Chapter 7

Advancing Ohio State Plant Pathology to National Prominence (1984–2005)

Just as the attainment of a separate Department of Plant Pathology in 1967 finally came only as part of a series of administrative decisions made at college and university levels, so the further development of the department took place in a climate of continual change at The Ohio State University. During the first dozen years of its existence, the department received good financial support from Dean Roy Kottman, who at that time, "wore three hats" as Dean of the college and Director of both the OARDC and the Extension service. He had championed the department from its beginning and facilitated its considerable growth in the early years under Ira Deep's leadership. However, the financial position of the state began to decline by the late 1970s and things changed considerably by the early 1980s. Kottman retired in 1982 and an administrative merger took place between OARDC and the university. No longer would all the power in the college be placed in the hands of one individual. Furthermore, a period of leadership instability occurred in the college, with two deans and two interim deans holding the reins in less than ten years. In 1983, Max Lennon came from the University of Missouri to follow Roy Kottman as Dean. No greater contrast could be imagined than between those two leaders. Lennon was a man on a mission who came in and vowed to change everything overnight. He had so many new ideas and was in such a hurry to change things that many faculty referred to him privately as "Fast Max." He stressed that the college and its faculty had to become a more intimate part of the greater university beyond the agricultural community, championed new forms of faculty governance, set up the first college promotion and tenure committee, and spoke passionately of the promise of advanced science to quickly revolutionize agriculture through biotechnology.

At this same time, new leadership came to the Department of Plant Pathology. Ira Deep stepped down as the department's first chairperson in 1984. After a nationwide search, Charles Curtis, chairperson of Plant Science at the University of Delaware, was attracted to lead the department. He arrived at the height of the whirlwind created by Max Lennon and threw himself into leading the department in these new directions. He strongly stressed that the faculty had to engage more fully in biotechnology and the molecular revolution that was taking place in the biological sciences. In a time of declining allocated resources, he pushed the faculty to place increased emphasis on writing grant proposals to obtain outside support for their research. He encouraged the faculty to increase the visibility of the department and publicize its accomplishments. Lennon made resources available to the department and four new faculty were hired in Curtis' first two years. Two of these, Terry Graham and Robert Garber, were basic scientists brought to increase department expertise at the cellular and molecular levels. As chairperson, Curtis was highly visible, taking many roles on university committees, councils, and task forces and working with the college leadership

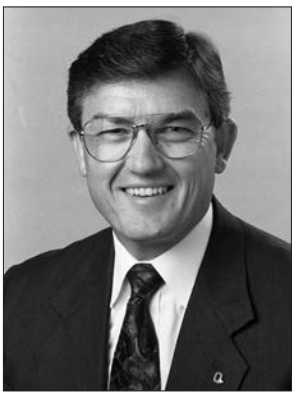
OSU Archives

Charles Curtis (left) and Ira Deep, 1986

to pull the college more into the academic life of the university.

Like many reformers, Max Lennon did not stay long in any one place. In 1986, after only three years as Dean, he left to become President of Clemson University. He was followed as VP and Dean by Fred Hutchinson, an agronomist who had come from the University of Maine only a few years earlier to be OARDC Director. Hutchinson was warm, personal, and reassuring, but the Lennon whirlwind was over, and now resources were again declining. OARDC had developed a significant budget deficit, and a period of austerity was upon us. In the next ten years, only two new department faculty were hired and budgets were cut continually. Despite this climate, the department thrived. Curtis had championed an interdisciplinary Plant and Pest Diagnostic Clinic and that developed well. He also stressed the department needed to enter into the new era of distance learning, and he led by example in that area. The faculty put major emphasis on development of the graduate program and graduate student enrollments ranged from 20–30 throughout the 1980s and 90s. The mix of graduate students became more international and many more women were enrolled in the program. Several plant pathology faculty played key leadership roles in a new interdisciplinary Plant Molecular Biology and Biotechnology graduate program begun in the college.

Hutchinson, too, did not stay long and, again after only three years as Dean, became OSU provost in 1989. For the next two years, the college was led by interim VP and Dean Robert Warmbrod, who had been chairperson of the Department of Agricultural Education. Leadership stability finally returned to the college in 1991 with the appointment of Bobby Moser, former director of OSU Extension, as VP and Dean. Moser was a strong supporter of Ohio agriculture, came from an animal science background, and understood the importance of plant pathology in the mission of the college. Throughout the next 20 years under his leadership of the college, Moser was supportive of the department, though the financial and academic climate within the university went through continual change.



OARDC

Under President Gordon Gee, a major restructuring of the entire university took place in the mid-1990s, aimed at moving Ohio State into the top tier of public research universities. Student admission policy was moved from an open enrollment philosophy to selective enrollment. Strong emphasis was placed on undergraduate teaching by all faculty. Departments were held to higher academic excellence factors, though there was considerable debate about what those were. Standards for new faculty hires, promotion, and tenure were continually raised. "Responsibility Based Budgeting," a new fiscal system, was introduced and department funding was tied to teaching credit hours. Deans were pressured to do major restructuring in their own colleges, and in response, VP Moser began Project Reinvent in 1994. Among the goals of this effort was a consolidation of academic departments in the college. For the first time since its founding in 1967, the existence of the Department of Plant Pathology was threatened by Moser's initial proposal that the departments of horticulture, agronomy, and plant pathology all be combined into a department of plant sciences. After considerable discussion by the faculty, Randall Rowe and Michael Garraway prepared a document rebutting this proposal that was sent to the college cabinet. The argument was made that plant pathologists were microbiologists, not plant scientists, and subsuming all department activities within those of 40–50 plant scientists would greatly undermine our programs. We made a strong pitch to remain as a separate academic department. However, if some combination had to be made, it would be better to combine with entomology, with pest management as a common factor. Fortunately, the strength of the faculty's rebuttal was recognized. In the end, the college was restructured from 11 academic departments to 8, but plant pathology remained independent.

Charles Curtis stepped down in 1996 and Randall Rowe became department chairperson. Rowe had been on the faculty in Wooster since 1974, and was the first Plant Pathology chairperson located on the Wooster campus. During his decade in that position, three faculty served as associate chairpersons on the Columbus campus, Terry Graham, Steve Nameth, and then Michael Boehm. As chairperson, Rowe

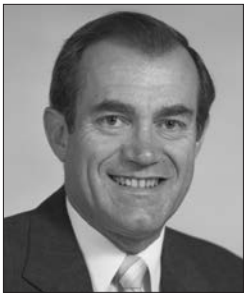
Randall Rowe (left) and Terry Graham at Kottman Hall, Columbus, 1996

worked to facilitate faculty governance, improve the integration of department activities among the two campuses, increase undergraduate and graduate student enrollments, recruit and mentor new faculty of the highest quality, and assure the fiscal integrity of the department. His tenure as chairperson was concurrent with implementation of Responsibility Based Budgeting within the university, which dictated major changes in fiscal management. This was a time of declining operating revenues available to departments from both the OARDC and Extension Service, and a shift in university policy towards tying operating revenues for departments to credit hours of teaching. Dealing with this necessitated working closely with faculty, developing creative approaches to budgeting, and increasing dependence on extramural funds for department operations.

The OARDC deficit had ballooned to over $9 million by 1993 when Tom Payne came as the new OARDC director. Payne was a talented reformer and worked diligently to get the fiscal house in order by increased austerity and a targeted appeal to the legislature for new resources. His efforts paid off, and by 1997, the deficit was retired. This paid significant benefits for academic departments as new resources became available. Five new faculty were hired in the first term of Rowe's leadership, including several with significant reputations in molecular plant-microbe interactions. In addition to the recognized excellence of the current faculty, the department had positioned itself nationally as a visible leader in the discipline by widespread faculty participation as journal editors, committee chairs, grant panel members, and leaders in professional societies. Rowe served as president of the American Phytopathological Society in 1993, followed in that role by Laurence Madden in 1997, and Steven Slack in 2001.

At the time of an external department peer review in 2000, there were eight department faculty in Columbus and ten in Wooster, plus two ARS adjunct faculty. The department's graduate program remained strong, with 25–30 M.S. and Ph.D. students enrolled, and undergraduate teaching had increased significantly. An undergraduate Plant Health Management major enrolled about 10 students, and a plant pathology minor was in place. The department continued its strong emphasis on Extension programming with about ⅔ of the faculty participating in the Extension mission in some way. The report of the review team to the college leadership recognized Ohio State Plant Pathology as "an outstanding department that enjoys a reputation of distinction among other like departments in the United States." They found "the Extension, outreach, and disease management programs of the department to be among the very best of peer programs in the United States" and concluded that, "The excellence of the department continues to add to their national and international reputation for quality research, teaching, and Extension programs in plant pathology." After 33 years as a department of plant pathology, Ohio State had reached its goal of becoming recognized nationally as among the best centers of research, teaching, and outreach in the discipline.

Charles R. Curtis (1938–). B.S. (1961), M.S. (1963) and Ph.D. (1965), all from Colorado State University.



Curtis served in the U.S. Army (1965–67) in the Army Security Agency with assignments to the National Aeronautics and Space Administration (NASA). From 1967–78, he was a member of the plant pathology faculty in the Department of Botany, University of Maryland, rising to the rank professor. He then served as chairperson, Department of Plant Science, University of Delaware (1978–84), and as a special assistant to the president and provost for international programs. There he established the first large grant with the Agency for

International Development to train agriculture students from the University of Panama. While at Delaware he received the NASA Cosmos Achievement Award for participating in a cooperative NASA-Soviet Union biosatellite experiment. In 1984, Curtis was appointed professor and chairperson of the Department of Plant Pathology, The Ohio State University, Columbus. He replaced Ira Deep, who returned to teaching and research following 16 years as chairperson. Curtis served as chairperson until 1996, when he returned to full-time teaching and research. He retired in 2006.

As department chairperson, Curtis promoted the concept and development of a new interdisciplinary Plant and Pest Diagnostic Clinic in Columbus. He developed a renewed emphasis on writing grant proposals and obtaining outside funds to support expanded research, particularly biotechnology, and developed an awareness that the department must better publicize its accomplishments and honors. Curtis was organizer, chairperson, or moderator of numerous symposia and workshops focused on integrated pest management, air pollution effects on vegetation, status of undergraduate plant pathology programs, international agricultural research, biotechnology, and risk-assessment of fungicide use. He represented the college and university administration as a member or chairperson of several committees, councils, and task forces and served on the Pesticide Advisory Council of the Ohio Department of Agriculture. Curtis represented OSU as a member of the 1987 Governor's Trade Mission to India. With other chairs, he toured agricultural facilities in the Dominican Republic (1988) and the Centro Internacional de Agricultura Tropical (CIAT) in Colombia (1989) to facilitate research collaborations and scientific exchanges. In 1990–91 he participated in delegations to the Chinese Academy of Agricultural Sciences, Beijing, the Asian Vegetable Research and Development Center, Taiwan, and the International Maize and Wheat Improvement Center (CIMMYT), Mexico. He was invited to join an Ohio agriculture exchange team to visit the agriculture system in Israel. Curtis served as a grant project director for USDA/NAPIAP to prepare an evaluation of approaches to assess the agricultural benefits of pesticide use (1986–1992). This study led to a national fungicide benefits assessment study for all major commodities in the United States.

Plant Pathology Department

Charles Curtis at his desk in Kottman Hall, Columbus, 1992

While chairperson and afterwards, Curtis was very active in department teaching. He strongly believed that the department needed to increase the amount of teaching done at the undergraduate level. He took leadership for the team-taught course *Societal Issues: Pesticides, Alternatives, and the Environment* (1997–2006). Curtis also developed and taught a new course for undergraduate non-science majors, *Social Impact of Plant Diseases in Shaping Human Society* (1993–2004). He was a pioneer and strong advocate of developing and teaching web-based, online courses to students at distant locations. From 2001–2006, he developed and taught the first department online course prepared for distance education students, a version of *Social Impact of Plant Diseases in Shaping Human Society*. He also developed and taught another new course *Bioterrorism: An Overview* (2006), which was continued by other faculty after his retirement.

Curtis took several leadership roles in the American Phytopathological Society (APS), serving as president of both the APS Potomac (1980–81) and North Central (1986–87) Divisions. He was the APS representative to the Council for Agricultural Sciences and Technology (CAST), and was appointed a member of the CAST executive board (1995). He received the Governor's Ohio Commodore Award for service to the state of Ohio (1987) and the USDA Foreign Service International Honor Award (1994).

Stephen G. P. Nameth (1953–). B.S. in agronomy (1979), California Polytechnic University; Ph.D. in plant pathology (1985), University of California, Riverside. In 1985, Nameth was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus. When he first joined the department faculty, Nameth's major responsibility was in Extension, as director of a newly organized Plant and Pest Diagnostic Clinic (PPDC), in addition to responsibilities in research and teaching. In 1993, his responsibilities changed from clinic director to Extension specialist responsible for Extension education and research in floral and nursery crops. Nameth was promoted to associate professor in 1991 and professor in 2002. He served as department associate chairperson from 2000 to 2004, when he left the department to become Director of the OSU Agricultural Technical Institute, located at Wooster.

