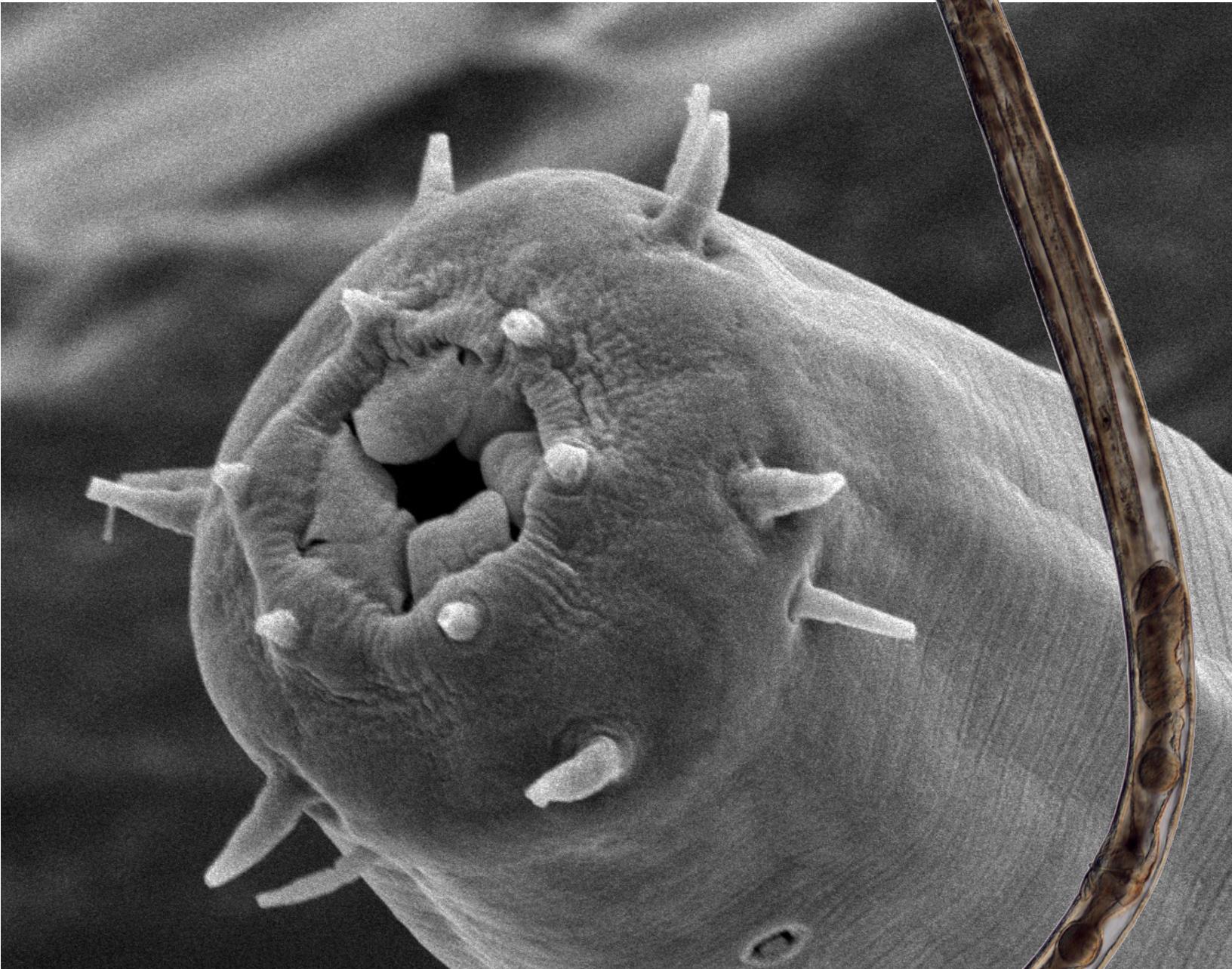


PathogeNews

Department of Plant Pathology
2021 Annual Newsletter



GROWING

FLEXIBLE, NIMBLE AND STRONG MINDS



Here in the Department of Plant Pathology, we're big on making big impacts. Our passion lies in solving challenges at the microbial level that affect sustainable plant productivity. And we do it all while training the next generation of plant pathologists.

We'd love to hear how an advanced degree in plant pathology from UNL will benefit you.

<https://plantpathology.unl.edu/>
402-472-2858 | @UNL_PlantPath



DEPARTMENT OF PLANT PATHOLOGY

JOIN US

M.S. & Ph.D. Programs

plantpathology.unl.edu/apply



TABLE OF CONTENTS

| | |
|-------------------------|----|
| Greetings | 2 |
| Graduate Student Assoc. | 4 |
| Inclusive Excellence | 5 |
| Fresh Faces | 6 |
| Lab Highlights | 7 |
| Diagnostic Clinic | 16 |
| Awards | 18 |
| Departures | 19 |
| 2021 Graduates | 20 |



PPGSA PAGE 4

INCLUSIVE EXCELLENCE PAGE 5



GRADUATES PAGE 20

Front cover photo:

The nematodes on the cover are *Tobrilid* species, known for their ability to live in extreme environmental conditions. The Scanning Electron Microscopy image shows a 5,000x close-up of the face, with a mouth surrounded by six lips and a circle of sensory papillae that aid in locating its food. It was collected from Border Lake in the western Sandhills of Nebraska, which has a pH over 10. The nematode is known to eat diatoms. The full-body image is a female in the process of laying eggs.



PLANT & PEST DIAGNOSTIC CLINIC UPDATES PAGE 16

FRESH FACES PAGE 6

PathogeNews is an annual publication from UNL's Department of Plant Pathology.
Editor & Designer: Madilyn McKay
Editor: Amber Hadenfeldt

All Lab Highlights were written by each respective PI. All photos are from faculty and staff within the department, or from the UNL digital photo archive.



Letter

FROM THE HEAD OF THE DEPARTMENT
DR. LOREN GIESLER

Greetings from the Department of Plant Pathology at the University of Nebraska-Lincoln. In 2021, we continued to respond to the COVID-19 pandemic, but it was a productive year with strong success in all areas of our mission. We continued the first year of our independent graduate program, and we ended the year with a strong commitment from upper administration to support four new faculty hires in the upcoming year.

