education. Shortly after the birth of the internet, Craig developed the Soybean Plant Health Web site (www.plantpath.wisc.edu/soyhealth/) to communicate more efficiently with his clientele, which includes farmers, crop consultants, seed companies and others.



Appearance of soybean rust on upper (above) and lower surface of soybean leaf.

An important advantage of the site is the ability to reach more people. Craig says, "I get emails from South America asking me things that they pick up from the Web site. It's really increased our efficiency of disseminating information."



These advances in communication have also helped make collaboration easier among scientists. This is especially true for soybean researchers.

"There are pockets of multi-state projects. A lot of times it's not just pathologists, but soybean breeders and pathologists and soybean entomologists and pathologists. There's just a lot of collaboration among the states and within disciplines," Craig says.

According to Craig, this collaboration is important in an increasingly complicated world. "You can't be an expert in everything. [Collaboration] is a meshing of people with differing talents and a tremendous amount of synergism results," he says.

Craig likes to teach his students about the importance of extension work and outreach-oriented research. He says he tries to involve his grad students in extension-related activities like commodity meetings and field days. "It is important to see firsthand how research results can be delivered to our clientele to help solve some of their production problems," he says.

As for his undergraduates, Craig says, "I try to give them the opportunity to see what plant pathology has to offer as a career."



Focus on Faculty:



**Patricia
McManus**

It's said that variety is the spice of life. And that spice is exactly what **Patty McManus** finds so appetizing about her job as a professor in the department of plant pathology.

"In a single day I can provide an apple grower advice on timing her fungicide sprays; participate in an oral prelim dealing with the role of chemotaxis in bacterial wilt of tomato; and review a manuscript on a strain of *Fusarium* used to kill coca," she says.

Patty says she also enjoys the freedom of choosing what projects to work on and which direction to take her program. She describes her research as "a mile wide and an inch deep," because unlike many researchers, she hasn't spent the majority of her career focused on one disease.

"I think the longest I've stuck with one disease is five years. I'd like to believe that this is because I'm addressing ever-changing, current needs," she says.

One of Patty's current projects is focused on identifying antibiotic resistance genes in bacteria from foliage in apple orchards. Collaborating with plant pathology colleague **Jo Handelsman**, the researchers are interested in spatial and temporal gradients of antibiotic resistant bacteria in a commercial apple orchard relative to the application of streptomycin.

While others have studied antibiotic resistance genes in orchards, Patty explains that in previous studies, the bacteria were cultured first and then the genes were analyzed. This project, which was funded by the USDA/NSF Microbial Observatories Program, is forging the way in alternative methods to culturing.

"A major purpose of this grant is to use a culture-independent method. We will culture bacteria, but we also will employ culture-independent methods: microscopy and metagenomics," Patty says.

According to Patty, metagenomics involves isolating total DNA from a sample and analyzing it rather than relying only on DNA from organisms that grow on plates.

These culture-independent methods were first used by Jo and former UW researcher **Bob Goodman** on soil from the west Madison Agricultural Research Station and more recently from Alaskan soil. But Patty says that this is the first time these methods will be used in an agricultural setting where an antibiotic is used to control a disease.

"It's still pretty new," Patty says, "It's laborious and it has its own quirks and problems, but it overcomes the problem you

have with culturing - that you lose a lot of the bacteria; you really only recover about 1% of [the bacteria] that are out there."

Also involved in the project are Master's student **Lindsay Rusnak**, who is co-advised by Handelsman and McManus and PhD student **Erika Yashiro**, who is in the McManus lab.

Barrett Gruber, also a PhD student in Patty's lab, is studying the effects of cherry leaf spot and fungicides on photosynthesis in tart cherry. Research Specialist Russ Spear is developing microscopic methods to enumerate bacteria from apple leaves.

It's her research group's work Patty says she is most excited about, "All these projects are in their early stages, so the findings are all new and exciting," she says.



*Symptoms of
fireblight on
apple foliage.*

A large part of Patty's work is extension with fruit growers and other stakeholders with an interest in fruit production. She says her extension work is important because it brings about an exchange of knowledge that often involves her students and keeps her program fresh.

Patty says she feels most effective when she "extends out" by using results from students' or her own research in an extension talk or bulletin. Furthermore, she also sees the effects of her work.

"I've really harped on the problem of pathogen resistance to bactericides and fungicides,

and growers seem much more aware of this now than they were eight or 10 years ago.

But, she explains, extension also brings information in, "Most of my students' projects have come about after observing firsthand a problem in the field and listening to growers concerns," she says.