Nameth's primary research interests in the department were development and application of novel methods of plant pathogen identification, using both immunological and nucleic acid technologies, and identification and characterization of viruses and virus-like agents in floral and vegetable crops. Techniques and procedures that he developed have been used in the identification of plant diseases of concern to the floral and vegetable crop industries in Ohio and elsewhere. He conducted both basic and applied studies in plant virology, using highly sensitive and specific analysis techniques to monitor production of, and interrelationships between, double-stranded RNA production and virus accumulation.

Nameth was extensively involved in the department teaching program. He taught *Field Plant Pathology* (1986–91) and a section of *Introductory Biology* (1992–95). Working with D. L. Coplin, they developed and taught a new course, *Introduction to Bacteriology and Virology* (1988–2004). Nameth also taught *Diseases of Ornamentals* (1998–2003) for horticultural students, including offering night sections some years for working students.

During his eight years as Director of the OSU Agricultural Technical Institute, beginning in 2004, ATI regained financial stability, developed new programs in bioenergy, and acquired an 18-hole golf course/learning lab which helped support the academic programs in turfgrass management and horticulture. In 2012 he became Dean and Chief Administrative Officer of the Kent State University Columbiana Campuses at Salem and East Liverpool, where he oversaw two of the seven Kent State regional campuses. In 2015, Nameth was appointed Interim Associate Provost for regional campus systems integration at Kent State University. In 2017, he became Assistant Director, Graduate Program Review, Office of Academic Affairs, Ohio Department of Higher Education.

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Steve Nameth checking greenhouse geranium plant for disease, 1992

William W. Shane (1952–). B.S. (1977), Michigan State University; M.S. (1979), North Carolina State University; Ph.D. (1985), University of Minnesota. In 1985, Shane was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibility for research, teaching, and Extension on diseases of turfgrass. He resigned his position in 1991 to take a position at the Michigan State University SW Michigan Research and Education Center, Benton Harbor.

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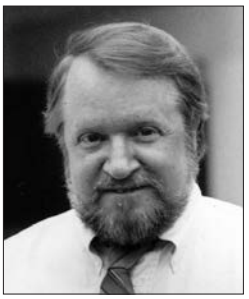
Shane's research in Ohio emphasized the use of systems and epidemiological analysis for understanding

the factors affecting pathogen multiplication. He and his students developed and published improved methods for detection of Pythium blight and necrotic ring spot diseases of turfgrass. He made research and Extension presentations to turfgrass professionals throughout Ohio and prepared Extension fact sheets and bulletins on turfgrass diseases. He conducted fungicide evaluation trials for control of turfgrass diseases to develop independent data in support of disease control recommendations. Shane advised several graduate students and was active in the department teaching program. He taught *Turfgrass Diseases*, a keystone course in the OSU turfgrass science major (1986–90). He also developed a new team-taught course, *Plant Disease Management*, a course that was an important component of the department graduate program for many years.

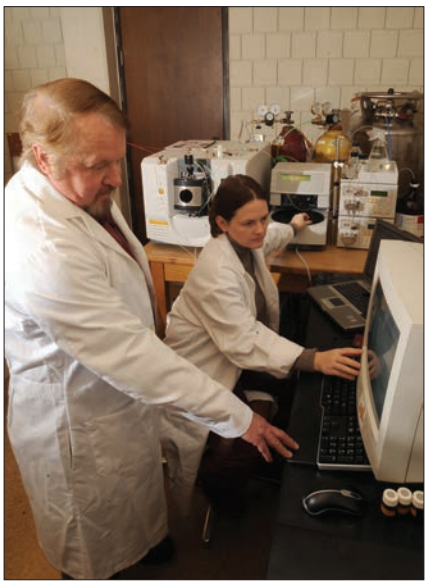
Terry Graham examining soybean leaf for disease symptoms

Terrence L. Graham (1947–). B.S. in biochemistry (1969), Pennsylvania State University; M.S. (1973) and Ph.D. in biochemistry (1975), Purdue University. Following two years of postdoctoral research in the Department of Plant Pathology, University of Wisconsin, he joined Monsanto Chemical Company, St. Louis, Missouri, as Project Leader of the Host-Pathogen Project (1977). While at Monsanto, Graham was promoted to Senior Research Group Leader of Stress Biochemistry (1979), Senior Research Group Leader of Biological Control (1982) and Research Manager of Cellular and Molecular Biology (1984). In 1986, Graham was appointed assistant professor, Department of Plant Pathology, The Ohio State University, Columbus, with a courtesy appointment at the OSU Biotechnology Center. He was promoted to associate professor (1992) and professor (2003), and served as department associate chairperson (1996–2000) and interim associate chairperson (2010–2011). He retired in 2012.



At Ohio State, Graham's research was centered on the cellular biochemistry and biochemical genetics of signal perception and signal transduction in induced plant disease resistance. His primary interest was in defining and characterizing the molecular, cellular, and genetic nature of the internal plant signals that "set up" the resistance response and the regulatory molecules of plant and pathogen origin that intercept and modulate these signals. Graham focused his research on these aspects in the soybean–*Phytophthora* pathosystem. He believed that improved understanding of the signals involved in plant defense may lead to novel biologically based disease-control strategies.

Early on, Graham's research led to pioneering efforts in plant metabolic profiling/metabolomics and a full definition of the remarkable array of defense responses triggered in soybean by a single master elicitor, the cell wall glucan from *Phytophthora*. Later, he found that



Plant Pathology Department

Terry Graham working in his Kottman Hall laboratory, Columbus, 2008

establishment of a state of elicitation competence in host cells was a prerequisite for both race-specific and non-race-specific responses to the elicitor. His team also discovered that plant allelopathic chemicals condition these defense responses in plants. Because of his expertise in plant natural products chemistry, Graham also managed the Tandem HPLC-Mass Spectrometer for the College of Food Agricultural and Environmental Science. His training in natural products identification led to collaborative relationships with colleagues in the Colleges of Pharmacy and Veterinary Medicine in efforts to discover and characterize botanical molecules with efficacy as anti-cancer agents.

Graham was heavily involved in the department graduate program. He served as major professor for several M.S. and Ph.D. students and on a great many Student Advisory Committees for graduate students in Plant Pathology and other departments. He served twice as department Graduate Studies Chairperson (1995–1998, 2008–2011) and was a founding member of the campus-wide Plant Molecular Biology and Biotechnology Program. He taught *Biochemistry of Plant Responses to Infection* (1988–2012) and co-taught *Plant-Microbe Interactions* (2006–2011). For several years, he taught the biotechnology section of an undergraduate course *Societal Issues: Pesticides, Alternatives, and the Environment*. During the university conversion to semesters (2010–11), he led departmental efforts to convert several advanced graduate courses into a new course, *Molecular Basis of Plant Host-Microbe Interactions*.

Graham served on the editorial board of the research journals *Plant Physiology, Journal of Medicinal Food Chemistry*, and *Phytopathology*. He served as the OSU representative to the Ohio Plant Biotechnology Consortium (2000–2012) and chaired the group in 2000–2002.

Throughout his career, Graham's academic excellence was widely recognized. As an undergraduate at Penn State, he was awarded the Evan Pugh Silver and Gold Medals for being in the upper 0.5% of his junior and senior classes. While at Monsanto, Graham was inducted into the Monsanto Science Fellow Program as Science Fellow (1982) and Senior Science Fellow (1984) to recognize his contributions to plant science. He received three Monsanto Achievement and Incentive Awards. While at OSU, he was awarded the Department of Plant Pathology Research Award (2000) and the FAES College Pomerene Teaching Award (2003).

Robert C. Garber (1953–). B. A. (1976), Humboldt State University, California; M.S. (1979) and Ph.D. (1984), both from Cornell University. He did postdoctoral research at Cornell University (1985–87). In 1987, Garber was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, (50%) and the OSU Biotechnology Center (50%). His research areas of interest were the molecular genetics of plant pathogen interactions, mobile genetic elements, the lability of eukaryotic genomes, and fungal mitochondrial plasmids. He resigned his position in 1990 to take an editorial position with the scientific publisher Springer-Verlag, New York.

Charles R. Krause (1941–). B.S. in zoology (1964), M.S. in entomology (1970), and Ph.D. in plant pathology (1976), all from The Ohio State University. From 1965–72, he worked as a biological laboratory technician for the USDA Forest Service, Agricultural Research Service, at Delaware, Ohio. From 1976–90, he served as research plant pathologist at the USDA/ARS Nursery Crops Research Laboratory, Delaware, Ohio. He moved to the OARDC Wooster campus in 1990 as a USDA/ARS lead scientist. Since 2001, he has served as research leader, USDA/ARS Application Technology Research Unit, Wooster and Toledo, Ohio. He became an adjunct assistant professor in the Department of Plant Pathology in 1977 and adjunct associate professor in 1986.


OARDC

While working for the Forest Service, Krause, with C. L. Wilson and C. E. Seliskar, found mycoplasma-like bodies associated with elm phloem necrosis that proved to be the causal pathogen. As research leader, Krause leads the USDA/ARS application Technology Research Unit, which consists of eight scientists and engineers located at the OARDC/Wooster and at the University of Toledo. The goal of this group is to improve pesticide application

technology that optimizes chemical and biological control of plant diseases. Objectives are to visualize host/parasite fungicide interaction on the phylloplane and characterize chemical pesticide injury and stress caused by air pollutants. His own research focuses on fungicide coverage using a cold field emission scanning electron microscope and energy dispersive x-ray microanalyzer. Objectives are to directly quantify and relate fungicide distribution to efficacy, and to study phylloplane interactions between pathogens, host surface structures, and fungicide coverage.

Krause also served as field research director of a USDA-ARS program to obtain residue, efficacy, and phytotoxicity data for IR-4 Minor Crop Pesticide label expansion for food use, nursery, greenhouse, and turf crops. He received the IR-4 Meritorious Service Award (1990), the Norman Jay Coleman Award from the American Nursery and Landscape Association (2005), and the Outstanding Research Award from the Ohio Nursery and Landscape Association (2007).

Sally A. Miller (1954–). B.S. in biology (1976), The Ohio State University; M.S. (1979) and Ph.D. (1982) in plant pathology, both from University of Wisconsin. Miller was appointed research scientist with DNA Plant Technology (DNAP) Corp., Cinnaminson, New Jersey (1982) where she had responsibilities to develop disease diagnostic kits and plant tissue culture systems for studying plant-fungal interactions. In 1986, she was promoted to manager, plant pathology group, with Agri-Diagnostics Associates, a joint venture of DNAP and Union Carbide Corp. Miller and colleagues built a well-characterized fungal culture collection and worked in antibody and diagnostic kit development and applications, particularly for *Phytophthora* spp. in soil and plant tissue, and for turfgrass diseases. In 1991, Miller was appointed assistant professor in the Department of Plant Pathology at Wooster with responsibilities for vegetable crop diseases. **She was the first female faculty member in plant pathology at Ohio State since F. Detmers (1906–1926).** Miller was promoted to associate professor in 1997 and professor in 2003.


APS

Miller's research with vegetable crops, in both conventional and organic systems, has focused on development of sustainable disease management practices, including biological and cultural tactics and responsible pesticide use, and on understanding the relationship of plant diseases and management practices to microbial food safety. She and her colleagues established a systems approach to the study of microbial hazards, both plant and human pathogens, in tomato production greenhouses at multiple scales. Her lab has developed and applied molecular assays and procedures to detect, diagnose, and trace plant pathogenic and beneficial bacteria and fungi in plants, soil, and water, and on environmental surfaces. Applied research on biological control of postharvest diseases caused by *Botrytis, Penicillium, Rhizopus,* and *Alternaria* and on effective sanitation practices has led to recommendations widely adopted by the greenhouse tomato industry. Work in her lab on the biology of the systemic bacterial plant pathogens *Clavibacter michiganensis* subsp. *michiganensis* and *Erwinia tracheiphila* using lux-transformed bioluminescent strains has provided new insights into the ways in which these pathogens infect and colonize their hosts.


Sally Miller and Mark Erbaugh, OSU International Programs, in Uganda, 2005

A hallmark of Miller's career has been continuous and very active involvement in international agricultural research and development. She has partnered with USAID-funded projects in South and Southeast Asia, East and West Africa, and Central America. She led the activities of a multidisciplinary IPM project in the

Philippines as site chair (1998–2005), and was co-PI for plant pathology research and outreach in the Philippines (1995–2005), Bangladesh (2000–2014), Nepal and India (2005–2014), and Kenya, Uganda, Tanzania, Senegal, and Ghana (2005–2014). With U.S. and international colleagues, she worked to improve the health of vegetable crops in smallholder systems by development and deployment of IPM packages that included the use of disease resistant cultivars and rootstocks, biocontrol microorganisms, and cultural practices. As PI of the International Plant Diagnostics Network (2005–2014), Miller helped to build plant diagnostic capacity in institutions in twelve countries. She has also had projects or consultancies in Canada, Egypt, Ukraine, Ecuador, Nigeria, Guatemala, and Turkey. In 1997, Miller was named an Honorary Professor of the D'nepropetrovsk State Agrarian University in Ukraine, the first American woman to be so honored. She has served as a consultant on plant disease diagnostics and management to several organizations, including the Bill and Melinda Gates Foundation and the World Bank.