This year we are providing lab highlights from each program and spotlighting the success of all our team members. Our faculty do amazing work that collectively serves our three mission areas of extension, teaching, and research. The continuum of basic to applied research is clear among our team, and they all work to serve the greater mission of ensuring a sustainable and ample food and fiber supply to support our growing global population.

This marks my third year as head of the department, and I continue to find it humbling to serve in this capacity. Our faculty, staff, and students all have amazing achievements across our field of science. Below are a few highlights from 2021.

- Dr. Richard Wilson was promoted to full professor in July.
- Our department graduated 3 graduate degrees with 1 M.S. and 2 Ph.D.
- Our students were recognized with 14+ local and national awards.
- Technologist Julie Stevens received the Lambrecht Award – this award is the result of an endowed foundation award in memory of Patricia Lambrecht (Technologist for Anne Vidaver)
- Dr. Gerry Adams retired from his appointment as Associate Professor of Practice.
- Dr. Sydney Everhart relocated to the University of Connecticut to become the head of the Department of Plant Science and Landscape Architecture.
- Faculty secured over \$1.9 M in funding to support their programs in research and extension.
- A search for a Field Crop Pathologist began in November.
- The Inclusive Excellence Advisory Group was formed and a survey related to department culture was deployed. Our department is committed to growing in diversity, excellence, and inclusion.

While the pandemic continued to challenge all of us, I am very proud of the resilience and grit our faculty, staff, and students exhibited. The COVID-19 pandemic has changed the world for all of us, but we continued to find ways to be effective, travel less, and still connect with our stakeholders.

Wishing you all the best in 2022!

Letter

**FROM THE PLANT PATHOLOGY GRADUATE
STUDENT ASSOCIATION PRESIDENT, KATHERINE LATOURRETTE**



The Plant Pathology Graduate Student Association (PPGSA) consists of master's and Ph.D. students working within the plant pathology department. Our students are working on projects from all areas of plant pathology, encompassing a large breadth of plant pathogens and plant diseases. This year, we focused on events and opportunities that built the social connections within our student body and grew our professional network within and outside of the department.

For the first time since the COVID-19 pandemic began, PPGSA, with the help and guidance of extension educator Kyle Broderick, was able to host a Plant Pathology booth at the Farmers' Market and at the East Campus Discovery Days. Students were able to interact with community members and answer their questions on what plant pathology is, how to protect their plants, and why the work we do in the department is important. The booth was a great opportunity for students to build their communication skills and learn more about a wide variety of plant diseases.

The 2021 Annual Elevator Speech Contest was an enormous success and was even planned in a hybrid format. The Elevator Speech Contest is a collaboration between the Plant Pathology, Agronomy, and Entomology departments, which gives students the opportunity to practice communicating their research in three minutes or less. Multiple students from PPGSA participated with our students taking home 1st, 3rd, and 5th place!

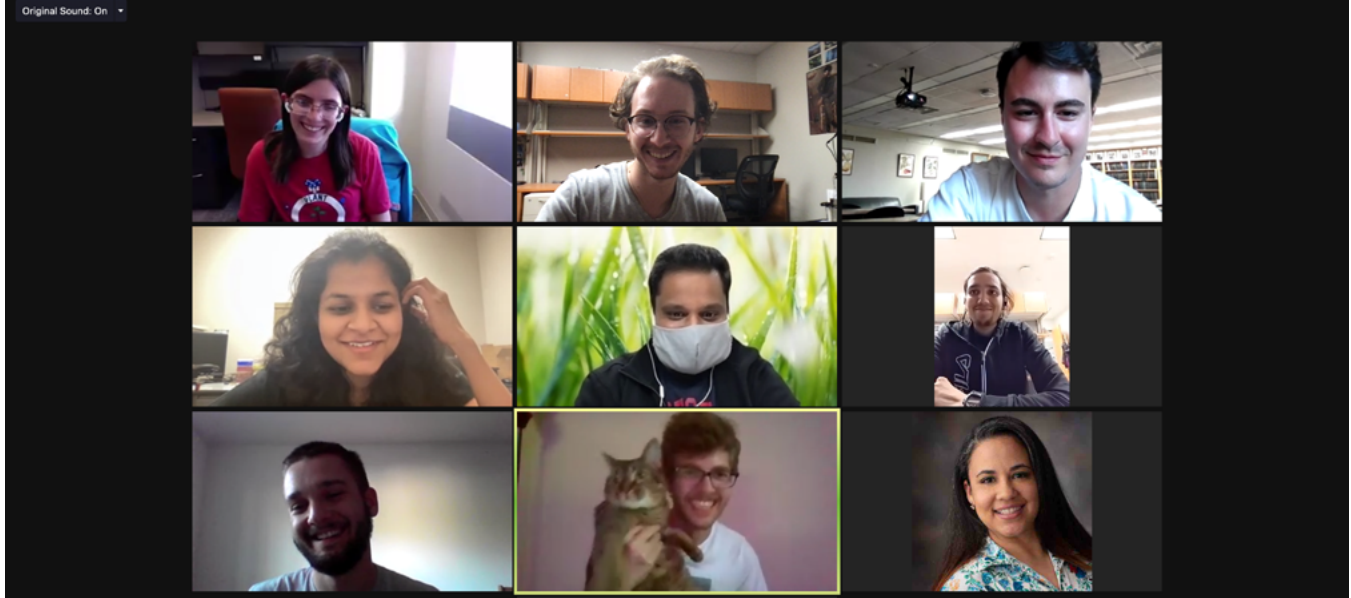
PPGSA has also been very active internally by planning socials, faculty-student engagement lunches, and monthly general meetings. Students have participated in board game nights, bowling, ice cream, a White Elephant gift exchange, and a Halloween party (including costumes). For our faculty-student engagement lunches, Plant Pathology faculty or other university members are invited to discuss topics that enhance students' professional development, such as picking a committee, setting up an effective experiment, and developing presentation and scientific writing skills. Additionally, PPGSA has instigated monthly zoom networking sessions with other universities in the American Phytopathological Society North Central division. These sessions allow our students to expand their professional network, learn about the research being conducted at other universities, and identify potential future opportunities and collaborators.

This next year, the club looks forward to continuing our monthly activities while building on our current momentum to increase professional development and engagement with and within the department. If there is any interest in participating in a PPGSA event, please reach out to the PPGSA president.