Staff Profile: Mark Nakhla



Mark Nakhla

Mark Nakhla grew up in Cairo, Egypt. He came to the United States as a student to learn virus detection methods.

He met **Drs. Douglas Maxwell** and **Jeffery Wyman** in summer 1990 and learned of their interest in Tomato yellow leaf curl virus and its vector, the whitefly. Mark came to the plant pathology department a year later as a postdoc to study this geminivirus. From

1991 to 2005 he worked with Professor Doug Maxwell; an experience that he says was a life-altering.

“Professor Douglas Maxwell is the one who introduced me to international research and changed my life,” he says.

After the project on TYLCV, Mark was a key member of the Bean/Cowpea CRSP team for many years and then became involved in three MERC USAID projects (Middle East Regional Cooperation Program; grants to **Amy Charkowski** and Maxwell) on developing virus detection methods and antiviral strategies for controlling geminiviruses.

Mark's time in the department left a noticeable impression. Through his work in the Maxwell lab, he trained many undergraduate students and foreign scientists, as well as traveled to the Middle East, North Africa and Central America collaborating with universities and research centers in Tunisia, Morocco, Jordan, Egypt, Israel, Guatemala, Honduras, and Costa Rica.

“Sometimes I felt like I was in the United Nations; the lab hosted scientists and graduate students from all over the world,” he says, “Lots of travel, lots of work and many rewards.”

Mark also played a large role in the Introduction to Plant Pathology course as an instructional specialist. He taught lab sections and presented lectures for the course, which over the years, has been team-taught by **Craig Grau, Nancy Keller, Doug Maxwell** and **Doug Rouse**.

“It is a team, and everyone shared responsibility to give as much as possible to the students,” Mark says. “It was a great experience for me and I am proud to have been a part of the PP300 team for many years.”

Now Mark is working for the USDA-Animal and Plant Health Inspection Service (APHIS) in Maryland. His work involves developing molecular diagnostic tools for the detection of imported plant pathogens and introduced germplasm.

“I feel that it has an important impact on US agriculture,” he says. A typical day for Mark includes responding to email, some bench work and keeping himself up-to-date with the latest research articles.

But Mark is also still very much a part of the research projects he left here at UW. He continues to collaborate with Doug Maxwell on an MERC grant for the development of tomato resistant to tomato yellow leaf curl virus, and he's also working with Amy Charkowski on a potato project in the Middle East. Amy and Mark presented a workshop on detection methods for potato viruses in Morocco for this project in June 2006.

If he had to choose the most rewarding project he's worked on, it would be the MERC project on the development of diagnostic tools for important plant viruses in the Middle East. The project, which ended a few months ago after seven successful years, included a number of graduate students and scientists from the Middle East who were trained in the Maxwell lab and other labs in the US. Furthermore, Mark says that several advanced labs have already been built in the participating countries using funding and expertise from the project.

Mark says that over the years his interests in plant pathology have varied. Starting out as a traditional virologist, he says he used to identify viruses the old-fashioned way; host range, indicator plants, insect vectors.

“With time I shifted my interest to serodiagnosis and purified several viruses, injected rabbits and produced antisera,” he says.

But the biggest change happened when he joined the Maxwell lab in 1991. “Since then my main interest has been studying geminiviruses.”

To the plant pathology students who might be interested in following a similar career path, Mark advises, “It is a dynamic career and you have to be ahead all the time.”

Good luck Mark!



Mark conducting a laboratory exercise in Morocco



What's Happening? - News from Near and Far

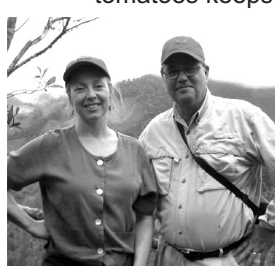
Although officially retired in July 2001, **Doug Maxwell** remains active with his international research on begomoviruses of tomatoes. His work in Guatemala has resulted in the



Healthy (left) and geminivirus infected plants

formation of a new start-up company, called GenTropic Seeds, which will produce and market resistant tomatoes for Central America. Also, his research in the Middle East on breeding tomatoes keeps

him traveling to Jordan, Egypt, Tunisia and Morocco. He just got another four-year grant so he expects to be very active with



Caitilyn Allen and Doug Maxwell in Guatemala



Some Geminivirus resistance comes from the a wild tomato relative

his international research until 2010. Martha and Doug still have the sheep farm and now live only a mile from Madison, no they did not move; Madison is expanding!!!

Jo Handelsman received a renewal for her HHMI Professorship for another 4 years to keep the Wisconsin Program for Scientific Teaching going strong. Recent PhD graduate from Jo's lab, **Christian Riesenfeld** was



awarded an NSF Biological Informatics Postdoctoral Fellowship to work at the Desert Research Institute in Reno, NV with Dr. Alison Murray.