Communication of science-based solutions to vegetable disease management problems has been a major focus for Miller. She has provided grower groups throughout Ohio, other U.S. states, and Canada with timely, in-person information on disease management in field, high tunnel, and greenhouse-produced vegetables, particularly tomatoes. Annually, her lab has diagnosed several hundred physical samples of vegetable problems, and many digital samples imaged and sent electronically. Miller has made extensive use of the internet to increase the reach of her vegetable disease management program, including both basic (English and Spanish) and advanced versions of fact sheets, and specific information for diagnosticians. She uses various social media options to alert growers, Extension educators, and others to critical disease outbreaks and to her blog "Ohio Veggie Disease News." A significant portion of her website and blog readership comes from outside the U.S.

Miller has been very active in department teaching programs. In 1995 she assumed responsibility for teaching *Diagnostic Field Plant Pathology*, a field survey course of crops and diseases of Ohio. Miller and A. E. Dorrance redesigned the course in 2003, replacing weekly field visits with an intensive (10-consecutive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Sally Miller with diseased pumpkin in commercial field, 2013

day) summer course that combined focused field trips with intensive hands-on learning of traditional and modern diagnostic techniques. Since 2007, she has co-taught *Fruit and Vegetable Crop Diseases*, with M. E. Ellis. In 2008, Miller teamed with Luis Cañas, Department of Entomology, to develop a 2-week annual continuing education short course, *Pest and Disease Diagnostics for International Trade and Food Security*, which has trained more than 50 U.S. and international scientists on modern and classical plant diagnostics. Miller has served as major advisor to many M.S. and Ph.D. students, and hosted dozens of postdoctoral associates, visiting scientists and scholars, and undergraduates for training in plant pathology, particularly in phytobacteriology and diagnostics.

Miller has a long history of service to the American Phytopathological Society (APS) and other organizations. She has served on numerous APS committees, and as Associate (1996–1999) and Senior (1999–2000) Editor for *Plant Disease*, Section Editor for *Biological and Cultural Tests* (1996–1999), and Senior Editor (2003–2009) for APS Press. She served as Director of the APS Office of International Programs Board (2007–2013), and was elected APS Vice-President in 2013. She served as APS President in 2015–2016 (the sixth APS president to serve from Ohio State). Miller was organizer and chairperson of five Annual Tomato Disease Workshops (1992–

2012), a member of the Scientific Committee of the International Symposium on Tomato Diseases (2004, 2008, 2013), and a member of several national review panels. Miller's work has been well recognized and she was honored by election as an APS Fellow in 2010. She received the APS International Service Award (2002), Gamma Sigma Delta International Award of Merit (2007), International IPM Excellence Award (2009), OSU/OARDC Distinguished Multidisciplinary Team Research Award (2013), and the Philippines Department of Agriculture Bureau of Agricultural Research Director's Award (2001).

Michael J. Boehm (1965–). B.S. (1987), Heidelberg College, Ohio; M.S. (1990) and Ph.D. (1992) in plant pathology, both from The Ohio State University. From 1992–94, he served as postdoctoral research plant pathologist with the USDA/ARS Horticultural Crops Research Laboratory, Corvallis, Oregon. His research there focused on microbial ecology and biological control of the soft-rotting Erwinias. He served as assistant professor at Monmouth College, Illinois, during 1994–95. Boehm served for 20 years in the military reserves. Following the attacks in 2001, he was recalled to active duty in the U.S. Navy as a microbiologist, serving from late 2001 to early 2003. In 1996, he was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibilities for teaching, research, and Extension. He was promoted to associate professor in 2001 and professor in 2007. Boehm served as department associate chairperson from 2004 to 2007 and department chairperson from 2007 to 2010. He left the department in 2010 to serve as OSU Vice Provost for Academic and Strategic Planning. In 2017, he was appointed Vice Chancellor for the Institute of Agriculture and Natural Resources, and Vice President for Agriculture and Natural Resources at the University of Nebraska, Lincoln.


APS

Boehm's research and outreach responsibilities were in the integrated management of turfgrass diseases. His research focused on the biology, ecology, and integrated management of turfgrass pathogens with an emphasis on *Sclerotinia homoeocarpa*, the causal agent of dollar spot. He also made significant contributions to the integrated management of Fusarium head blight of wheat and barley in a partnership with USDA/ARS Plant Pathologist, David Schisler. Together they identified a yeast biocontrol agent that significantly reduces symptoms and the amount of mycotoxin contamination in harvested grain. This technology was patented, licensed, and a commercial bio-pesticide developed. Boehm's team also worked to advance understanding of the *S. homoeocarpa* and its interaction with creeping bentgrass. They were the first to show that the *S. homoeocarpa* produces oxalic acid similar to other pathogens in the family Sclerotiniaceae. They were also the first to apply RNA-Sequencing analysis of the *Sclerotinia homoeocarpa*-creeping bentgrass pathosystem, providing a starting point for the characterization of potential virulence factors and host defense responses. Boehm and others in his lab were part of a collaborative team led by colleagues from Rutgers University that studied the taxonomy of *S. homoeocarpa*, which ultimately led to its reclassification and renaming.

Boehm was a well-regarded and award-winning teacher who taught at all levels of the departmental curriculum. Courses he developed, revised, or taught included: *General Plant Pathology, Turfgrass Diseases, Integrated Turfgrass Health Management, Mentored Teaching in Plant Pathology, Mentored Extension/Outreach Teaching in Plant Pathology*, and *Bioterrorism: An Overview*. The premium he put on problem-based and competency-based learning was a hallmark of Boehm's teaching. He was repeatedly recognized with awards for teaching excellence from the department and/or the College of Food, Agricultural and Environmental Sciences (1998, 1999, 2000, 2002, and 2006). In 2000, Boehm received an Ohio State Alumni Award for Distinguished Teaching and in 2008, he was honored with the Excellence in Teaching Award from the American Phytopathological Society. He was also awarded the Association of Public and Land-grant Universities' 2010 National Teaching Award, one of only two presented nationwide.

Boehm's outreach and engagement efforts focused on providing leadership for all Extension-outreach activities related to turfgrass disease management and plant health at Ohio State from 1996 to 2010. In

Mike Boehm (left) and golf course superintendent checking golf green turf for disease

partnership with J. W. Rimelspach, turfgrass pathology Extension associate, Boehm led a team that diagnosed numerous turfgrass disease samples and made many site visits to golf courses, sod farms, and athletic fields. In 2005, the team developed and provided golf course superintendents with an integrated dollar spot management strategy that effectively reduced the need for fungicide applications on fairways by up to 50%. Boehm was awarded the Professional Excellence Award from the Ohio Turfgrass Foundation in 2003.

An active member of the American Phytopathological Society (APS), Boehm served in many significant leadership roles. He served as APS President for 2012–13 (the fifth APS president to serve from Ohio State). Other leadership roles included: Public Policy Board (2010–2015), Councilor-at-Large (2007–2010), Plant Management Network Strategic Planning Board (2006–2008), Annual Meeting Board (2005–2007, 2009, 2011–2012), and Financial Advisory Committee (2007–2010). From 2008–10, he chaired the Ad Hoc Governance Structure Task Force, which led to the restructuring of APS Council—a significant milestone in APS history.

As OSU Vice Provost for Academic and Strategic Planning, Boehm served in many university-wide roles. He served on and helped guide the Executive Vice President and Provost's leadership team in many activities, including strategic planning, budget management, fund raising, physical facility planning, community and college partnerships, reviews of deans and academic programs, integrated capital planning, and classroom readiness. In 2013–14, Boehm had dual responsibilities with both the university's Interim President and the Executive Vice President and Provost. As special assistant to the interim president, he was a member of the President's Cabinet, helping the president and other senior leaders establish institutional priorities and providing coordination in strategic leadership for developing policy recommendations and actions.

Anne E. Dorrance (1958–). A.S. (1978), Herkimer County Community College; B.S. (1980) State University of New York, College of Environmental Science and Forestry; M.S. (1985) University of Massachusetts; and Ph.D in Plant Pathology (1995) Virginia Polytechnic Institute and State University. From 1985–89, Dorrance served as state plant pathologist, Vermont Department of Agriculture. She did post-doctoral research at Washington State University (1996–97) at the Research and Extension Unit in Mt. Vernon. In 1997, she was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Wooster, with responsibility for research and Extension on diseases of soybean. She was promoted to associate professor in 2003 and professor in 2009.

APS

Dorrance is a nationally and internationally-recognized authority on soybean diseases. Her work has focused on host plant resistance, pathogen genetics, integrated management, and the delivery of Extension-education programs to crop producers and advisors. Her research, in collaboration with graduate students and postdoctoral scientists, has ranged from field-based studies to genomics. Her primary focus has been on diseases caused by *Phytophthora sojae* and *Pythium* spp. which cause extensive losses worldwide in poorly drained soils. She has made key contributions to the development of soybean cultivars with combined race specific (R-gene mediated) and partial resistance towards *P. sojae* to deal with pathogen populations shifting in virulence. Dorrance and her students have identified and characterized several new sources of

resistance to *P. sojae* and several *Pythium* spp., as well as to *Fusarium graminearum*. She works with a team of OSU soybean breeders that develop and release soybean cultivars with high levels of resistance to *P. sojae*.

Research in Dorrance's laboratory has also focused on identifying and characterizing pathogens and identifying best management practices that impact soybean in reduced and no-till production systems. She, along with colleagues in the Midwest, have documented changes in pathotype in the *P. sojae* population and the impact of combining seed treatments and host resistance in reducing yield losses in high-disease situations. The team also has evaluated changes in soybean cyst nematode (SCN) populations as affected by use of seed treatments and different sources of SCN resistance in on-farm trials, as well as the impact of charcoal rot in northern regions. These findings have led to changes in fungicide usage in the soybean industry, as well as increased awareness of SCN in many production regions. In studies of production practices, she and students have shown that fungicide applications to soybeans have a greater effect in reducing leaf area affected by the fungi that cause brown spot and frogeye leaf spot than to actual plant health effects. Studies using research plots and large on-farm trials, have documented these impacts. She has also evaluated the effects of fungicides and cultivar resistance to manage Sclerotinia stem rot.

OARDC

Anne Dorrance in soybean field, 1997

Dorrance is passionate about her Extension responsibilities. Her Extension program has had a major impact on the education of growers, county educators, and crop consultants in Ohio and the region. She is a major contributor to the OSU Extension Team Newsletter "C.O.R.N" which is viewed online by over 30,000 readers per month, having a large impact on Ohio farmers and associated agricultural professionals. Much of this impact results from information leading to increased crop yields and reduced fungicide use on large acreages statewide. With her Extension colleagues, Dorrance designed and delivered numerous, intensive hands-on workshops for producers and crop consultants to bring the "biology" of disease management directly to their county. She is regularly invited to present her applied research findings to producer groups in Ohio and beyond.

Dorrance has played an active role in the department graduate program, serving as advisor to many M.S. and Ph.D. students. She has been very active in the OSU Translational Plant Science Program. In 2010, she spearheaded the establishment of a new Professional Science Master's Degree program in the department, the Master in Plant Health Management. This new degree program is targeted at training the next generation of Extension educators, certified crop advisors, and industry employees with expertise in plant health management. Dorrance has maintained a strong service commitment, particularly with the American Phytopathological Society (APS). She has chaired several APS committees, served as APS Councilor-at-Large (2009–12), as Secretary (2002–05) and President (2011–12) of the APS North Central Division, and in editorial roles with the APS journal *Plant Disease* (2008–14). She has also been an active participant in many North Central Research Extension Committees focused on soybean diseases and soybean rust. Dorrance has been widely recognized for her excellence in research and Extension by several awards, including the Outstanding Achievement Award from the Ohio Soybean Council (2002), the Special Meritorious Award from the American Soybean Association (2008), and the APS Excellence in Extension Award (2009). In 2016, she was honored by election as an APS Fellow.

Sophien Kamoun (1965–). Maitrise in cell biology and genetics (1987), Pierre and Marie Curie University, Paris, France; Ph.D. in Genetics (1991), University of California, Davis. His thesis work focused on the genetic analysis of pathogenicity of *Xanthomonas campestris*. Kamoun was postdoctoral fellow at the UC Davis Center for Engineering Plants for Resistance Against Pathogens (CEPRAP) (1991–94), and senior research scientist at the Department of Phytopathology, Wageningen University, the Netherlands (1994–97). In 1998, he was appointed assistant professor of oomycete molecular genetics at The Ohio State University, Department of Plant Pathology, Wooster. He was promoted to the rank of associate professor in 2002 and professor in 2006. In 2007, he resigned his position to join The Sainsbury Laboratory, Norwich, England.