All of these activities and opportunities would not be possible without the substantial effort from the 2021-2022 officer team: Michael Richter (Vice-President), Shiv Singla (Treasurer), Nawaraj Dulal (Social Coordinator), Mitch Hockbein (Secretary), and Rosalba Rodriguez-Peña (GSA representative). Many thanks to our officers for their commitment to making PPGSA great!

A handwritten signature in black ink, which appears to read "Katherine Latourrette".

PPGSA IN ACTION



Pictured above are members of the Plant Pathology Graduate Student Association (PPGSA) with graduate students from the University of Wisconsin-Madison. Networking events were held monthly between the PPGSA and graduate student associations in other North Central plant pathology programs.



Above: Graduate students (from left) Haritha Nunna, Michael Richter, and Ph.D. researcher Maitham Al-Sammak working the Plant Pathology booth at 2021 Discovery Days, held on UNL's East Campus

Right: PPGSA members (from bottom left, clockwise) Katherine LaTourrette, Mahnoor Asif, Eric Parperides, Shiv Singla, and Nawaraj Dulal enjoying a heated game of Tryal during a board game social event

2021-22 OFFICERS

President: Katherine LaTourrette

Vice President: Michael Richter

Treasurer: Shiv Singla

Secretary: Mitch Hockbein

GSA Representative: Rosalba Rodriguez-Peña

Social Media Coordinator: Nawaraj Dulal

Faculty-Student Engagement Lunch

Coordinator: Shiv Singla



CREATING A CULTURE OF INCLUSIVE EXCELLENCE

The Department of Plant Pathology recently formed the Inclusive Excellence Advisory Group (IEAG) to help strengthen a culture of inclusivity, unity, and support within the department. The group's responsibilities include, but are not limited to, fostering a healthy environment in which value, respect, and dignity are given to all individuals; providing recommendations on how diversity and inclusion can be incorporated in teaching, learning, mentoring, and recruitment; and working to ensure department operations are transparent, fair, and honest.

The advisory group's name, Inclusive Excellence, is a term used by the University of Nebraska-Lincoln to emphasize "All are welcome here." Inclusive Excellence is the acknowledgement that diversity, equity, and inclusion (DEI) are central to the success of the University and must be integrated at every level. In the same way, Inclusive Excellence is crucial to

the success of the Department of Plant Pathology and will serve as a core guiding principle for all we do.

On November 5, 2021, the group met with Associate Vice Chancellor Rich Bischoff who shared anonymous summaries of the department climate survey that was deployed earlier in the year with the assistance of his office and the Office of Diversity and Inclusion. The group is working through these results, identifying areas of greatest need, and developing strategies for improvement. A broad summary of the survey results will be shared with department members as we work together to learn and grow in this space. The group will also focus early attention on developing a department statement of diversity and inclusion as well as a webpage of campus DEI resources housed on our department website. The advisory group will communicate regularly with department members to share progress and future plans.



**Members of the Inclusive Excellence Advisory Group (left to right):
Amber Hadenfeldt, Becky Higgins, Dr. Jeewan Jyot, Katherine
LaTourrette, Dr. Stephen Wegulo**

FRESH FACES



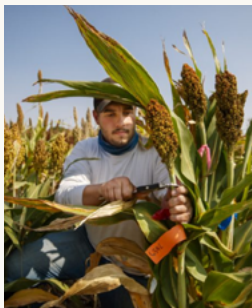
MyMy Luu joined the department in May 2021 as the new Office Associate in the Extension office and Plant and Pest Diagnostic Clinic.



Mahnoor Asif joined the department in August 2021 and is a Ph.D. student in Dr. Stephen Wegulo's lab.



Mitch Hockbein joined the department in January 2021 and is an M.S. student in Dr. Lirong Zeng's lab.



Kyle Linders joined the department in January 2021 and is an M.S. student in Dr. Brandi Sigmon's lab.



Eric Parperides joined the department in August 2021 and is a Ph.D. student in Dr. Hernan Garcia-Ruiz's lab.



Shiv Singla joined the department in January 2021 and is an M.S. student in Dr. Deanna Funnell-Harris' lab.

Welcome to all new members of our department! We're happy you're here.

A lot happened in 2020 and 2021! Read through our lab highlights to see what was happening here in the UNL Department of Plant Pathology.



Pictured above are Wilson lab members and their families on a group beach trip! Front row (left to right): Shuying, Julie, Jessie, Libby, Hadrian
Back row (left to right): Gang, Michael, Ziwen, Nawa, Dr. Wilson, Claudia

2021 proved to be a good year for papers, with the lab publishing 8 manuscripts, including three co-authored with current or former graduate students, one published in *Nature Microbiology*, and one our first foray into pre-prints. Dr. Wilson became a full professor this year and spoke (via Zoom) at several international meetings. He was a plenary speaker at the Korean Society of Plant Pathology annual conference and also an invited speaker at the EMBO PlantTOR meeting in Portugal. Dr. Wilson became an Associate Editor at *PLOS Pathogens* in the Plant Pathogens section, and was an Invited Editor at *mBio*. In Spring 2021, Dr. Wilson taught his first class, PLPT 963, Genetics of Host-Parasite Interactions. Dr. Wilson was elected vice chair of the ARD Advisory Council, becoming chair in 2022-2023.

We said “goodbye”, then “hello again!”, to Ziwen Gong, who due to COVID travel restrictions remained in the lab until May 2022. We hosted Dr. Sibongile Mafu, Assistant Professor at the University of Massachusetts-Amherst, while she learned new techniques for working with the rice blast fungus. In December, the lab received verbal notification of the award of an NSF PBI grant in the region of \$750,000 (final amount to be determined). This grant will allow us to continue our investigations into the nature and regulation of the membranous interface that emerges between fungal pathogen and host plant cell during the early stages of infection.

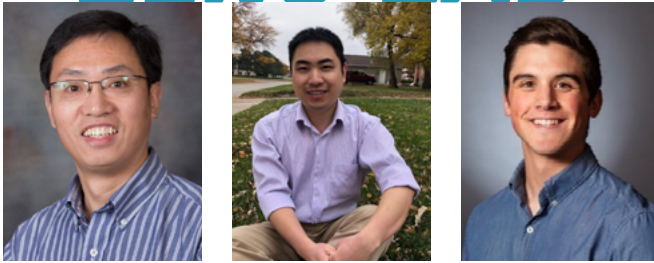


PROMOTION & TENURE

In 2021, Dr. Wilson was promoted to full professor. Below are some quick facts about him!