Andrew Bent reports: We've just graduated **Mark Dunning** - PhD completions are always a landmark event for any lab - we'll miss you Mark! Mark did some very interesting work

on how plants perceive bacterial flagellins, and how to find the "active site" within an LRR (Leucine-rich repeats) domain. We remain very interested in this - we're continuing



this work with FLS2 and with other LRR plant disease resistance proteins. A few sources of new funds arrived this year so we're in a growth phase, which is fun. This counteracts our contraction phase at home, where we're just graduating our

oldest son from high school. Donations will be accepted if anyone wants to help us pay his way through college!

Steve Cloyd, the head of our UW Plant Pathology Memorial Library reports an impressive increase of 5.6% in our patron base over 2004. In addition, 125 new and donated books have been added to our collection, many donated by faculty and grad students. He encourages visitors both new and old to stop in.

Alumna **Mary Ann Hansen** (MS 1984) reports: I continue to manage Virginia Tech's Plant Disease Clinic. In 2005 we were able to hire an additional diagnostician, and in 2006 we will be expanding our lab space to accommodate the use of newer diagnostic techniques, such as PCR. I have been involved in several international projects, including a project in which I worked with a collective of tomato growers in rural Ghana to diagnose diseases, implement practical control methods, and teach sprayer calibration. Currently I'm part of a USDA-funded interna-



Observing tomato plants in Ghana

tional science education project, in which I will travel with Virginia Extension agents to South Africa to learn about disease management practices that might be applicable to Virginia agriculture. We will be especially interested in learning about management practices to control Asian soybean rust. I am also

involved in teaching both a graduate course in plant disease diagnostics and an undergraduate course called "Domesticating the Gene", in which we examine the genetic changes that have occurred in plants under domestication, including changes related to disease resistance and susceptibility. Away from the clinic I keep busy hiking with my family in the Blue Ridge mountains, hosting hordes of visiting Danish relatives, recovering from my latest sports-related injury, and helping my 10-year-old son Finn make competitive robots out of Legos.

There were many changes in **Amy Charkowski's** lab group over the past year. **Mee-Ngan (Frances) Yap** obtained her PhD in January 2006 and has moved to a postdoctoral position at the NIH in Maryland, where she will be studying protein secretion in *Escherichia coli*.

Mike Hibbing obtained his MS in December and is now pursuing a PhD at Indiana University. **Mark Nakhla** also left the



NIH Visitor Center

Charkowski lab for a permanent position with USDA-APHIS in Beltsville (see article pg. 6). We miss them both and wish them the best of luck. Newcomers include **Dija Selimi** (post-doc) and **Maria del Pilar Marquez Villavicencio** (graduate student) who joined the lab over the past year.

Nancy Keller met her former PhD student **Dimitrios Tsitsigiannis** in his home town of Athens, Greece in February where he was offered a job as Assistant Professor at the Athens Agricultural University Department of



Plant Pathology. **Dr. Marion Brodhagen**

from the Keller lab has accepted a tenure track position as Assistant

Professor in Microbiology in the Department of Biology at Western Washington University in Bellingham, WA.




Masters student **DaWoon Chung** has been accepted to a PhD program at Texas A&M. Summer plans for Nancy include travel to the East coast to visit family and go to a meeting and then travel to Australia for the same purposes. The Keller lab celebrated the arrival of their newest



W. Washington Univ. campus

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Awards and Recognition

-  **Lori Adams-Phillips** in **Andrew Bent's** lab won an NIH Kirchstein Postdoctoral Fellowship awarded to “promising applicants with the potential to become productive, independent investigators.
-  **Jian Yao** in **Caitilyn Allen's** lab has won a Louis and Elsa Thomsen Wisconsin Distinguished Graduate Fellowship.
-  In addition to her APS-Sequeira Student Travel Award (see box), **Jennifer Clifford** in **Caitilyn Allen's** lab has won an Albert J. and Adelaide E. Riker Plant Pathology Graduate award.

Zomary Flores, a third-year Ph.D. student, was awarded the APS-Kelman Student Travel Award for 2006.

Originally from Puerto Rico, Zomary says the UW's quality of graduate and research programs is what brought her here to study plant pathology.

“As a bacteriologist, I am interested in understanding how some bacteria are capable of causing disease and while others cannot,” she says. Because agriculture is important economically and socially, Zomary says she feels like she is able to help people by studying crop diseases.