APS

Kamoun is a pioneer and leader in the fields of effector biology and genomics of eukaryotic plant pathogens. While at Ohio State, he published the first significant papers on these topics. His research has centered on *Phytophthora infestans*, the cause of potato late blight and a pathogen of great historical significance that continues to threaten subsistence and commercial potato production worldwide. *Phytophthora* and other oomycete plant pathogens have long been considered intractable organisms for molecular genetics research. Kamoun's contributions have been critical in addressing this issue and shifting the focus in the study of oomycetes to the investigation of pathogenicity mechanisms.

Kamoun pioneered the use of functional genomics strategies that link plant pathogen sequences to phenotypes and is credited with discovering several disease effector families from pathogenic oomycetes. In the early 2000s, his research group designed and implemented algorithms to identify effector genes from sequence data. Kamoun developed this approach with Ph.D. student Gertrude Torto, and their 2003 publication described the first effector family from oomycetes. With Ph.D. student Miaoying Tian, Kamoun published the first report of a protease inhibitor in any plant-associated microbe. He then


OARDC

Sophien Kamoun (left) and Gertrude Torto in Selby Hall laboratory, Wooster, 2002

confirmed that these effectors inhibit various host defense proteases in the plant apoplast. Since then, protease inhibitors have been reported in several other plant pathogens, suggesting a general counterdefense mechanism. Also, with Ph.D. student Jing Song, Kamoun was the first to demonstrate that unrelated plant pathogens from different kingdoms have evolved to deploy effectors (protease inhibitors) to target the same host defense protein. This concept has since been generalized to other plant-pathogen interactions.

Kamoun was one of the key scientists directly involved in the discovery of the RXLR host translocation motif of oomycete effectors. Kamoun and collaborators then showed that the RXLR domain functions in the human parasite *Plasmodium*, suggesting a similar mechanism of host translocation in plant and animal eukaryotic pathogens. With British collaborators, Kamoun also discovered the RXLR-type effector AVR3a, the first *P. infestans* avirulence effector. With Ph.D. student Jorunn Bos, Kamoun established that AVR3a suppresses plant immunity.

While at Ohio State, Kamoun was highly committed to the education of students in the areas of molecular plant pathology and genomics. From 2001–2007, he worked with G-L Wang to develop and co-teach a new course *Agricultural Genomics: Principles and Applications*. He also taught a graduate-level course in

Plant-Microbe Interactions and gave lectures in several upper-level graduate courses. Kamoun served on several committees and think tanks for the American Phytopathological Society, including "Priorities for Plant Pathology" (2004–05). During his time on the OSU faculty, Kamoun was recognized with several awards: APS Syngenta Award for research (2003), OARDC Junior Faculty Research Award (2004), and the OSU Pomerene Teaching Award (2004). After moving to the U.K. in 2007, Kamoun has served as head of The Sainsbury Laboratory (TSL), a privately funded institute focused on plant-microbe interactions. At TSL, he has worked to expand the Laboratory mission from purely fundamental research to translational activities aimed at delivering solutions to crop disease problems.

Margaret G. "Peg" Redinbaugh (1955–). B.S. (1977), State University of New York at Albany; M.S. (1980) and Ph.D. in biochemistry (1984), both from the College of Environmental Science and Forestry, State University of New York. She did postdoctoral research in the Biochemistry Department, Michigan State University (1984–85) and in the Department of Genetics, North Carolina State University (1985–89). Redinbaugh joined the USDA/ARS Crops Research Lab, Oxford, North Carolina in 1989, with a joint appointment in the Department of Crop Science, North Carolina State University. In 1995, she transferred to the USDA/ARS Forage and Range Research Lab, Logan, Utah, with an appointment as adjunct associate professor, Department of Plants, Soils and Biometeorology, Utah State University. Her research in both these positions focused on nitrogen metabolism in plants, especially the regulation of nitrate assimilation and its role in plant establishment. In 1998, Redinbaugh joined the USDA/ARS Corn and Soybean Research Unit (CSRU), located at the OARDC, Wooster, and was appointed adjunct associate professor in the Department of Plant Pathology, The Ohio State University. In 2007, she was promoted to adjunct professor and became CSRU research leader. The CSRU and ARS Soft Wheat Quality Laboratory were merged into the Corn, Soybean and Wheat Quality Research Unit in 2012 under her leadership.


OARDC


OARDC

Margaret Redinbaugh with virus-infected maize, 1999

Redinbaugh's research is focused on virus diseases in maize and soybean as part of the long-term OARDC-USDA/ARS Maize Virus Research Team. She collaborates closely with other ARS scientists and faculty in the departments of Plant Pathology, Entomology, and Horticulture and Crop Science. Her research group has made significant contributions to the characterization of emerging maize-infecting viruses, vector transmission of viruses to plants, the genomes of insect vectors, and genes and QTL for virus resistance in maize and soybean. She and collaborators characterized two previously unknown viruses of maize, *maize necrotic streak virus* and *maize fine streak virus*, which they continue to study as models for virus-based gene silencing vectors for monocots and leafhopper transmission of viruses, respectively. With several collaborators, she demonstrated that, in Serbia, maize redness is caused by stolbur phytoplasma, and identified a role for wheat-maize rotations in the epidemiology of the disease. Recently, her group worked with researchers from CIMMYT and Kenya Agricultural Research Institute to diagnose maize lethal necrosis (MLN) as the cause of major crop losses in East Africa. She and collaborators continue work

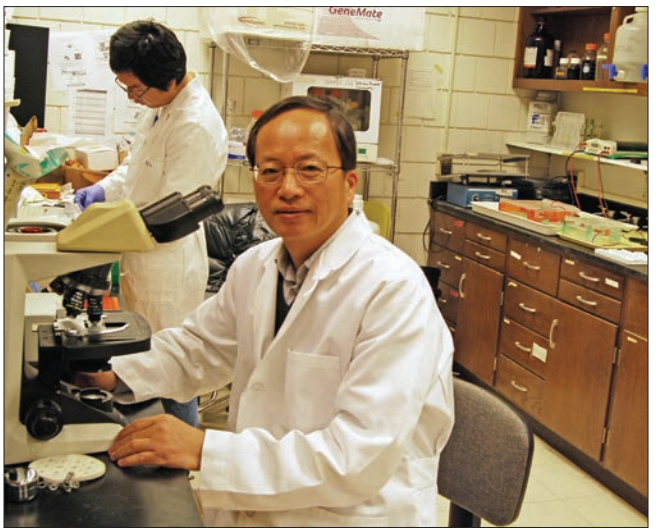
to characterize the distribution and spread of viruses causing MLN and to identify measures for disease control. Redinbaugh and another group of collaborators have defined transcriptome responses of the black-faced leafhopper and the soybean aphid to feeding on virus-infected plants. These studies have provided the first genome information on a leafhopper vector, and demonstrated a strong and rapid response of vectors to virus-infected plants, independent of whether the virus is transmitted by the vector or is transmitted in a non-persistent or persistent manner. Working with OSU collaborators, her group has characterized maize genes and QTL for resistance to nine phylogenetically diverse viruses, including participation in isolation of the first virus resistance gene from maize.

Redinbaugh has published widely on her research and has been invited to speak at and organize several national symposia, and prepare review articles and book chapters. She served as a senior editor of the research journals *Plant Disease* and *Phytopathology* and has been a member and leader of several subject matter committees within the American Phytopathology Society. In the department, she teaches sections in several graduate-level courses, including *Introduction to Plant-Microbe Interactions, Plant Disease Diagnostics,* and *Pest and Disease Diagnostics for International Trade and Food Security*.

Guo-Liang Wang (1961–). B.S. (1982) in plant genetics, Hunan Agricultural University, China; M.S. in plant genetics and breeding (1985), Fujian Agricultural University, China; Ph.D. in plant genetics and breeding (1992), University of Philippines. He was admitted to the International Rice Research Institute (IRRI) while pursuing his Ph.D. After a postdoctoral fellowship at Texas A&M University (1992), he did further postdoctoral research at the University of California, Davis (1993–96). He served as a senior scientist at the National University of Singapore (1996–99). In 1999, Wang was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus. He was promoted to associate professor in 2004 and to professor in 2008. He also holds courtesy appointments in the Hunan Agricultural University, China and the Chinese Academy of Agricultural Sciences.


OARDC

Wang is a leading international scientist in diseases of rice who has conducted pioneering research with worldwide impact. His most significant contributions include: 1) mapping and isolating of several broad-spectrum resistance genes to two important rice pathogens, *Xanthamonas oryzae* pv. *oryzae (Xoo)* and *Magnaporthe oryzae*; 2) use of novel genomic technologies such as long-serial analysis of gene expression (LongSAGE), massively parallel signature sequencing (MPSS), and sequencing-by-synthesis (SBS) for defense transcriptome analysis; 3) elucidation of the function of ubiquitination-mediated pathway in rice defense responses, and 4) understanding the function of epigenetic regulation in plant disease resistance. His research has been well-funded by NSF, USDA, Rockefeller Foundation, DOE, USAID-IRRI, and various industry sources.



Guo-Liang Wang in his laboratory, Kottman Hall, Columbus, 2016

Wang is highly committed to student education. In 2000, he and S. Kamoun developed a new course, *Agricultural Genomics*. Wang helped organize a multi-department, interdisciplinary seminar series for the interdepartmental graduate program in Plant Molecular Biology and Biotechnology. He also co-organized the *MPMI at OSU Symposium*, a research forum on molecular plant–microbe interactions. While at OSU, Wang has supervised many Ph.D. and undergraduate students and numerous postdoctoral fellows. His

laboratory regularly hosts visiting international graduate students and scholars from many countries.

Wang's expertise is in high demand, especially in Asian countries where rice is an important crop. He has presented numerous invited talks at national and international conferences. Wang has served as a panel member for USDA and NSF grants programs. He is an editor for the research journals *Rice, Plant Physiology, Journal of Plant Biology,* and *Molecular Plant-Microbe Interactions*, and is co-organizer of the Rice Functional Genomics Workshop at the International Plant and Animal Genome Conference. Wang has received several awards including both the OARDC Junior Faculty Research Award (2005) and the OARDC Senior Faculty Research Award (2013). He was elected Fellow of the American Phytopathological Society (2012), and Fellow of the American Association for the Advancement of Science (2017).

Steven A. Slack (1947–). B.S. in plant pathology (1969) and M.S. in plant pathology (1971), both from the University of Arkansas, Fayetteville; Ph.D. in plant pathology (1974), University of California, Davis. He did postdoctoral work at the University of California, Davis. In 1975, he joined the faculty of the Plant Pathology Department at the University of Wisconsin, Madison with responsibilities for potato virology research and development of technologies for disease certification in seed potatoes. His duties included management of the Wisconsin Elite Foundation Seed Potato Farm in Rhinelander, and the seed potato certification program for the state of Wisconsin. He also taught introductory plant pathology and achieved the rank of professor (1985). In 1988 he joined the Department of Plant Pathology, Cornell University, as the Henry and Mildred Uihlein Professor of Plant Pathology. There he maintained a research program in plant virology and was in charge of the Uihlein Foundation Seed Potato research facility in Lake Placid, New York. While at Cornell, he served as department chairperson from 1995–1999. Slack joined the faculty at The Ohio State University in 1999 as Associate Vice President for Agricultural Administration and Director of the Ohio Agricultural Research and Development Center (OARDC) through 2015. His responsibilities included chief research administrator of the College of Food, Agricultural and Environmental Sciences and affiliated programs, including support of selected research efforts in the Colleges of Arts and Sciences, Education and Human Ecology, and Veterinary Medicine, both at Columbus and Wooster. He also had oversight of the OARDC campus in Wooster and 10 statewide outlying research stations. He retired in 2016.


OARDC

Slack's research accomplishments include the development of an integrated tissue culture propagation and *in vitro* pathogen testing system for nuclear seed potato stocks, development of *in vitro* viral therapy techniques to eliminate viruses from potato germplasm and varieties, and development of viral and bacterial test detection methods and characterization of viral genetic resistance. He authored over 100 refereed journal publications. While at The Ohio State University, Slack's administrative accomplishments included tripling extramural funding in the college and establishing the BioHio Research Park as a public-private OSU affiliate. Under his leadership, many facility improvements took place, including building a state-of-the-art nutrition and feed formulation Feedstock Processing Research Facility and the Ralph Regula Plant and Animal Agrosecurity Research Biocontainment facility. Following a 2010 tornado that struck the Wooster campus and caused >$30 million in damages, he was instrumental in rebuilding the new Agricultural Engineering Building and the Williams Hall Horticulture and Crop Science Greenhouse complex

Slack is a Fellow of the American Phytopathological Society (APS) and served as APS President in 2001. He is an honorary life member and past President of the Potato Association of America, and a Fellow of the American Association for the Advancement of Science (2002). In addition he served in several capacities for APS, including editor-in-chief of APS Press (1991–1994), President of the Northeastern Division (1996), and APS Treasurer (2012–2018). He also served on editorial boards for the journals *Phytopathology*, *Plant Disease*, and the *American Potato Journal.*

Honors include a USDA Group Honor Award for Excellence for work on a non-pesticidal control strategy for the potato golden nematode, the Outstanding Alumnus award from the Dale Bumpers College of

Agricultural, Food and Life Sciences at the University of Arkansas, Fayetteville, the meritorious service award for research by the National Potato Council, the Outstanding Achievement Award by the Ohio Soybean Council and the 2015 Inductee to the National Institute of Food and Agriculture (NIFA) Hall of Fame.