- Joined the department in 2009
- Has internationally-recognized molecular genetics program in field of molecular phytopathology
- Current research targets *Magnaporthe oryzae*
- Has had 10 yrs of continuous NSF support
- His lab has hosted over 30 undergrads, 8 grad students, and 5 visiting scientists
- Currently teaches PLPT 963 Genetics of Host-Parasite Interactions
- Serves on several dept. committees
- Offers professional expertise for multiple journals

ZENG LAB

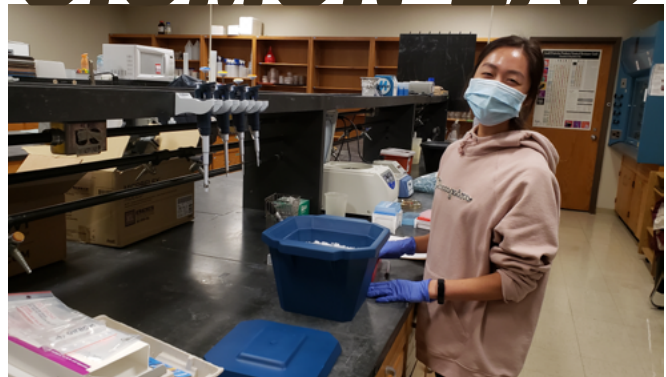


Zeng lab members (left to right): Dr. Lirong Zeng (advisor), Dr. Chaofeng Wang (post-doc), and Mitch Hockbein (M.S. student)

Research in Dr. Zeng's lab focuses on the elucidation and eventual manipulation for crop improvement the key mechanisms underlying plant immunity against biotic stresses caused by various microbial pathogens. His lab is particularly interested in the roles and molecular basis by which ubiquitination and other post-translational protein modifications regulate plant defense responses. There are two major projects currently ongoing in Dr. Zeng's lab. The first project studies the role of a tomato plasma membrane-localized ubiquitin E3 ligase and its Arabidopsis homolog in plant immune signaling, which is funded by the National Science Foundation (NSF). His group made a project breakthrough in 2021 by demonstrating that the E3 ligase targets a component of the endosomal sorting complexes required for transport (ESCRT) to modulate plant immunity. The second project involves discovery and in-depth understanding of the differential roles of plant ubiquitin-activating enzymes in plant defense against bacterial pathogens. Dr. Zeng was invited for an oral presentation of his research at the Annual Plant Biology Conference (Plant Biology 2021) organized by the American Society for Plant Biologists (ASPB). In addition to research, Dr. Zeng's lab is actively involved in supervising and fostering next-generation scientists such as graduate students and postdocs. In 2021, his lab welcomed a new master's graduate student, Mitchell Hockbein.

Mitchell was awarded by the prestigious CASNR Mary and Charles C. Cooper/Emma I. Sharpless Fellowship for his graduate study. Dr. Zeng's undergraduate and graduate dual-listed course, Microbial Genetics and Genomics was approved by the university and officially listed in the UNL Undergraduate Catalog last year. In addition, Dr. Zeng was appointed as the chair of the department Curriculum and Instructional Improvement Committee (CIIC) in 2021. Thanks to the strong support from the department head and all faculty members, the Plant Pathology Minor proposed by the CIIC was approved by UNL. With support by NSF, Dr. Zeng's lab was able to host an undergraduate student, Daniel Bacher from Oregon State University for the 2021 UNL Summer Research Program.

SIGMON LAB



Alice Guo setting up her very first experiment in the new lab space in Plant Sciences Hall on East Campus

2021 saw the start of the Sigmon Lab in Plant Sciences Hall on East Campus, which plans to focus on molecular biology, genetics, and development and phenotyping in maize and sorghum. The lab's first master's student, Kyle Linders, started this year, and his thesis project will involve phenotyping the Sorghum Association Panel under different nitrogen treatments for many different biomass and

2020-21 LAB HIGHLIGHTS

panicle traits to better understand the impacts of nitrogen stress on sorghum development and yield. Also, Microbiology undergraduate student, Alice Guo, received UCARE funding to start working on a project in the lab investigating gene expression patterns in maize lines that are resilient to nitrogen stress. Another undergraduate student, Clay Christenson, who is a double major in Plant Biology and Mathematics, completed an independent study project focusing on image processing and analysis of 3D videos of field-grown maize ears. Once fully developed, this processing and analysis protocol will have a broad range of applications in future studies of maize ears in the lab. We also mentored a talented high school intern this summer named Elise Keller. Her project involved assembling a collection of DNA and RNA from prairie grasses closely related to maize and sorghum for future comparative studies. With these projects started, we look forward to an exciting 2022!

WEGULO LAB



Wegulo lab members (left to right): Dr. Stephen Wegulo (advisor), Julie Stevens (technologist), and Mahnoor Asif (Ph.D. student)

The Wegulo Lab studies the epidemiology and integrated management of Fusarium head blight (FHB), a devastating disease of wheat and other small grain cereals caused mainly by *Fusarium graminearum*. Wheat and barley lines in the UNL small grains breeding program are screened for resistance to FHB, stem rust, and

leaf rust. Field trials are conducted to evaluate the efficacy of fungicides in controlling head and foliar fungal diseases of wheat including FHB, leaf spots, and rusts. Extension activities include the development and delivery of clientele-targeted educational materials, participation in crop production clinics and field days, and annual wheat disease surveys. In 2020, Esteban Valverde Bogantes, co-advised by H.E. Hallen-Adams and S. Wegulo, graduated with a Ph.D. in Food Science and Technology. His dissertation research involved a four-year survey evaluating the species, trichothecene genotype, and phenotypic diversity of FHB pathogens infecting Nebraska wheat. The majority of the isolates were identified as *F. graminearum*. Other species identified included three *F. boothii*, two *F. poae*, and one *F. acuminatum*. An *F. graminearum* × *F. boothii* interspecific hybrid was also identified. All *F. graminearum* and *F. boothii* isolates had the 15-ADON genotype. A greenhouse study showed that isolates of *F. graminearum* were more aggressive and produced more DON than *F. boothii* isolates. A simple PCR-based assay was developed to identify FHB pathogens and facilitate pathogen species surveillance. The resulting research enhanced knowledge of the diversity of FHB pathogens in Nebraska and will be useful in disease management by providing a baseline for future FHB surveys. A recently (2021) published book chapter, “Advances in understanding the epidemiology of *Fusarium* in cereals,” was well received by the FHB research community. In 2021, Mahnoor Asif joined the lab as a Ph.D. student working on FHB. The lab is managed by research technologist Julie Stevens.