Her research is focused on the mechanisms the bacterial wilt pathogen, *Ralstonia solanacearum* uses to defend itself from plant-derived reactive oxygen species. “These reactive oxygen species are known to have antimicrobial effects and are involved in plant-host defenses,” she says.

Zomary has spent the past four and a half years studying in Madison. She says she loves the variety of ethnic restaurants here, but she misses the food from back home. She is able to satisfy her cravings about twice a year, when she goes home for Christmas and summer break.

This summer, Zomary says she plans to work on her research, but she also wants to learn Italian. “I was in Italy a few years ago and I loved it, I hope to someday visit again,” she says.

Zomary says receiving this award helped financially support her participation in this year's APS meeting which was held in Quebec, July 29 - August 2.

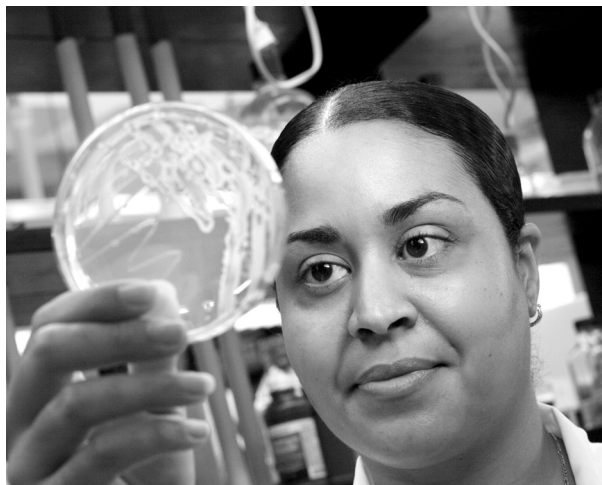





photo by B. Wolfgang Hoffmann

Arthur Kelman Student Travel Award

Dr. Arthur Kelman received his Ph.D. from North Carolina State University and became assistant professor of plant pathology there in 1949. During his time at North Carolina State, he was recognized for both his research and teaching. His work on *Ralstonia solanacearum* and *Erwinia carotovora* had far-reaching influences on both disease control and basic biological understanding. He developed a forest pathology research program and received several teaching awards.

Dr. Kelman moved to the UW in 1965 as chair of the Department of Plant Pathology. He was a widely respected administrator and his 10-year tenure as chairman was set apart by good judgment on difficult issues and impartial decision-making. He taught the basic undergraduate course in plant pathology for many years, and continued to be recognized for his excellence in teaching, winning a Distinguished Teaching Award.

He has served on many professional societies and has received numerous awards and honors, including The Honorary Degree of Doctor of Science from the University of Rhode Island and the APS Award of Distinction. He is a fellow of the National Academy of Sciences.

-  Another winner of this year's Riker awards is **Barrett Gruber** in the lab of **Patty McManus** who won the Riker Plant Pathology Academic Merit Award designed to support students studying plant tissue culture and diseases of forest trees. The Riker awards were established by former faculty member A.J. Riker who performed pioneering research on crown gall and on plant tissue culture that provided some of the basis for modern plant genetic engineering.
-  **Nate Schroeder** in **Ann MacGuidwin's** lab won a Plant Pathology Riker Graduate award. He also received a Henry Vilas Travel Award and the N.A. Cobb travel award to support his trip to the annual meeting of the Society of Nematologists. At this meeting Ann will take over the reins as president of the Society of Nematologists.
-  **Keats Shwab** in **Nancy Keller's** lab has won the August M. Gorenz Scholarship to support his graduate research in the regulation of fungal secondary metabolism.

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Awards and Recognition



In the **Keller** lab, **Elyse Bolterstein** received a Molecular and Environmental Toxicology Center NIH training grant while **Marion Brodhagen** won an NRI/USDA postdoctoral fellowship. Meanwhile Nancy has recently been elected as one of only 376 individuals from across all areas of science as a fellow to the American Association for the Advancement of Science.



Amy Charkowski was selected as Researcher of the Year from the Wisconsin Potato and Vegetable Growers Association. In addition to her own research program, Amy is the administrative director of the Wisconsin Seed Potato Certification Program.

Jennifer Clifford is the recipient of this year's Luis Sequeira-APS Council Award.

Jennifer holds a bachelor's degree in Animal Science and a master's degree in Plant Biology, both from the University of New Hampshire.

Jennifer says that in a way, her father's interest in agriculture helped guide her own interests in plant pathology. From early on, she was interested in microbes and pathogenesis, but says she had only been exposed to mammalian systems.

"It occurred to me suddenly one day that plants, and not just animals, get sick too," she says, "so I decided plant pathology was a way I could pursue my interest in disease-causing organisms in a useful way...for the purpose of improving agricultural crops."