National and international leadership activities included Experiment Station Committee on Organization and Policy (ESCOP) representation: ESCOP chair for 2013–2014, member of the Board on Agricultural Assembly Policy Board of Directors 2010–2015, 2008 Farm Bill/CREATE-21, ESCOP Budget and Legislature Committee and APLU Systems Integration Task Force member. Additional activities included the Consultative Group on International Agricultural Research (CGIAR), Nomination Committee for Science Council 2003–2007, International Sorghum and Millet Collaborative Research Support Program (INTSORMIL CRSP) Board of Directors, Northeast Sun Grant Advisory Board, and the National Agricultural Biotechnology Council chairperson (2005–2006).

Pierluigi "Enrico" Bonello (1962–). M.S. (Laurea) in Forest Sciences (1987), University of Padua, Italy; D.Phil. in forest pathology (1991), University of Oxford, U.K. Bonello did postdoctoral research at the Institute for Biochemical Plant Pathology, GSF-Forschungszentrum für Umwelt und Gesundheit in Munich, Germany (1991–1992); the Department of Environmental Science, Policy, and Management, University of California, Berkeley (1994–1996); and the Department of Plant Pathology, University of California, Davis (1997–2000). In 2000, he was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibilities for tree disease research. Bonello was promoted to associate professor in 2005 and professor in 2010. He is also a member of the Environmental Science Graduate Program, the Center for Microbe Interface Biology, the Center for Applied Plant Sciences, and the Translational Plant Sciences graduate program at The Ohio State University; adjunct professor in the Department of Biological Sciences at Wright State University; and a faculty member of the doctoral program, Department of Agricultural and Environmental Sciences, University of Florence, Italy.


OARDC

Bonello's formal training and current position are in plant pathology, but his research has evolved over the last 25 years from a single focus on tree defense responses to pathogens, to host-mediated interactions between pathogens and insects, to tree defenses against insects and mycorrhizal biology and ecology. Since joining the department, and in collaboration with D. A. Herms (OSU Department of Entomology), and other institutions (Wright State University, University of California, Berkeley, the Universities of Florence and Padua in Italy, and the USDA Forest Service), Bonello has used a combination of targeted metabolomic, proteomic, and transcriptomic approaches to dissect the basis of the phenomenon of systemic induced resistance, which he demonstrated for the first time in a forest tree, in the Austrian pine–*Diplodia sapinea* model pathosystem. In his work on this system he has demonstrated whole-tree cross induction of resistance against both fungal pathogens and insects, and that such induced protection has a basis in phenolic metabolism. Bonello has also been heavily involved in studying interactions of trees with ecologically, socially, and economically significant invasive pathogens and insects, making major inroads in understanding both resistance mechanisms against the invaders and developing potential management tools based on such new understanding. In the ash—emerald ash borer system, his work has begun to unravel the co-evolutionary basis of the development of resistance in this very important tree genus, and how environmental variables such as nutrient and water availability are major modulators of such interactions. His work on the coast live oak—sudden oak death (SOD) system in California has resulted in the identification of the first phenolic biomarkers that can be used to predict, with a given level of confidence, whether a tree will survive an attack by the SOD pathogen in Northern California's oak savannahs. Such work was then expanded to develop an infrared spectroscopy-based technique that allows for the quick identification of field-resistant trees. The technique is now being tested on other important forest tree pathosystems, e.g. white pine blister rust on whitebark pine and root rot of Port

Enrico Bonello with student working on mass spectrometer, Kottman Hall, Columbus

Orford cedar. Both tree species are under severe threat by their respective diseases in Oregon. More recently, Bonello's research has begun to investigate molecular links between drought stress and proline metabolism, ROS homeostasis, host programmed cell death, and the fungus' ability to utilize some of these host responses to its own advantage using the Austrian pine–*Diplodia* model pathosystem. Bonello's research currently focuses on putting interactions between trees and pests into a chemical and molecular ecological context, providing a much richer understanding of how trees cope with the complexity of their environments.

Bonello has served as major advisor to several M.S. and Ph.D. graduate students and plays an active role in departmental teaching programs. He has taught the undergraduate/graduate level course *Diseases of Forest and Shade Trees* (recently converted into a forest health course in collaboration with D. A. Herms, OSU Department of Entomology), graduate level courses such as *Advanced Fungal Biology* and *Plant–Microbe Interactions*, graduate seminar courses such as *Fungi in Natural Ecosystems* and *Ecology of Plant-Associated Microbes*, and has participated as a guest lecturer in several courses such as *Molds, Mushrooms, and Mankind; Mycology; Plant Disease Management; Diagnostic Field Plant Pathology; Soil Ecology*; and *Arboriculture*. Bonello has taken editorial responsibilities for several research journals. He is Section Editor for *Phytopathologia Mediterranea* (2009–present) and serves on the editorial boards for *Physiological and Molecular Plant Pathology* (2007–present) and *Tree Physiology* (2007–present).

Brian B. McSpadden Gardener (1969–). B.S. in biology (1992), University of Illinois; Ph.D. in botany and plant pathology (1998), Michigan State University. His postdoctoral research at the Root Disease and Biological Control Research Unit, USDA/ARS, Washington State University (1998–2000) focused on the ecology and diversity of rhizosphere-inhabiting bacteria, particularly those that suppress take-all disease in wheat. In 2000, McSpadden Gardener was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Wooster, with responsibilities for research and teaching in molecular microbial ecology. He was promoted to associate professor in 2006 and professor in 2012. In 2009, he was designated as a World Class University Scholar in Korea. He was appointed Director of the OARDC Organic Food and Farming Education and Research program in 2011. In 2015, following his interests to further develop new microbial bioproducts for the organic and naturals markets, he resigned his position for employment in the private sector, retaining his affiliation with the department as an adjunct professor.

OARDC

McSpadden Gardener's research was centered on the distribution and activities of natural populations of plant-associated microorganisms that promote crop health and productivity. His greatest achievement was the development and application of microbial community profiling methods for the purpose of identifying new and interesting plant health-promoting microorganisms. Using various PCR-based methods and novel sampling strategies, he was able to identify and recover novel variants of diverse biocontrol bacteria and yeasts for further testing as microbial biopesticides. Using terminal restriction fragment length polymorphism analyses, his lab was the first to identify, recover and demonstrate the biopesticidal activities of novel *Mitsuaria* and *Burkholderia* spp. from an organic farming system in Ohio. With his Korean colleagues, he developed new and effective sampling strategies that improved the efficiency of recovery of novel and active plant-associated bacteria. Following the advent of cost-effective high throughput sequencing methods, his lab began sequencing genomes and community

DNA to further elucidate the diversity and activities of microorganisms inhabiting the root zone of diverse crop plants.

McSpadden Gardener actively promoted the development of public-private partnerships, by helping to found three different small companies, engaging in diverse industry-sponsored research projects, and securing patents to several different inventions. He was closely engaged with the organic farming community, and advocated the need for diverse and more biologically-based farming systems. He taught two courses in statistics for biologists, *Quantitative Methods in Applied Biology* and *Quantitative Methods for Agricultural Scientists*, and participated in several team-taught graduate-level courses including *Phytobacteriology, Plant–Microbe Interactions, Ecological Plant Associated Microbes*, and *Current Topics in Plant Pathology (Biological Control of Plant Pathogens)*.

John A. Lindbo (1964–). B.S. (1986), Pacific Lutheran University; Ph.D. in Microbiology (1993), Oregon State University. Lindbo did postdoctoral research in the NSF Center for Engineering Plants for Resistance Against Pathogens (CEPRAP), University of California, Davis (1993–94). He was assistant professor, Department of Biology, Pacific Lutheran University, Tacoma, Washington, where he taught molecular biology, general biology, and other courses (1994–97). He was senior scientist at Biosource Technologies, a biotech startup company, where he developed virus-based expression vectors and associated technologies for production of foreign proteins in plants, or for use as tools in plant gene discovery research (1997–2004). In 2004, he joined the Department of Plant Pathology, The Ohio State University, Wooster, as assistant professor with responsibilities for research and teaching in plant virology. He resigned his position in 2007 to join Campbell's Seeds Co, Davis, California, managing their Marker Assisted Breeding program and pathology labs. Following the acquisition of Campbell's Seeds, by HM Clause Seeds in 2012, he assumed expanded responsibilities in research and breeding management for the vegetable seed industry.


OARDC

Lindbo was a pioneer in the field of RNA silencing/RNA interference (RNAi). In 1992, he was the first person to develop transgenic plants that were immune to a plant virus. He further went on to show the mechanism behind this resistance was an RNA-triggered sequence specific RNA degradation system, which was the first time such a system had been proposed in biology. It is now well appreciated that the RNA silencing system initially described by Lindbo and W. Dougherty (Oregon State University) is an important gene regulation mechanism (RNAi) which functions in all eukaryotic systems, not just plants. While at Ohio State, Lindbo developed improved plant expression vectors based on tobacco mosaic virus, which were patented. Lindbo was a member of the American Society for Virology and the American Phytopathological Society. During his time in both academic and corporate settings, he has served on numerous grant panels and grower scientific advisory boards, and has consulted for the biotech industry.

Dennis J. Lewandowski (1963–). B.S. in biology (1985), University of Dayton; Ph.D. in plant pathology (1992), University of California, Riverside. Lewandowski was research associate in the Department of Plant Pathology, University of Florida Citrus Research and Education Center, Lake Alfred (1992–2005). While there he worked on molecular biology of tobacco mosaic virus (TMV), molecular characterization of citrus tristeza virus and detected several new viruses infecting hibiscus and other ornamental plants. In 2005, Lewandowski was appointed assistant professor and Extension specialist in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibilities for management of diseases of floriculture and nursery crops. He resigned his position and left the department in 2011.

Lewandowski's primary research interests in the department were in management of virus diseases of herbaceous ornamental crops. Hosta virus X (HVX), an emerging viral pathogen only infecting hosta, caused significant losses to Ohio growers.

Through a combination of Extension education and research, he showed growers the benefits of indexing symptomatic plants, rejecting HVX-infected material, and practicing improved sanitation methods. This integrated disease management approach led to significantly reduced losses to HVX. He advanced the development of a virus-based strategy to screen hosta germplasm for resistance to HVX by constructing the first full-length clone of HVX. His applied research efforts were focused on the efficacy of disinfectants to control major greenhouse pathogens on contaminated surfaces, particularly TMV. Though a well-known plant pathogen, TMV continued to cause major losses throughout the horticulture industry. Through rigorous greenhouse trials, Lewandowski developed effective TMV management practices that were valuable to large vegetative propagators producing millions of petunia cuttings, and to local growers of annual bedding plants. His research also showed that strains of TMV isolated from petunia are biologically distinct from those typically isolated from tobacco.

As a member of the interdisciplinary OSU Extension Floriculture Industry Roundtable of Ohio, Lewandowski traveled statewide with colleagues making regional "Extension Reloaded" presentations to the floriculture industry that recapped a day's worth of interactive greenhouse tours and discussion. He was also a member of the OSUE Nursery Landscape and Turf Team. Lewandowski co-taught *Diseases of Ornamentals* and guest-lectured in several plant pathology and horticulture courses. He advised several graduate students and undergraduate honors students.

Sidebar 4

The Maize Virus Research Team

An Interdisciplinary Collaborative Effort among OARDC and USDA/ARS Scientists

Until the early 1960s, corn in the Corn Belt states was relatively free of virus diseases. That changed when a serious stunting disease appeared in southern Ohio in 1962. Two years later, it had spread across the state, causing a five million bushel reduction in annual yield. Mosaic symptoms first appeared in June at the base of young leaves, sometimes forming light streaks along the veins. Younger leaves yellowed, then turned brown or red at maturity. Along with foliar symptoms, many plants were severely stunted, particularly when infection began early in the season.

By 1965, OAES plant pathologists L. E. Williams and L. J. Alexander had isolated a mechanically-transmitted virus from infected plants and named it maize dwarf mosaic virus (MDMV). W. N. Stoner, a visiting USDA/ARS scientist, demonstrated that the new virus could be aphid transmitted. Corn breeders E. J. Dollinger and W. R. Findley screened corn lines for tolerance or resistance to the virus. A tolerant line was found that partially alleviated the disease, but this line was not as productive as susceptible varieties.

WLWT-TV Cincinnati news interview of early maize virus research team ca.1965.
left-to-right: William Findley and E. J. Dollinger, corn breeders, William Blair, entomologist,
Lansing Williams, plant pathologist. Person on right is unknown.

More research expertise was needed to work on the disease and Dean Roy Kottman worked with Ohio legislators to secure funding for additional faculty positions and vital equipment. He succeeded in procuring funds to hire three new faculty members: electron microscopist, O. E. Bradfute (1964), plant virologist, D. T. Gordon (1966), and plant virus-vector entomologist, L. R. Nault (1966). An electron microscope, ultra-centrifuges, and other equipment needed to study plant viruses were purchased.