YUEN LAB

Over the past two years, Dr. Gary Yuen focused most of his efforts on undergraduate and graduate teaching. To meet the challenges of instruction under pandemic conditions, he

provided his undergraduate Introductory Plant Pathology course and graduate Plant Pathology Principles & Application and Biological Control of Pest course via online technology. At the same time he was active in course and curriculum development to enhance future instruction in the department. He created Plant Pathogens and Disease to be a required course for all students in the new undergraduate Plant Landscape and Systems major and collaborated in the development of the new undergraduate Plant Pathology minor.



A screenshot from the Zoom celebration held in honor of Dr. Vivian Shi's graduation in May 2021

Christy Jochum, who was the Research Technologist in Dr. Yuen's lab for over 20 years, retired at the end of 2020. Meanwhile, Dr. Yuen's Ph.D. student Dongxue (Vivian) Shi was stranded in China by the pandemic since early 2020. As a result, the Yuen lab was relatively quiet during 2021. Nevertheless, Christy assisted Dr. Yuen in completing research investigating the role of fungi in the damage to soybean caused by the soybean gall midge, while Vivian remotely completed and defended her dissertation (Characterizing the Expression of Biocontrol Genes by *Lysobacter enzymogenes*

Strain C3 in vitro and in the Rhizosphere). Katie Bathke, who began an independent research project in Dr. Yuen's lab in 2019 as a freshman, presented her results in a poster (The biological control of bacterial leaf streak of corn using *Bacillus subtilis* and *Bacillus pumilus*) at the 2021 APS Annual Meeting.

POWERS LAB



Former M.S. student, Abigail Borgmeier (left) celebrating her August graduation with her parents

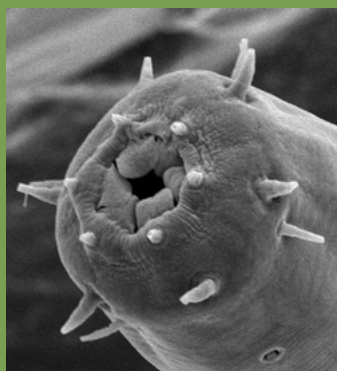
Abigail Borgmeier completed her master's thesis on comparative nematode biodiversity in the Lancaster County Prairie Corridor. She graduated in August, presented her results at the Annual Meeting of the Society of Nematologists, and immediately entered a Ph.D. program at Brigham Young University in evolutionary biology. Our nematology team published a description of a new lesion nematode species from corn in Nebraska and Kansas. The new species, *Pratylenchus smoliki*, is named in honor of a long-term colleague, Dr. James Smolik, former nematologist at South Dakota State University. Novel research activities include exploring nematode-algal virus interactions in collaboration with Dr. David Dunigan and Dr. James Van Etten's chlorella virus team. We have discovered remarkable nematode adaptation to the high pH, hyper-alkaline lakes of the

2020-21 LAB HIGHLIGHTS

western Sandhills. Together with nematologists from the University of Florida, through a USDA funded project, we are constructing a nematode mitochondrial DNA database for a metagenomic barcoding approach to characterization of nematode communities. And although 2021 was especially difficult for students, our three UCARE students Innocent Byiringiro, Cassidy Chase, and Katie Burton, all managed to make progress on their DNA barcoding projects.



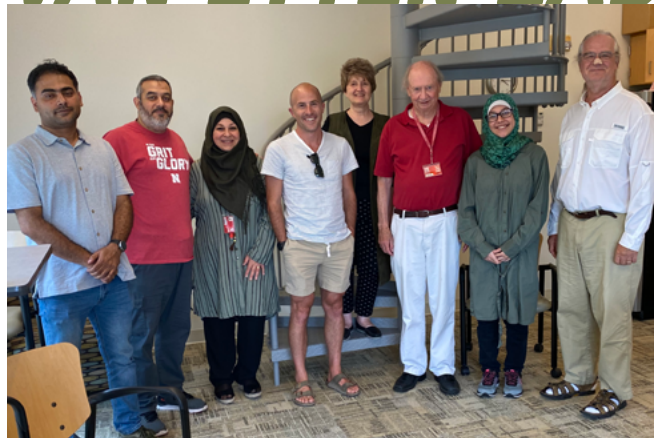
Members of the department celebrating with Abigail following successful defense of her master's thesis



Photos, like what is featured on the cover of this year's newsletter, will be presented in an upcoming gallery show at WallSpace Ink. Images of nematodes

captured by the Powers lab will be displayed. The show will demonstrate the connection between those that walk the earth and those that live within the earth. The show is expected to debut later this year. We look forward to sharing more information about it's opening as it gets closer.

VAN ETTEN LAB



Van Etten Lab members (left to right): Dr. Jayadri Ghosh, Maitham Al-Sammak, Zeina Al-Ameeli, Eric Noel, Dr. Irina Agarkova, Dr. Jim Van Etten, Fatima Al-Sammak, Dr. Dave Dunigan

The Van Etten laboratory continues to work on a range of topics associated with the molecular biology, biochemistry, physiology, ecology, and bioinformatics of viruses that infect certain unicellular, eukaryotic chlorella-like green algae. Chloroviruses are found in freshwater all over the world and they have many interesting and unexpected properties. One property is that the chloroviruses are among the largest viruses known, containing as many as 16 tRNA-encoding genes and 400 protein-encoding genes, including many not previously reported in viruses. These genes encode DNA restriction and modification enzymes, hyaluronan and chitin biosynthetic enzymes, polyamine biosynthetic enzymes, ion channels and transporters, and many glycosyltransferases. The proteins encoded by some of the chloroviruses are either the smallest or among the smallest proteins of their class. Consequently, some of the chlorovirus-encoded proteins are the subject of intensive biochemical and structural investigation. Currently there are more than 475 publications on the chloroviruses and their gene products. In the past year, our lab published nine manuscripts and three more are in press on

the viruses. This year's publications were in *J. Virology*, *PLoS One*, *J. Gen. Physiol.*, *Viruses*, *Cells*, *J. Phycol. Microbiome*, *Microorganisms*, and *Glycobiology*. Invited seminars were presented at Virginia Tech Univ. (virtual) and at two scientific meetings (virtual). We currently have active projects with collaborators at Purdue University, University of Texas El Paso, three Universities in Italy (Milano, Genova & Naples), Germany (Darmstadt), France (Aix-Marseille University), and Spain (University of the Basque Country). We currently have a NSF-EPSCoR-funded project with the University of Delaware, University of Hawaii, and Roger Williams University (Rhode Island) that involves looking for chloroviruses in the unique alkaline lakes located in western Nebraska. There are only two other places in the world that have lakes similar to the ones in Nebraska.