Originally from southern New Hampshire, she decided to pursue her Ph.D. in plant pathology at the UW after coming to Madison for a conference.

"I was impressed with the people I met and my family and I liked Madison," she says.

Now a third-year Ph.D. student in **Caitilyn Allen's** lab, Jennifer is studying the bacterial wilt phytopathogen, *Ralstonia solanacearum*, and its tomato host.

More specifically, Jennifer is interested in determining pathogen genes that are involved in early virulence and rhizospheric behavior by identifying genes that are induced in response to the host root exudate.

Jennifer says her research will keep her busy this summer, but she is also making time for Spanish classes and a vacation back home to see her family. She also attended the APS annual meeting in Quebec City at the end of July.

When she finds a little free time, Jennifer likes to hang out outdoors.

"I enjoy biking, running, and participating in multi-sport events. I also like other outdoor activities such as hiking, and I am learning to kayak," she says.



Luis Sequeira Student Travel Award

Dr. Luis Sequeira, Emeritus J. C. Walker Distinguished Professor of Plant Pathology and Bacteriology, was born in San Jose, Costa Rica. After earning his doctorate from Harvard University, he worked with the United Fruit Company in Central America where he helped develop methods to control bacterial wilt disease caused by *Ralstonia solanacearum*. This bacterium became the focus of his research throughout his career.

Dr. Sequeira came to the UW in 1961 where he established a research program renowned worldwide for its excellence in research and training in bacterial disease physiology. He has also been recognized for his exceptional contributions in teaching. His course in disease physiology became a fundamental part of the graduate program and his passion for bringing effective plant pathology to the developing world inspired generations of students.



Dr. Sequeira gave his time generously to our profession, serving as Editor-in-Chief of both Phytopathology and MPMI, as Chief Scientist for the USDA-NRI program, and most recently as a member of the Presidentially-appointed National Science Board, the elite group that sets policy for the NSF. Among the many awards and honors Dr. Sequeira has received are the APS Fellow Award and APS Award of Distinction. He is a member of numerous national and international scientific societies, including the National Academy of Sciences.



Jo Handelsman was named as a Woman of Distinction by the YWCA of Madison for her "community service, professional achievement, integrity, leadership and dedication to the lives of others and to the quality of life for all." In addition, Jo along with **Christine Pfund** and **Sarah Miller Lauffer** were honored as National Academies Mentors in Life Sciences Education for their work at the 2005 National Academies Summer Institute on Undergraduate Education in Biology.



Awards and Recognition

-  Undergraduate **Amy Vande Voort** was awarded the Vicky Lee Hirsh Endowment for Conservation Scholarship given to a Wisconsin born undergraduate with high academic standing studying the area of conservation and natural resources.
-  Incoming M.S. student **Dirk Netz** in the lab of **Glen Stanosz** won an Ismael Badillo AOF Fellowship. Other incoming students including **Muthu Venkateshwaran**, **Mapi Marquez Villavicencio**, **Monica Chen**, **Michelle Kohout**, **Lindsay Rusnak** and **Erika Yashiro** were given O.N. Allen Graduate Scholar Awards.

Recent Graduates - December 2005 to May 2006



Frances Yap

Ph.D. May 2006

Thesis Advisor: Amy Charkowski

Genes involved in biofilm formation of *Erwinia chrysanthemi*



Molly McGrath

Ph.D. December 2005

Thesis Advisor: John H. Andrews

Micro-scale colonization of leaves by *Aureobasidium pullulans*

Dija Selimi

Ph.D. May 2006

Thesis Advisor: Douglas Rouse

Mysteries of the Sands: Learning about Soil Microbiology in Central Wisconsin

Featured Alumni (Cont. From p. 3)

thesis nagged at me for nearly 20 years, particularly concerning experimental design and statistical approaches to quantifying microbial diversity. Here in France I encountered some of the scientists who had also tried to address these questions in the 1980's and we collectively resolved our frustrations with an editorial style literature review on microbial biodiversity in 2002 (see *Microbiol. Molec. Biol. Rev.* 66 :592-616). Another source of major inspiration for me at Madison was the series of Wednesday noon meetings of Chris Upper's group. I learned great details about ice nucleation active bacteria, how to make and calibrate thermocouples, and critical points about sampling bacteria from the air under field settings that I am putting to the test today in a program about long distance voyages of *Pseudomonas syringae* to non-agricultural habitats, its

biological and physical activities while in the atmosphere and the impact of non agricultural habitats on disease emergence and epidemiology.