By 1966, maize dwarf mosaic had been discovered in other Corn Belt states, and the USDA Agricultural Research Service approached the OARDC about jointly supporting maize virus research. An agreement was reached to house three ARS scientists on the Wooster campus. These were plant virus epidemiologist, R. Louie (1967), aphid ecologist, J. K. Knoke (1967), and biochemist, R. E. Gingery (1969). USDA also provided equipment and support personnel for the expanded research effort. In 1980, plant disease epidemiologist L.V. Madden was added to the Team. His charge was to use data already collected by the Team to develop predictive mathematical models describing how virus diseases developed in maize over time and space. During the 1980s and 2000s, Dr. El-Desouki Ammar, Cairo University, worked with the Team as a visiting scientist, studying many of the maize viruses and mollicutes. His expertise in electron microscopy helped characterize maize pathogens and their cytopathic effects in plant and insect vector tissues and cells.

Early members of the OARDC/USDA-ARS Maize Virus Research Team in Selby Hall, Wooster, circa 1972. Standing left-to-right: R. Louie, J. K. Knoke, D. T. Gordon. Seated left-to-right: L. R. Nault, R. E. Gingery, O. E. Bradfute

Shortly after MDMV appeared in the early 1960s, a second virus-like disease of corn, kernel red streak, was reported in regions of Ohio, Indiana, Michigan, and Ontario, reducing the value of grain sold for animal feed. Wheat streak mosaic virus (WSMV), an eriophyid-mite-transmitted potyvirus, was isolated from some, but not all diseased plants. Nault and Williams soon discovered that kernel red streak was not incited by WSMV, but by an apparent salivary phytotoxin from mites feeding upon developing corn kernels. This saved growers millions of dollars when red-streaked corn was no longer docked in price as mixed-grade corn by grain purchasers.

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Ray Louie and John Knoke examining virus-infected corn seedling, OARDC Wooster, 1974

In the 1970s, the Team came to recognize that, in addition to the several strains of MDMV already characterized by Louie and Knoke, there was another agent involved in the disease. In further studies with breeding plots, Louie and Knoke showed that some plants that were stunted in the field were not infected by MDMV or other mechanically-transmitted viruses. From there, every member of the Team participated in the discovery of a second component in the maize dwarf mosaic disease complex. In 1972, Bradfute identified a single, large viral inclusion composed of small isometric, virus-like particles in leaves from affected plants. Critically, Nault demonstrated that the black-faced leafhopper, *Graminella nigrifrons*, a common species found in Ohio corn fields, could transmit this virus-like particle to maize. Although nearly all leafhopper-transmitted viruses are transmitted in a persistent manner, Nault determined that *G. nigrifrons* transmitted this virus in an unusual, semi-persistent manner, changing the protocol for virus transmission. Based on symptoms produced on plants inoculated by leafhopper vectors, Nault and the Team named the new pathogen maize chlorotic dwarf virus (MCDV). Later, Nault and Gingery further discovered that a previously unknown helper component was required for leafhopper transmission of MCDV.

In greenhouse studies with maize plants inoculated with MCDV by leafhoppers, Gordon and Gingery were able to produce MCDV-infected plants and to isolate and chemically characterize the single-stranded, RNA virus. Gingery and Nault showed that double infection of plants by two strains of MCDV caused much more severe disease. A survey by Gordon and Nault, working with collaborators in 23 states, indicated that MCDV was twice as prevalent as MDMV, making it the most frequent cause of corn stunting disease in the U.S.

Throughout the 1970s, the Maize Virus Research Team became recognized as the world

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Lowell (Skip) Nault examining insect cage containing leafhoppers, 1985

center for the study of maize virus diseases. The Team assisted U.S. and international collaborators in identification and characterization of maize pathogens, especially the insect-vectored viruses and mollicutes (phytoplasmas and spiroplasmas). They analyzed samples of diseased maize plants from the U.S., Mexico, Central and South America, southern Europe, Africa, and Asia. Through these studies, they showed that the maize-stunting pathogens, corn stunt spiroplasma, maize bushy stunt phytoplasma, and maize rayado fino virus, all transmitted by the corn leafhopper, *Dalbulus maidis*; and maize stripe virus and maize mosaic virus, both transmitted by the corn delphacid, *Peregrinus maidis*, caused disease in maize in U.S. states bordering the Gulf of Mexico. Prior to this, these pathogens had been known principally in Mexico, Central and South America, and the Caribbean islands. The Team sponsored the first Maize Virus Disease Colloquium and Workshop in 1978, and a second in 1982, hosting scientists from all major corn-growing regions of the world on the Wooster campus. Proceedings published from these meetings became the primary source of information about virus and mollicute diseases of maize. Moreover, for 20 years, Gordon provided the Maize Virus Information Service, which included references from international literature on maize viruses, to researchers and agricultural scientists worldwide. Prior to the Internet, this service was especially valuable to researchers in developing countries.

After several retirements in the 1980s and 1990s, the Maize Virus Research Team added maize geneticist M. D. McMullen (1987–1995) and maize breeder R. C. Pratt (1986–2011). During this time, the group developed improved inoculation methods and screening protocols that allowed identification of Caribbean maize lines with high tolerance to MCDV and, using molecular markers, localization of *Mdm1*, the dominant gene conferring resistance to MDMV, to the short arm of maize chromosome 6. In the 1990s, Louie developed the vascular puncture inoculation technique (VPI), a novel approach for mechanically transmitting viruses directly to germinating maize kernels. Critically, VPI allowed for transmission of all maize-infecting viruses without the need for or knowledge of their vectors. In the late 1990s, plant molecular biologist M. G. Redinbaugh (1998–present) and insect vector molecular biologist S. A. Hogenhout (1999–2007) joined the Team, focusing their research on interactions among viruses, vectors and maize.

In the 2000s, VPI was critical to the Team in the rapid characterization of the emerging viruses maize necrotic streak virus (MNeSV) and maize fine streak virus (MFSV). VPI also allowed for demonstration of Koch's postulates for wheat mosaic virus (WMoV), the causal agent of High Plains disease in both maize and wheat. Infectious clones for MDMV and MNeSV were developed, facilitating virus gene characterization. In 2006, the Team was contacted by USDA, Foreign Agriculture Service about outbreaks in Serbia of a disease on maize that caused maize leaves to become red and necrotic, with poor grain set and low yield. In 2003–2004, Serbian farmers lost 30–70% of their crop. Working with Serbian collaborators, the Team identified Stolbur phytoplasma, transmitted by the cixiid planthopper *Reptalus panzer,* as the disease agent. The group also showed how maize and winter wheat rotations used in the region could lead to increased vector populations and higher rates of disease. In 2007, population entomologist A. P. Michel joined OSU, and began working with Redinbaugh on *G. nigrifrons* transmission of MFSV. Molecular virologist L. R. Stewart joined the Team in 2009, bringing expertise in working with cloned viruses and the cellular biology of virus infections.

To reinforce the strong interactions among Team members and to strengthen the group's expertise in using new sequencing and bioinformatics tools, USDA/ARS and OARDC administration provided funding for a postdoctoral research associate to develop transcriptomes for virus vectors, including *G. nigrifrons*, which resulted in Team publication of the first transcriptome for a leafhopper species. The Team, including D. M. Francis (OSU Department of Horticulture and Crop Science), also showed that virus resistance in the multi-virus resistant maize line Oh1VI, which had exceptionally high tolerance to MCD and was released by the Team, was clustered in just four regions of the maize genome.

Margaret Redinbaugh in Ecuador checking virus-infected maize

Over the past fifty years, members of the Maize Virus Research Team have traveled throughout the world to assist researchers in solving maize virus disease problems. Many American and international students have come to OSU to obtain graduate degrees studying maize virus diseases. Additionally, scholars from U.S. and foreign institutions have come to OSU to study with their counterparts on the Team. This is exemplified by research activities associated with recent outbreaks of maize lethal necrosis in sub-Saharan East Africa. Team members Redinbaugh, Stewart and Francis have traveled to East Africa to work on collaborative projects with Kenyan, Ugandan, Rwandan, and Tanzanian students and collaborators. The Team has also hosted international graduate students who came to OSU through several programs, as well as numerous collaborators who came to learn technologies for virus diagnosis and resistance screening.

Chapter 8

Ohio State Plant Pathology in the Twenty-First Century (2006–2017)

After Rowe's retirement in 2006, and a year with L. V. Madden as interim chairperson, Michael J. Boehm became department chairperson in 2007. The department initiated a new professional, non-thesis, Master of Plant Health Management degree program in conjunction with the Department of Entomology. This allowed the department to expand its graduate enrollment and broaden its student base beyond those seeking research degrees. The program met with considerable success and grew to 16 MPHM students by 2016. With the university change to semesters in 2012, a total revision of the departmental curriculum took place, with an emphasis on principles and concepts. Boehm moved into university administration in 2010. Madden again served as acting chairperson until Terry L. Niblack came from the University of Illinois as the new chairperson in 2011. During this period, enrollment in the graduate program continued to advance, and by 2016 stood at 40 M.S. and Ph.D. students. Department faculty continued to provide national leadership on many fronts, capped by service as APS President by Michael Boehm in 2013, and Sally Miller in 2016. An additional ten new faculty joined the department between 2006 and 2016, though total active faculty numbers dropped to 14, plus three ARS adjuncts. Of the original faculty who had built the new department through the 1970s and 1980s, nearly all were now gone. Those early pioneers had been replaced by the current group of faculty and staff who were all working diligently to further advance Ohio State plant pathology to the highest levels.

Despite all the pitfalls and roadblocks that had been faced and overcome since the OSU Department of Plant Pathology began in 1967, the original vision of the department's founders had been achieved. In 2010–11, the National Research Council conducted a study of doctoral programs in the U.S. and concluded that Ohio State ranked among the top 3–5 plant pathology doctoral programs nationally. The department underwent another outside peer review in 2011. In their report to the college administration, the review team concluded that, "The department offers a strong, comprehensive program with excellent research, education, and Extension. The grantsmanship, graduate student enrollment, and publication record of the department are all very strong. Research productivity is extremely high. Publication output and graduate student numbers are among the highest in the United States."

On the 50th anniversary of the Department of Plant Pathology at Ohio State in 2017, great things had been accomplished and a bright future lay ahead.

Pierce A. Paul (1969–). B.S. in agronomy (1997), M.S. in plant pathology, both from the Federal University of Viçosa, Brazil; Ph.D. in plant pathology (2003), Iowa State University. Paul was born and raised in Guyana, South America. He did postdoctoral research in the Department of Plant Pathology, The Ohio State University, at Wooster (2003–06), and in 2006 was appointed assistant professor in the department at Wooster, with responsibility for research and Extension in diseases of field crops. He was promoted to associate professor in 2012.


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Paul's research deals with the epidemiology and management of diseases of field crops. His primary

focus has been Fusarium head blight of wheat (FHB), caused by *Fusarium graminearum*, the most economically important disease of cereal crops in the U.S. since the stem rust epidemics of the 1950s. Paul has been a leading member of several teams of researchers studying FHB and the associated DON mycotoxin produced by the pathogen. Taking a statistical approach, he has contributed to the development of multi-state projects and quantitative synthesis of research findings. Paul has become a leading authority on meta-analysis in the agricultural sciences. He has used this approach to: combine results from multiple studies to quantify relationships between FHB and DON, and FHB and grain yield and quality; and evaluate the efficacy, stability, and economics of FHB and DON management strategies. Paul and collaborators have shown that an integrated management approach is more stable across environments than fungicide or host resistance alone, and that the combined effect of both is additive. He and students have shown that modified harvesting strategies effectively improve wheat grain quality harvested from FHB-affected fields; that an integrated management approach can be economically feasible for FHB and DON management; and that fungicide applications made a few days after flowering may provide effective FHB and DON control. Paul's work has significantly advanced understanding of the epidemiology of FHB. He and colleagues showed that spores of *F. graminearum* are not only wind-disseminated but also splash dispersed, effectively moving spores to wheat spikes where infections occur. They showed that spore density on wheat spikes is significantly related to moisture, temperature, and rainfall over weekly periods. He and students have also shown that the amount, timing and pattern of moisture affect the production of DON in FHB-affected spikes.

Pierce Paul with experimental wheat plants in OARDC greenhouse, Wooster, 2015

Paul has taken leadership for Extension and outreach activities in corn and wheat pathology. He provides Ohio's producers, county Extension educators, crop consultants, and agricultural industry with research-based management recommendations for diseases of agronomic crops. Based on his applied research, he develops economically sound integrated disease management recommendations for corn and wheat. He works closely with members of OSU's Plant Pathology Extension team and Agronomic Crops Extension team to provide clientele with up-to-date information by way of Extension publications, trade journal articles, technical reports, in-service training sessions, workshops, seminars, and electronic newsletter articles. Through on-site visits, telephone conversations, email messages, and laboratory processing of samples, he contributes to the diagnosis of plant health-related problems in corn and wheat. A major part of his Extension focus has been to help wheat growers and millers evaluate the risk of FHB development and mycotoxin accumulation in wheat through a weather-driven, web-based forecasting and alert system. A major outcome of his Extension-outreach program has been the successful generation, synthesis, and dissemination of multi-state information to stakeholders pertaining to timing, efficacy, and economics of fungicides used for disease management in wheat and corn.