GARCIA-RUIZ LAB



Garcia-Ruiz lab members (left to right): Rosalba Rodriguez-Peña, Erica Schufeldt, Dr. Hernan Garcia-Ruiz (advisor), Katherine LaTourrette, Eric Parperides, and Katie Tran

Our lab is focused on the study of plant-virus interactions, mainly the mechanisms of antiviral gene silencing, determinants of symptom development in virus-infected plants, determinants of host adaptation, and genomic

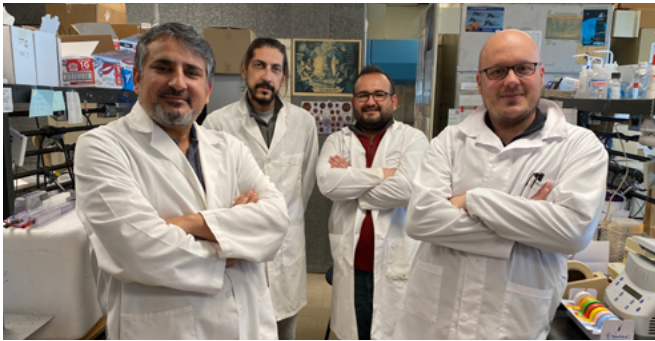
variation in viruses. Plants and other eukaryotes use gene silencing to target and destroy foreign RNA, including viruses. Current projects focus on the early steps of the gene silencing pathway, the interaction between the plant's antiviral response and virus pathogenicity, and in the identification and characterization of cellular factors with pro-viral or antiviral activities. We implement an interdisciplinary approach that combines biochemical, genetic, genomic, and bioinformatic tools. We use experimental model systems that consist of positive- and negative-strand RNA viruses and model plants *Arabidopsis thaliana* and *Nicotiana benthamiana*, and heterologous host *Saccharomyces cerevisiae*. We are particularly interested in the mechanisms of Maize Lethal Necrosis. We have identified several silencing suppressors from viruses implicated in Maize Lethal Necrosis, and hypervariable regions in the genome of potyviruses, poleroviruses, orthotospoviruses, and betacoronaviruses. Hypervariable areas in viral genomes mediate adaptation to hosts and vectors without compromising functionality. The computational approach developed is a fundamental tool for profiling viruses of agricultural importance. Our findings have an immense impact on agriculture, such as molecular diagnostics and engineering of genetic resistance to viral diseases in plants.

In August 2021, Dr. Garcia-Ruiz was named the Associate Director for the Nebraska Center for Virology on UNL's East Campus. Congratulations on this accomplishment Dr. Gracia-Ruiz! For more information about his program, visit <https://plantvirology.unl.edu/>

MITRA LAB

The Mitra lab is busy hosting one visiting scientist, Dr. Inanc Soylu, and two postdoctoral research associates, Dr. Hasan Pinar and Dr. Mahmut Kaplan, working on disease resistance in transgenic potato and tomato plants.

Their efforts include use of multi-domain antimicrobial peptides, mutated R genes, and RNA interference approaches for resistance against zebra chip disease in potato and a several viral diseases of tomato. In addition, graduate student Serkan Tokgoz is trying very hard to make up lost time and graduate by spring 2023. All in all, things are hectic and a lot of dishes are piling up every day!



Mitra lab members (left to right): Dr. Hasan Pinar, Dr. Mahmut Kaplan, Serkan Tokgoz, and Dr. Inanc Soylu

JACKSON- ZIEMS LAB

Our lab has undergone several changes over the last year. Jae Brungardt has transitioned out of her Technologist role to a smaller, part-time position in the lab, so we're working to refill her position. Technologist Brad Tharnish continues to lead our field testing program and we were glad to return to more "normal" (pre-COVID) operations during this past year.

Graduate student Asha Mane, co-advised with Sydney Everhart, has been busy with her research and is gaining recognition for her work. Asha's results have confirmed widespread fungicide resistance in the frogeye leaf spot pathogen of soybean in Nebraska and her follow-up survey results are helping us to better understand how fungicide application decisions are made by stakeholders. She was awarded 1st place for her poster presentation at the 2021

North Central Division meeting of APS and more recently won the 2nd place poster award at the International IPM Symposium in Denver, CO. Kudos, Asha!

Tamra continues on a busy Extension program schedule that is still recovering from the pandemic and now has more teaching responsibilities. The online mini-course, Corn Diseases, debuted in Spring 2021. The PLPT 891 Plant Diseases Across Nebraska tour course resumed again in August and we had a great time traveling to the Nebraska Panhandle and back, giving students the opportunity to see much more of our state and the plant production systems here.



Ph.D. student Asha Mane presenting results of her survey on fungicide resistance of frogeye leaf spot at the 2021 Soybean Management Field Days

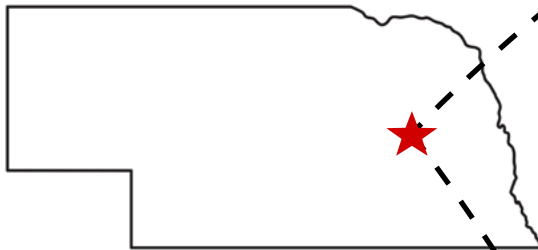
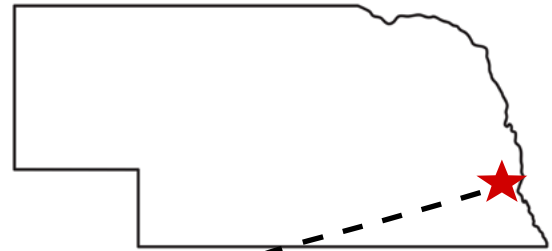
PLPT 891 FIELD DISEASES ACROSS NEBRASKA TOUR



Above: Students meet with Kyle Broderick and Roch Gaussoin to discuss turf before leaving Lincoln



Left: Students arrive at Kimmel Orchard in Nebraska City, NE



Fun fact! Did you know that the potatoes in your bag of potato chips may have been grown in NE? The photo on the right shows students on a tour at CSS Farms near Duncan, NE



Left: M.S. student Shiv Singla, talking with Dr. Bob Harveson in a field of dry beans. In the background, students observe and take note of the field.