Our work has involved many international collaborations and travel. We have travelled throughout Europe, to Canada, the US, Australia and Africa. Philippe has had the occasion to return twice to China. And in 2007 I will be involved in teaching an international workshop on plant-associated micro-organisms at the University of Concepcion in Chile. In the search for our pathogens in non agricultural settings, we are also finding it necessary to depart on treks to the mountain sources of rivers and hopefully to places such as Patagonia – that is the most interesting travel of all.



Welcome New Grad Students!

Name	Professor	Degree	Program
Fall 2005			
Yu (Monica) Chen	Halterman	Ph.D	Plant Pathology
Adam Heuberger	Bent	MS	Plant Breeding and Plant Genetics
Paul Koch	Grau	MS	Plant Pathology
Michele Kohout	MacGuidwin	Ph.D	Plant Pathology
Kim Lesniak	Stevenson	MS	Plant Pathology
Mapi Marquez Villavicencio	Charkowski	Ph.D	Plant Pathology
Lindsay Rusnak	Handelsman/McManus	MS	Plant Pathology
James Scott	Keller	MS	Plant Pathology
Muthu Venkateshwaran	Ane (Agronomy)	Ph.D	Plant Pathology
Erika Yashiro	McManus	Ph.D	Plant Pathology

Spring 2006

Dirk Netz Stanosz MS Plant Pathology



What's Happening (Cont. From p. 7)

(and youngest) member, Abigail Hammond, born April 21st to graduate student Tom and his wife !

Anna Whitfield who received her PhD in 2004 in Tom German's lab has accepted an Assistant Professorship at Kansas State University.



Walt Stevenson led teams to Serbia this past October and again in May as part of a USDA-Foreign Ag Service project aimed at revitalizing the Serbian

agricultural economy. In the October team were **Kevin Bula** from the Wisconsin Seed Potato Program, A. J. Bussan – UW Horticulture Department and Dennis Zeloski – potato grower from Lake Mills, WI. The focus of weeklong trip was the production of certified seed potatoes in Serbia and this included a series of meetings with growers, government officials and extension staff in central and southern Serbia. The May team included Jeff Wyman – UW Entomology and Dennis Zeloski. This team focused on vegetable production in



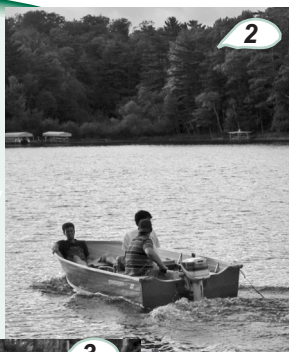
WI members of the Serbia team included (front) D. Zeloski, A.J. Bussan, W. Stevenson; (back, 3rd from left) K. Bula

Continued on p. 12

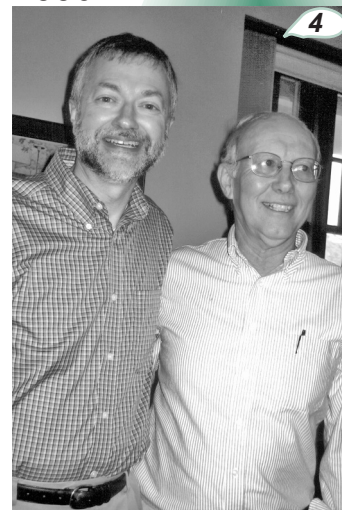
Photo Gallery



**New Student
Welcome,
Kemp Station,
Fall 2005**



Departmental Recognition Reception, Spring 2006



What's Happening (Cont. From p. 11)

central and northern Serbia and included visits to vegetable cooperatives, an agricultural fair in Novi Sad and a meeting with the Minister of Agriculture. A series of workshops is planned on a third visit this coming year that focuses on addressing pest and crop management needs of the potato and vegetable industry of Serbia.



Showing products at a cooperative in northern Serbia

July 26, 2006 was a milestone for research on postharvest diseases affecting potatoes and vegetable crops. During the past few months a \$2.2 million facility financed by the Wisconsin potato industry and government grants was constructed at the Hancock Agricultural Research Station. The facility was dedicated on July 26 at the annual Potato Grower



Field Day at Hancock complete with the traditional bratwurst and beverages. The nine bins and nine lockers will be filled with potatoes and vegetables this coming fall and the attached



Groundbreaking ceremony on April 5 for the new WPVGA (Wisconsin Potato and Vegetable Grower's Association) Storage Research Facility. L to R: Walt Stevenson – UW Plant Pathology, Mike Carter – WPVGA, Richard Straub – UW-CALS, Skip Tenpas – WPVGA Associate Division, Dennis Zeloski – Grower – Felix Zeloski Farms, Brian Hettiger – UW Foundation. Drawing of completed building (below left).

laboratory will soon be bustling with activity as studies on storage and postharvest disease management are initiated. The next time you pass by Hancock on a trip north, take a few minutes for a quick tour of this new facility.