Paul is active nationally with the American Phytopathological Society (APS) and other professional organizations. He has chaired the APS Epidemiology Committee, and served as Senior Editor for the APS journal *Plant Disease* and reviewer for several other journals. He has also been a member of several national committees dealing with cereal disease management. He received the APS Syngenta Award for research in 2016.

Thomas K. Mitchell (1970–). B.S. (1992), Pennsylvania State University; M.S. (1995) Clemson University; Ph.D. (2000) North Carolina State University. After completing his Ph.D., Mitchell stayed at North Carolina State and joined the Fungal Genomics Laboratory (2000–2007), which then became part of the Center for Integrated Fungal Research located on the NCSU Centennial Campus in Raleigh. In 2007, Mitchell was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibilities for research in fungal molecular genetics and host-pathogen interactions and for teaching a graduate course in his specialty. In 2012, Mitchell was promoted to associate professor and took on expanded teaching responsibilities. He maintains adjunct status at Oklahoma State University and Fayetteville State University and is a member of the OSU Center for Translational Plant Sciences.

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Mitchell has taken considerable responsibilities in the department teaching program, including *Mycology* (2009–2013), *Advanced Fungal Physiology and Genetics* (2008–present), *History of Plant Pathology* (2009–present), *Mushrooms, Molds, and Mankind* (2013–present), and shared responsibility for *Molecular Plant–Microbe Interactions* (2008–present). He also participates in numerous special topics courses.

Mitchell's research has made significant advances in the area of fungal molecular biology, particularly in understanding the molecular basis of fungal pathogenesis. He has given primary attention to cellular signal transduction, avirulence gene identification, and genome organization. He uses advanced whole genome and transcriptome approaches to identify and functionally characterize these important genetic determinants of disease. Through this work, Mitchell has become a world expert in applying these approaches to fungal pathogens of plants and humans. He is the leading expert in applying a technique known as chromosome-immunoprecipitation sequencing (ChIP-Seq) to understand the pathways that selected transcription factors regulate during disease development. While he has worked with many fungal pathogens, his primary focus is with *Magnaporthe oryzae*, causal agent of rice blast disease. While at North Carolina State University, he played key roles in sequencing its genome, the first fungal pathogen genome sequenced. At OSU, a large part of his work is with international partners, using genomic approaches to understanding pathogen populations and disease resistance in China and Africa. The ultimate goal is the establishment of markers that can be used to monitor pathogen populations so that new rice resistance lines can be deployed in a strategic and sustainable manner.

Plant Pathology Department

Tom Mitchell in Kottman Hall laboratory, Columbus, 2009

Mitchell is highly involved in academic service on numerous boards, offices and committees focused on education and curriculum development in the department, college, university and state. He currently serves as chairperson of the OSU Translational Plant Sciences Graduate Committee, chairperson of the departmental academic affairs committee, member of the college academic affairs committee, member of the college honors committee, and faculty on the Second Year Transformation Experience Team (STEP). He is also a member of the OSU Faculty Committee on Admissions, Graduate School Curriculum Committee, and Graduate Assessment Task Force. At the state level, he has served four years as the lead expert in biotechnology for curriculum alignment strategic initiatives for the Ohio Board of Regents. Mitchell also serves the American Phytopathological Society as Director of the APS Office of Education.

Feng Qu (1964–). Bachelor of Medicine (1985), Nantong Medical College, China; Master of Medicine (1988), Chinese Academy of Preventive Medicine; Doctor of Science, Chinese Academy of Sciences (1992). Qu was Associate Investigator at the Institute of Genetics, Chinese Academy of Sciences (1992–94). In 1994, he became a postdoctoral associate at the Nebraska Center for Virology, University of Nebraska-Lincoln, focusing his research on the molecular mechanisms of plant virus-host interactions. There he was promoted to research assistant professor (1999) and research associate professor (2004). In 2008, he was appointed assistant professor, Department of Plant Pathology, The Ohio State University, Wooster, with responsibility for research and teaching in plant virology. He was promoted to associate professor in 2014.


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Qu's research is in plant virus–host interactions, particularly focused on RNA silencing-based antiviral defense, resistance gene-mediated plant defense, cross protection, and the use of virus-induced gene silencing as a tool for plant genomics research. He teaches *Introductory Plant Virology* and *Plant Molecular Biology* in alternate years. He also participates in team-taught departmental courses, including *Molecular Plant-Microbe Interactions* and *Plant Disease Management,* as well as *Molecular Virology and Pathogenesis*, a course team-taught by faculty in four OSU departments (Medical School, Veterinary School, Molecular Genetics, and Plant Pathology).

Lucy R. Stewart (1980–). B.S. (2002) in plant genetics and breeding, Brigham Young University, Utah; Ph.D. (2009) in plant biology, University of California, Davis. In 2009, Stewart was appointed research molecular biologist with the USDA/ARS Corn, Soybean, and Wheat Quality Research Unit, based at the OARDC, Wooster. She holds a position as adjunct associate professor in the Department of Plant Pathology, The Ohio State University.


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Stewart's research at UC Davis focused on the whitefly-transmitted crinivirus, lettuce infectious yellows virus (LIYV). She identified the localization and protein interactions of LIYV-encoded proteins and showed that one was responsible for an unusual cytopathology at plasmodesmata. At OSU, Stewart contributes her virology expertise as a member of the interdisciplinary OARDC-USDA/ARS Maize Virus Research Team. Her research has included work on the phloem-limited maize chlorotic dwarf virus (MCDV) found in the U.S.; potyviruses including Maize dwarf mosaic virus (MDMV) and sugarcane mosaic virus (SCMV) found worldwide; and maize chlorotic mottle virus (MCMV), now emerging in East Africa and Asia.


Lucy Stewart in Tanzania

She has used high-throughput RNA sequencing and bioinformatics to develop methods for identification of known and previously unknown viruses. Using these methods, she has surveyed for viruses in Ohio soft red winter wheat, maize, and Johnsongrass (the major weedy reservoir of maize viruses in the Southeast and Midwest U.S.), and identified virus populations in maize lethal necrosis-affected areas of Africa. Stewart studies virus protein function and insect transmission of the phloem-limited, semi-persistently transmitted waikavirus MCDV. Her lab developed and tested virus vectors for virus-induced gene silencing in monocot crops (wheat, barley, and maize) as part of an OSU Center for Applied Plant Sciences research team.

Stewart has trained numerous undergraduate interns, research assistants, and visiting scholars. She presents guest lectures in several department classes, and participates in advising graduate students and postdoctoral scholars. She is active in the American Phytopathological Society and the American Society for Virology, and is peer-reviewer for major virology and phytopathology journals. She received the Schroth Fellowship for "Faces of the Future in Virology" from APS (2010) and served as chairperson of the APS virology committee (2012).

Christopher G. Taylor (1967–). B.S. in biochemistry (1989), Pennsylvania State University; Ph.D. in genetics (1996), North Carolina State University. In 1996, Taylor joined the NatureMark Potato Research Unit at Monsanto Corporation, St. Louis, Missouri, as a postdoctoral researcher where he worked on tissue-specific gene expression within the potato tuber. He then joined the Disease Control Group at Monsanto as a senior scientist with a focus on nematology. There he led a research group focused on characterizing resistance genes in soybean. In 1999, he joined Akkadix Inc., San Diego, California, as a senior scientist and group leader of the Nematode Research Group. At Akkadix his research focused on identifying and characterizing novel bacterial proteins for nematode control. In 2001, he was appointed a principal investigator at the Donald Danforth Plant Science Center, St. Louis, Missouri, where he continued work on identifying novel bacterial proteins for nematode control and investigated nematode-induced changes in gene expression within nematode-infested plants. In 2009, he was appointed an assistant professor in the Department of Plant Pathology, The Ohio State University, located on the Wooster campus. He was promoted to Associate Professor in 2015.


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Taylor's research focuses on basic and applied biology of plant-biotic interactions, with an emphasis on how plant-interacting organisms interact with plant roots. He has contributed to the study of root interactions with rhizosphereic bacteria, fungi, oomyctes, and plant-parasitic nematodes. His contributions include characterizing plant genes that are important to symbiotic (nitrogen-fixing bacteria on soybean) and parasitic (root-knot and soybean cyst nematode on *Arabidopsis* and soybean, respectively) interactions. Of particular interest is how microorganisms influence developmental, physiological, and biochemical changes within the root that impact plant health and alter symbiotic and parasitic interactions. Taylor serves as group leader for OSU's Center for Applied Plant Science's Microbial Bioproducts, Scale-up and Application Team and oversees the use of bacteria and microbial products for use in disease control. He teaches *Nematology* and *Plant-Microbe Interactions*. He has worked extensively with and chaired the OARDC SEEDS program and oversees growth chamber and greenhouse facilities for the department.

Tea Meulia (1958–). B.S./M.S. in biochemistry (1986), Ph.D. in virology and cancer genetics (1990), all from the University of Lausanne, Switzerland. Meulia did postdoctoral research at the Fred Hutchinson Cancer Research Center, Seattle, studying transcriptional mechanisms that deregulate expression of oncogenes. In 1994, she was appointed research scientist in the Department of Plant Pathology, The Ohio State University, Wooster, working with D. T. Gordon, characterizing various strains of maize dwarf mosaic virus by sequencing capsid proteins and performing phylogenetic analyses. She sequenced the entire genome of MDMV-A and constructed an infectious clone. She continued part time as research scientist with the Department of Horticulture and Crop Science in 1998 and also began work in the OARDC Molecular and Cellular Imaging Center (MCIC). In 2000, Meulia was appointed head of the MCIC, a core OARDC facility on the Wooster campus that provides support for research in microscopy, genetics, and bioinformatics. She was appointed research associate professor (2010) in the Department of Plant Pathology. In this role she collaborates with various faculty in Plant Pathology and other departments and teaches technical graduate classes in microscopy and bioinformatics.

Terry L. Niblack (1953–). B.S. degrees in agricultural education and ornamental horticulture and landscape design (1976), and M.S. in entomology and plant pathology (1982), all from the University of Tennessee, Knoxville; Ph.D. in plant pathology (1985), University of Georgia, Athens. From 1976–80, Niblack taught vocational horticulture (grades 10–12) in the Knox County Schools, Knoxville, Tennessee. She did postdoctoral research at Iowa State University (1986–1987). Niblack served on the faculty of the Department of Plant Pathology, University of Missouri, Columbia, rising to the rank of professor (1988–2000). In 2001, she joined the faculty of the Department of Crop Sciences, University of Illinois Urbana, Champaign, at the rank of professor. In 2011, Niblack was appointed professor and chairperson of the Department of Plant Pathology, The Ohio State University, Columbus. In 2016 and 2017, she served as Interim Senior Associate Dean in the College of FAES.


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Niblack's career has reflected a commitment to all three facets of the land-grant mission: teaching, research, and Extension. As department chairperson, her highest priorities are to support faculty governance and enable faculty, staff, and student achievement in every way possible. Her teaching passion is in introductory-level plant pathology, which she taught for many years at both the University of Missouri and the University of Illinois. At Ohio State, she has taught *General Plant Pathology* since 2012 and offered the course to students in Wooster beginning in 2013. She has also provided a graduate-credit option for the course to graduate students coming to the department without a background in plant pathology.

Niblack's research focused on root-pathogenic nematodes, primarily the soybean cyst nematode, *Heterodera glycines*, partly because the timeframe of its spread throughout the major soybean production regions of the U.S. coincided with her career, but mostly because research on this persistent and very damaging pest was needed to support Extension education of Midwestern soybean producers and their support industries. Prior to coming to OSU, she led research projects on the interactions between *H. glycines* and other economically important root-associated pathogens, such as the fungal agents responsible for soybean sudden death syndrome and charcoal rot, and studies of the basic biology of the nematode relative to its adaptation to different regions in the U.S. She led a team of nematologists, soybean geneticists, and Extension specialists to create a new framework for assessment of variability in virulence phenotypes among populations of the soybean cyst nematode, conducted fundamental and applied research to understand and manage such variability, and developed Extension education programs to address this topic. At OSU, she has continued collaborative research and Extension with colleagues in Ohio and throughout the Midwest on the biology and distribution of the soybean cyst nematode.

Throughout her career, Niblack has taken many editorial and leadership roles in the American Phytopathological Society (APS) and the Society of Nematologists (SON). She has chaired numerous committees for both organizations, served as President of SON (2004) and in other roles on the Executive Board, and served as editor of the *Annals of Applied Nematology* (1992–1995), associate editor of the *Journal of Nematology* (1989–1991 and 1996–2002), and both associate editor (1995–1997) and Features editor (2007–2010) of *Plant Disease*. In 2012, she was elected chairperson of the Nathan A. Cobb Nematology Foundation supporting nematology research.