Updates from the USDA-ARS labs

FUNNELL- HARRIS LAB



M. Sci. student, Shiv Singla, screening wheat with increased levels of lignin and other phenolics for resistance to Fusarium head blight

Dr. Funnell-Harris' research involves systematically describing, using molecular and biological techniques, interactions of fungal pathogens with specific sorghum and wheat host genotypes, especially those with altered lignin and carbohydrate compositions and concentrations.

TATINENI LAB



Tatineni lab members: Front row (L to R): Emily Rasmussen, Haritha Nunna, and Dr. Tatineni. Back row (L to R): Jeff Alexander, Sourav Pal, and Emma Sidel.

The main focus of Dr. Tatineni's lab research is virus-virus, virus-host, and virus-vector interactions of economically important wheat streak mosaic virus (WSMV), Triticum mosaic virus (TriMV), and High Plains wheat mosaic virus. Since these three viruses are transmitted by a common vector, wheat curl mite, mixed infection of wheat with two or three viruses is common in growers' fields with exacerbated yield loss. Dr. Tatineni's lab is working to understand how these viruses cause disease in wheat and identify the host and vector factors required for completion of the virus infection cycle and use this information to disrupt the virus infection cycle through biotechnological approaches such as RNA-interference and gene editing. To achieve these goals, Dr. Tatineni and his team are examining viral gene functions through reverse genetics and biochemical and molecular biology approaches and identifying host and viral factors through protein-protein and protein-RNA interaction and bioinformatics studies.

The availability of GFP- or RFP-tagged WSMV and TriMV facilitated the examination of viral genes required for movement, disease development, superinfection exclusion (SIE), synergistic interaction, and mechanisms of Wsm1 and Wsm2 genes resistance in wheat cultivars against WSMV and TriMV. Dr. Tatineni's lab developed RNAi-based dual resistant transgenic wheat against synergistically interacting WSMV and TriMV. Dr. Tatineni and his team are working on: (1) mechanisms of SIE of WSMV and synergistic interaction between WSMV and TriMV; (2) virus-host interactions of WSMV to identify means of disruption and control of viral diseases; (3) virus-vector interactions between WSMV and wheat curl mites to identify ways to interrupt vector transmission; and (4) developing and characterizing transgenic wheat for resistance to WSMV and TriMV and pyramid transgenes with natural resistance genes.

UPDATES FROM THE

PLANT & PEST

DIAGNOSTIC CLINIC



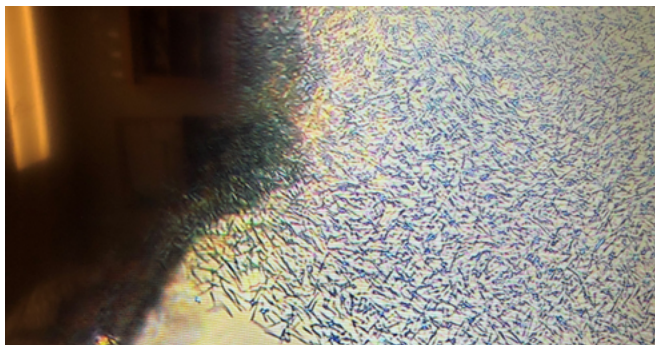
P&PDC Coordinator,
Kyle Broderick

Life in the Plant & Pest Diagnostic Clinic (P&PDC) returned to a general sense of normalcy in 2021 and we were able to be fully staffed (if socially distant) for much of the year.

In total, we received 1,276 unique samples from eight states. As is often the case, corn and soybeans dominated the samples, receiving 244 and 127 unique samples, respectively. The P&PDC continued to serve as the pathologist for the Nebraska Department of Agriculture (NDA) and roughly 10% of the samples were a part of NDA greenhouse, nursery, and field inspections. Fortunately, there



Tar spot (*Phyllachora maydis*) ascomata on corn leaves.



Phyllachora maydis (tar spot of corn) phialides erupting from an ascomata



Bacterial stalk rot of corn (*Erwinia dissolvens*). Note the shiny, bacterial exudate in the crown

were no major diseases identified that resulted in

regulatory action. Aside from the agronomic and NDA samples, we also received samples from golf courses, vineyards, organic vegetable producers, and commercial greenhouses. The biggest development in corn diagnostics was the arrival of tar spot. Over the course of 3 days late in the growing season, we confirmed tar spot in 5 counties along the Missouri River. The disease was also confirmed on ornamental corn shocks being sold in Lincoln. In addition to common foliar diseases such as southern rust, bacterial leaf streak, and gray leaf spot, Fusarium crown and stalk rot was problematic in many fields.

White mold of soybeans was common in many parts of the state. White mold has historically been a problem in the northern part of Nebraska, but the heavy reliance on irrigation in 2021 provided ideal conditions for the pathogen to spread during flowering and resulted in this disease being a problem much further south than had been seen previously. Additionally, we began receiving soybean samples of the interveinal chlorosis and necrosis that is common with diseases such as Sudden Death Syndrome (SDS) and brown stem rot, however

UPDATES FROM THE

PLANT & PEST DIAGNOSTIC CLINIC



Triazole fungicide toxicity on soybeans due to drought conditions. These symptoms are almost identical to those caused by SDS, but may occur lower in the canopy.

the uppermost leaves of the plants were healthy which is not common for either of these diseases. Conversations with growers revealed that the cause of injury was toxicity due to the application of triazole fungicides on drought-stressed plants. We also confirmed soybean vein necrosis virus in Nebraska for the first time.

The increase in attention to landscapes and gardening that we saw in 2020 continued as well. Abiotic problems due to environmental conditions were most common (dieback from extreme cold, drought injury, etc.). Anthracnose on shade trees was a problem in many parts of the state due to the delayed bud-break period. As is often the case, brown patch of turf was a problem in many landscapes as well and a lot of home gardeners had to deal with bacterial leaf spots on peppers and tomatoes.