John Andrews has just been appointed Director of the University of Wisconsin-Madison Officer Education

Program which oversees the ROTC program on campus. This is a prestigious position with a considerable history. Military training at the University of Wisconsin actually began in 1862, before enactment of state legislation implementing the Morris Act, which requires all land grant colleges and universities to conduct military training. The First ROTC (Army Infantry) unit was established on our campus in October of 1917, followed by the Naval program in 1946 and the Air Force unit in 1949. Ours is one of a very limited number of universities that have ROTC units for all three military branches.



We were delighted to hear from James Crill, CEO and President of Rebel Seeds, Inc. James sent us a number of articles about his father, **Pat Crill**, who received his PhD in 1968 under the direction of **Earle Hanson** and **Doc Hagedorn**. Although Pat is mostly retired, he still maintains activities in breeding, both in the U.S. and in Europe. Those in the know might be aware that Pat is the breeder of "Rebel," a major melon variety used in Guatemala for the fresh cut industry.



Departmental Picnic Fall 2005

Guide to the gallery (L-R in each photo)

- 1 Mushroom walk at Kemp Station - Lindsay Rusnak, Barrett Gruber, Isabelle Munck (leader), Michelle Kohout, Kim Lesniak, Mapi Marquez Villavicencio, Yu Chen, Erika Yashiro
- 2 Relaxing on the lake - James Scott with student hosts Barrett Gruber and Peter Rogers
- 3 New students, 2005 - Muthu Venkateshwaran, Erika Yashiro, Yu (Monica) Chen, Kim Lesniak, Lindsay Rusnak, Michele Kohout, Mapi Marquez Villavicencio, Adam Heuberger
- 4 Murray Clayton and Bob Rand (photo by Tammy Dettinger)
- 5 Nate and Britt Schroeder with Red



Guatemala (Cont. from p. 1)

The project is a collaborative effort with Professor Luis Mejia, a plant breeder at the University of San Carlos.



Greenhouse located at Ecke Guatemala, the largest importer of poinsettias to the U.S (above). Mindy and Emily in clean suits, required for entering greenhouse facilities at Ecke (right).



Coffee rust observed at San Rafael Urias Valdes coffee plantation in Antigua.



Zomary Flores is a third-year Ph.D. student in Caitilyn's lab, and she says the trip helped her see how agriculture differs from a developed country to a developing country. "Here things are mostly mechanized, and there people are

doing things by hand, like sugarcane harvesting. I think that was the toughest thing to see for everybody... everyone says they won't see sugar the same way again," she says.

Barrett agrees, "The part of the trip that had the biggest impact on me was the sugarcane plantation that we visited because it was such a huge operation," he says, "It really made me think and appreciate where our food comes from."



Bacterial wilt on tomato, causal agent: *Ralstonia solanacearum*

For many of the students, this was the first trip of its kind, but its impact will be long-lasting. Mapi says it confirmed why she is studying plant pathology.

"The experience of being in the field talking with the farmers was something that I enjoyed because I felt like part of a chain that some day will be useful not only in Guatemala, but in the world," she says.

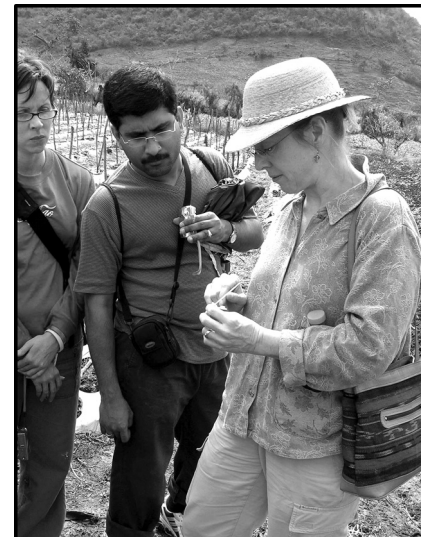
Teresa Hughes, second-year Ph.D. student in the Grau lab

says, "It is in countries like Guatemala that you see the necessities of research. I witnessed livelihoods destroyed by disease and people who live entirely on what they are able to grow."

The students said the trip was a valuable learning experience that offered them a new perspective on research – and life.

"The trip was very powerful in many ways and has influenced me not only in how I conduct research, but in how I live," Teresa says, "I have a new definition of poverty and the capacity of kindness of those living in it."

Barrett says the trip has motivated him to pursue research that will have a direct impact on how growers grow and harvest their food. "It makes you want to gear your research towards helping people and not advancing your own scientific career," he says.



Caitilyn Allen shows Muthu and Courtney results of an ELISA-based antibody test designed to detect *R. solanacearum*.

Guide to the gallery (cont. from p. 13)

- 6 Ann Ellingboe, Dennis, Leslie and Lauren Halterman
- 7 Deane Arny, Murray Clayton, Luis Sequeira
- 8 Amilcar Sanchez, Doug Maxwell
- 9 Mary Francis Heimann, Anita Hoffmann, Sarah Potts
- 10 DaWoon Chung, Hye-Sook Kim

- 11 Ann Ellingboe, Edith Arny, Elisabeth Sequeira
- 12 Paul Williams, Tom Dettinger
- 13 Lindsay Rusnak, Andrew Bent, Michelle Kohout
- 14 Not for my dinner! Jennifer Clifford appreciating carrot with hairy root symptoms caused by aster yellows

- 15 Hye-Sook Kim, Keats Schwab, Amilcar Sanchez, Walt Stevenson, Sarah Rosenthal (Hort), Barrett Gruber, Kim Lesniak, Maria Newcomb, Zhenyu Liu, Trent Stanger (Agron), Angie Peltier, Courtney Jahn, Craig Grau, Jennifer Clifford - Kemp Station, Aug 12



To Our Donors: Thank You!

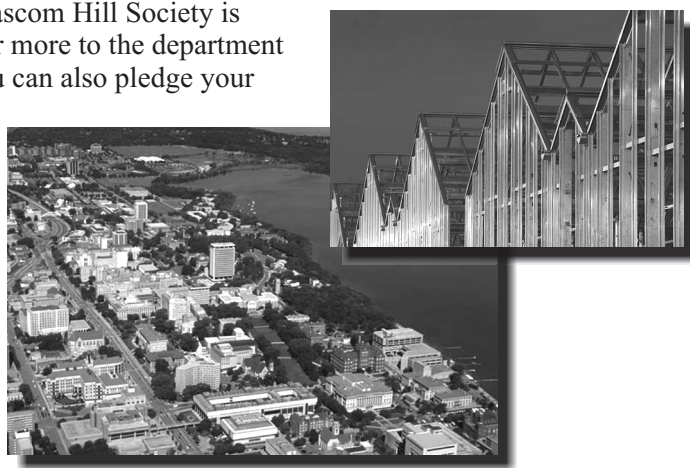


We sincerely thank our alumni and friends who have generously supported the UW Department of Plant Pathology. As state support for the UW continues to dwindle, your gifts are more important than ever. Your donations help us attract and support top-flight graduate students, sponsor seminar speakers, enhance research and teaching facilities, and maintain our preeminence as leaders in the field of plant pathology.

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If you have specific questions about giving, please contact Sandra Brown at the UW Foundation (Phone: 608/265-2925; e-mail: sandra.brown@uwfoundation.wisc.edu).

Photos by Jeff Miller, UW-Madison, University Communications



Department of Plant Pathology Fund

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Where Are They Now???

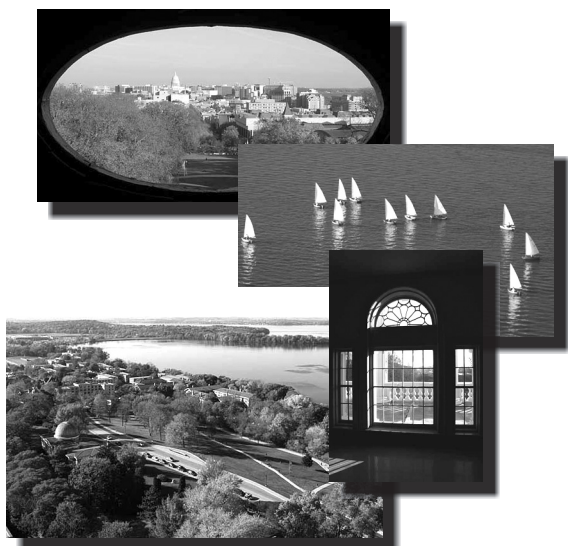
Do you have news to include in the 2007 *Pathogen*? New job? Family news? Recent retirement? We'd like to hear about what you've been up to lately. If your address has changed, please let us know so that we can keep our mailing list current. Send to: *The Pathogen*, Department of Plant Pathology, 1630 Linden Dr., Madison, WI 53706; phone: (608) 262-1410; fax: (608) 263-2626; e-mail: mkc@plantpath.wisc.edu.

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