Another aspect of the Clinic's return to normalcy meant the return of our educational booths

Scleroderma
earthball a.k.a.
"Devil's snuff box"



Slime mold on tall fescue

at the Lincoln Haymarket Farmers' Market. With the help of the Plant Pathology Graduate Student Association we were able to connect with many urban clients who

were previously unaware of the P&PDC. We were also involved in the UNL Discovery Days, an educational event hosted on campus. While similar to the Farmers' Market outreach events, the Discovery Days had more of a youth focus.

One of the biggest changes to the P&PDC was the departure of our long-time office associate, Debbie Pederson. For over 25 years, Debbie kept the P&PDC running and we wish her the best in her retirement. While nobody wanted Debbie to retire, change can be good for an organization and we were able to hire a new office associate, MyMy Luu. MyMy was born in Moscow and moved to Hanoi, Vietnam when she was 4 years old. At the age of 16, she came to Nebraska as a part of a study abroad program and has been here since. MyMy began working with the P&PDC in May 2021 and has been a great asset.



PLANT PATHOLOGY AWARDS

In the Department of Plant Pathology, we have a few department-specific awards that are distributed yearly. These are the Goss Memorial Scholarship and PPGSA Professional Development Award for students and the Lambrecht Award for technologists.

The Goss Memorial Scholarship was developed to help defray expenses for students who are presenting research at regional and national/international meetings, attending and participating in relevant workshops, or any other appropriate scholarly activity beyond the normal execution of their research. In 2021, we had 6 recipients of the Goss Memorial Scholarship: Samuel Eastman, Katherine LaTourrette, Asha Mane, Edgar Nieto Lopez, Haritha Nunna, and Sergio Gabriel Peralta.



The PPGSA Professional Development Award was established in 2020 and is meant to be used as financial assistance to travel to scientific meetings or attend workshops and training events. In 2021, there were 7 recipients of the award: Samuel Eastman, Katherine LaTourrette, Asha Mane, Sourav Pal, Michael Richter, Rosalba Rodriguez-Peña, and Shiv Singla.



The Lambrecht Award for Technologists recognizes the contributions of technologist Patricia Lambrecht to the science of plant pathology, the laboratory of Dr. Anne Vidaver and others, and assistance to the department in mentoring students, technicians, and post-docs in various techniques and practices in plant pathology, especially those connected with bacterial plant pathogens. The award is primarily for the furtherance of the awardee's education, attendance at conferences and meetings, travel to meetings and experimental sites, or other activities. In 2021, the recipient of the Lambrecht Award was Julie Stevens, technologist with Dr. Stephen Wegulo.

Congratulations to all recipients of awards and scholarships in 2021!

DEPARTURES



Dr. Sydney Everhart

In August of 2021, Associate Professor Dr. Sydney Everhart began a new adventure at the University of Connecticut. She currently serves as the department head for the Department of Plant Science and Landscape Architecture.

A few members of our department also joined Dr. Everhart at UConn: Daniel Cerritos Garcia and Sergio Gabriel Peralta, Ph.D. students, and Rachel Koch Bach, post-doc. All have started their new adventures on the East coast. We wish them the best of luck on their new endeavors!

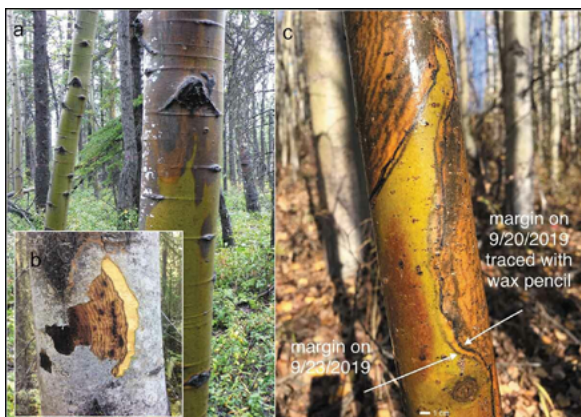


At left, members of the Everhart lab at UConn: Daniel Cerritos Garcia (Ph.D. student), Sergio Gabriel Peralta (Ph.D. student), and Dr. Rachel Koch Bach (post-doc).

In 2021, Dr. Gerry Adams, Associate Professor of Practice, retired from the department. Dr. Adams is now an emeritus professor and has so far been enjoying retirement, occasionally stopping into his office in Plant Science Hall. Late last year, Dr. Adams published a new article on Aspen Running Canker Disease in Alaska which was featured on the cover of the *Canadian Journal of Plant Pathology*.



Dr. Gerard Adams



GRADUATES



Dongxue (Vivian) Shi
Ph.D. graduate, May 2021
Advisor: Dr. Gary Yuen



Abigail Borgmeier
M.S. graduate, August 2021
Advisor: Dr. Tom Powers



Edgar Nieto Lopez
PhD graduate, December 2021
Advisor: Dr. Sydney Everhart

In 2021, we had three wonderful scientists graduate from our department. We're extremely proud of each of them!

- **Vivian Shi** graduated in May and is currently in China with her daughter and family.
- **Abigail Borgmeier** graduated in August and started her PhD program at Brigham Young University with Dr. Byron Adams.
- **Edgar Nieto Lopez** graduated in December and accepted a post-doc position at Iowa State University.

Congratulations to our 2021 Plant Pathology Graduates!

SAVE THE DATE!

JUNE 21-23, 2022 **— LINCOLN, NE —**

APS North Central Division 2022 Annual Meeting

Please join us as we gather
in-person and provide
opportunities for connection
and professional networking!

<https://go.unl.edu/nc-aps2022>





The Department of Plant Pathology is on a trajectory to be a leading institution in our field of science. As we continue to grow our department, there is a consistent need to support faculty, staff, and students in ways that inspire community and strengthen relationships in order to build connections and a sense of belonging.

The Plant Pathology Department Excellence Fund has been established to provide opportunities for future students and our department community. It is critical that our students are exposed to a diverse set of experiences to help them become effective leaders. Teamwork, leadership, interpersonal skills, collaborative projects, community outreach, teaching, and communication with diverse audiences are examples of qualities we want our students to grow in by encouraging their participation in rewarding activities.

Please consider donating to this fund to ensure opportunities continue that build our community of professional plant pathologists at UNL. To make a contribution to this fund, please visit: go.unl.edu/plantpath-excellence.