Niblack has been widely recognized for her work by many honors and awards, including the Junior Distinguished Service Award, Southern Soybean Disease Workers (1991); Special Recognition Award, Southern Soybean Disease Workers (1994); Fellow of the Missouri Institute of Instructional Technology (1999); Outstanding Achievement Award, United Soybean Board (2004); Excellence in Research Award, Illinois Soybean Association (2007 and 2011); Team Award for Excellence, College of Agriculture, Consumer and Environmental Sciences, University of Illinois (2008); and the Wyffels Award for Faculty Excellence, University of Illinois (2009). She was elected a Fellow of the Society of Nematologists in 2012.

Francesca Peduto Hand (1978–). Laurea Magistrale (B.Sc. and M.Sc.) in agricultural sciences and technologies (2003), and Ph.D. in plant pathology (2008), both from the University of Florence, Italy. She did postdoctoral research in the Department of Plant Pathology, University of California, Davis (2009–2013). In 2013, Hand was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibility for research, Extension and teaching in turf and ornamental crop diseases.


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Hand uses conventional and molecular techniques, combined with greenhouse and field studies, to investigate disease epidemiology, biology, and ecology of plant pathogens in an effort to improve disease control strategies in economically important crops. She has conducted research, in both Italy and the U.S., on bacterial and fungal diseases of diverse crops in nursery and field production systems, including fruit crops (grapevine, olive, cherry), herbaceous annuals and perennials, and woody ornamentals. Her research has focused on powdery mildew, bacterial crown gall, the grapevine trunk disease complex, and more recently, on anthracnose of woody ornamentals and gray leaf spot of turfgrass. The overarching objective of her program at OSU is the development of plant health management strategies that will effectively address disease problems faced by Ohio floriculture, nursery and turf industries. Specific goals are (i) to develop practitioner-performed decision support tools for rapid and reliable disease diagnosis, (ii) to improve knowledge of the biology and epidemiology of emerging pathogens of ornamental crops, and (iii) to develop sustainable management strategies for plant disease management in turf and ornamental crops.

Her Extension responsibilities entail providing Ohio's horticultural growers, county Extension educators, crop consultants, and various professionals in the green industry, with research-based information on the etiology and management of diseases of turfgrass and ornamental crops. Through on-site visits, telephone conversations, email messages, and laboratory processing of submitted samples, she also contributes to the diagnosis of plant health-related problems in turfgrass and ornamental crops. Hand also has responsibilities for undergraduate and graduate teaching and as research and academic advisor. She teaches *Diseases of Ornamental Plants* annually and *Plant Disease Diagnosis* in alternate summers.

Jason C. Slot (1973–). B.A. (1996) and M.A. in teaching (2000), both from Boston University; and Ph.D. in mycology (2008), Clark University, Massachusetts. He did postdoctoral research at Vanderbilt University (2008–13) investigating the evolution of fungal genome structure, with particular emphasis on horizontal gene transfer and gene clusters. In 2013, Slot was appointed assistant professor in the Department of Plant Pathology, The Ohio State University, Columbus, with responsibilities for research in fungal evolutionary genomics and teaching mycology.


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Slot's research focuses on the evolution of fungal metabolic pathways and genomes, emphasizing the acquisition of novel traits and the causes and consequences of metabolic gene clustering. His research is directed towards understanding the mechanisms of fungal community assemblages, particularly of endophytic and mycorrhizal fungi, and the emergence of pathogens from benign or mutualistic symbionts of plants. Slot teaches *Science of Fungi: Mycology*, a course he designed to give special attention to the diversity of fungal ecological modes, grounded in their genomic and physiological underpinnings. The course attempts to strike a balance among ecology, genetics, physiology, and application of fungi.

Ye Xia (1977–). B.S. in Plant Protection (2000), Northeast Agricultural University, China; M.S. in Plant Pathology (2003), Northeast Agricultural University and Chinese Academy of Agricultural Sciences, China; Ph.D. in Plant Pathology (2010), University of Kentucky. Her Ph.D. dissertation research focused on the role of cuticle, fatty acid,


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and lipid signaling in plant defense to bacterial and fungal pathogens. Using the *Arabidopsis–Pseudomonas syringae* model system, she studied the molecular, genetic, and cellular mechanisms of systemic acquired resistance (SAR) for long-lasting and more efficient plant disease control. She demonstrated that plant cuticle biosynthesis and signaling were critical for SAR during plant-pathogen interaction. She also discovered the SAR mobile signal inducer glycerlol-3-phosphate, studied its cross-talk with other signaling pathways, and investigated the fine-tuned mechanisms of SAR. In 2010, she began postdoctoral research with the Department of Horticulture, University of Kentucky, studying the phytobiome of several important crops. She investigated beneficial plant–microbe interactions, and isolated several plant associated microbes useful for targeting plant cell wall biosynthesis, increasing plant disease resistance, and promoting plant growth and development. Using both comparative metabolomics and chemical genomics approaches, she screened and identified small molecules secreted by endophytic bacterial microbes involved in targeting plant cell wall biosynthesis and affecting plant growth. Her research also dealt with characterization of the diversity and specificity of the plant endophytic bacterial community and the effects of various environmental factors.

In 2015, Xia joined the Department of Plant Pathology, The Ohio State University, Columbus, as assistant professor with responsibility for both research and teaching in the area of plant–microbe interactions. Her research is focused on the biochemical, genetic, and molecular mechanisms of beneficial plant–microbe/microbiome interactions as applied to plant disease resistance with the goal of improving plant health and yield for sustainable agriculture. Her research will emphasize two main areas: 1) Plant surface (cell wall and cuticle)-mediated plant immunity against diverse pathogens, and 2) Improvement of plant immunity and yield by beneficial microbes from the phytobiome.

Monica M. (Sanwo) Lewandowski (1961–). B.A. in biology/botany (1985), and M.A. in biology (1987), both from California State University, Fresno; Ph.D. in botany (1993), University of California, Riverside. She did postdoctoral research on citrus blight at the University of Florida, Citrus Research and Education Center (1993–1994), and subsequently was a researcher in the Plant Space Biology program at the Kennedy Space Center (1994–1998), where she evaluated plant growth under LED lighting systems in controlled environment systems. From 1998–2005, she worked at the University of Florida, Citrus Research and Education Center as Coordinator of Information and Publication Services, where she established the center's public relations program, and coordinated Extension and outreach activities with the citrus industry and community.


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In 2007, Lewandowski joined the Department of Plant Pathology, The Ohio State University, Columbus, as a lecturer, with responsibility to teach *Societal Issues: Pesticides, Alternatives and the Environment.* Later that year, she took the position of academic program coordinator, where her responsibilities included teaching, graduate admissions, student recruiting, communications, academic data reporting, and educational outreach. She has been actively involved in developing a website and other tools for graduate and undergraduate student recruitment. In 2015, Lewandowski was appointed to the Plant Pathology faculty as assistant professor, clinical professional practice. In this role, in addition to her current responsibilities, she assumed additional teaching responsibilities, including online teaching and professional development activities for students. Her areas of interest include science communications, education outreach, and diversity and equality. She has served on the board of the American Phytopathological Society's Office of Public Relations and Outreach since 2014.

Melanie L. Lewis Ivey (1972–). B.S. in microbiology (1996), University of Guelph, Canada; M.Sc. in plant sciences (1998), University of Western Ontario, Canada; Ph.D. in plant pathology (2011), The Ohio State University. In 1999, she was appointed research assistant in the Department of Plant Pathology, The Ohio State University,

Wooster, working with S. A. Miller. She was later promoted to research associate and research scientist. In these positions her responsibilities were to assist with the development and delivery of disease management guidelines and knowledge translation programs aimed at enhancing the health and safety of vegetable crops. Her research focused on the detection, quantification and management of plant and human pathogen populations throughout plant ecosystems, using classical and molecular strategies. In 2013, Lewis Ivey joined the Department of Plant Pathology and Crop Physiology, Louisiana State University, located at the LSU AgCenter, Baton Rouge. In this position, she served as the state horticulture pathologist extension specialist and the IR-4 state representative for food crops. She was a member of the Good Agricultural Practices Extension Team and the LSU AgCenter Food Safety Task Force. Her research at LSU focused on the development of sustainable management practices for bacterial diseases of tomato and pepper, and practices to mitigate food safety hazards of fresh produce. She co-taught *Plant Disease Management* and *Spring Practicum*.

In 2016, Lewis Ivey was appointed assistant professor, Department of Plant Pathology, The Ohio State University, Wooster, with responsibility for research, Extension, and teaching in fruit crop diseases. Her research focuses on the development and integration of economical and sustainable co-management tactics to reduce on-farm plant disease and food safety hazards on small fruit, tree fruit, and vegetable crops. She works with bacterial, fungal, and oomycete phytopathogens and bacterial human pathogens. Lewis Ivey has conducted research in temporal and sub-tropical climates and places a strong emphasis on integrated pest management (IPM) approaches, which can be applied to commercial, home garden and workplace production settings in any environment. Of special interest is the assessment of the microbial quality and safety of irrigation water and seed or transplant stock.

Through the use of innovative approaches that target the cultural and social diversity of stakeholders she moves research knowledge into practice. As the state-wide fruit pathologist Extension specialist, her responsibilities entail providing fruit growers, county Extension educators, crop consultants, home owners, industry professionals, and government agencies, with research-based information on the etiology and management of fruit crop diseases. She also contributes to the diagnosis of plant health-related problems in fruit crops through on-site visits, hands-on workshops or trainings, and social media. Lewis Ivey has responsibilities for undergraduate and graduate teaching and as research and academic advisor. She teaches the fruit portion of *Fruit and Vegetable Diseases* and guest lectures in *Plant Disease Management* and *Plant Disease Diagnosis*.

Lewis Ivey is actively involved with The American Phytopathological Society (APS). She served as the APS Public Policy Early Career Intern (2010–2011) and continues to participate in public policy board activities. She is also a member of the APS Extension committee and the Food Safety Interest Group (FSIG). She is a member of the editorial board of *Plant Disease*, serving as a *Plant Disease Note* assigning editor. She is a member of the International Association for Food Protection (IAFP), where she advocates for collaborations between food safety specialists, plant pathologists and government regulators to enhance research on fresh produce safety.

Chapter 9

Adjunct and Courtesy Faculty Associated with the Department of Plant Pathology

Biographical information for those Adjunct or Courtesy faculty who are/were permanently housed in the Department of Plant Pathology, either at Columbus or Wooster, is presented with the regular faculty in the appropriate chapter. These include:

- Roy E. Gingery (Chapter 6)
- Raymond E. Hite (Chapter 6)
- Charles R. Krause (Chapter 7)
- Raymond Louie (Chapter 6)
- Lowell R. "Skip" Nault (Chapter 6)
- Margaret G. Redinbaugh (Chapter 7)
- Lucy R. Stewart (Chapter 8)
- Warren N. Stoner (Chapter 6)
- Charles L. Wilson (Chapter 6)

The following Adjunct or Courtesy faculty were/are located in other OSU departments or other institutions in Ohio or elsewhere. They interacted in many ways with Plant Pathology faculty and students.

Harold L. Porter (1914–2002). B.S. in education (1936) and M.S. in botany (1938), both from The Ohio State University. His thesis, a study and survey of soybean diseases in Ohio, was one of the early Ohio studies on the pathology of this crop. In 1939, Porter joined the Ohio Department of Agriculture and served in several positions within ODA. From 1961 until his retirement in 1983, he was Chief of the ODA Division of Plant Industry, serving under several Ohio directors of agriculture. He was instrumental in the drafting of legislation which resulted in the enactment of Ohio's Pesticide Use and Applicator's Law. Porter was highly respected by the Ohio nursery industry, receiving the Distinguished Contribution Award from the Ohio Nurserymen's Association (1977). He received the Distinguished Alumni Appreciation Award from The Ohio State University's College of Agriculture (1971), the National Association of State Departments of Agriculture's Honor Award in the regulatory category (1978), and the USDA Award for Superior Service to the plant industry of Ohio and the nation (1979). In 1984, he was inducted into the Ohio Agricultural Hall of Fame.

Leon S. Dochinger (1924–2012). B.S., Rutgers University; M.S. Cornell University; Ph.D. (1956), Rutgers University. He was appointed adjunct professor of plant pathology in 1973. In 1956, Dochinger joined the USDA Forest Service as plant pathologist at the Central States Forest Experiment Station and Northeastern Forest Experiment Station, Delaware, Ohio. In his 33-year career with the agency, he served as plant pathologist, principal plant pathologist, and project leader. Dochinger is known nationally for his research on the effects of air pollution and acidic rain on forest trees. In addition, he conducted studies on several root, canker, and wilt diseases of trees, including extensive studies on chlorotic dwarf of eastern white pine. He retired in 1989.

Lawrence R. Schreiber (1931–). M.S. and Ph.D. (1961), both from Purdue University. Schreiber was appointed adjunct professor of plant pathology in 1974. He was appointed to the graduate faculty at Ohio State in 1977 and served as co-advisor of several graduate students in plant pathology. In 1961, he was appointed research plant pathologist with the USDA/ARS Shade Tree and Ornamentals Plants Laboratory, now known as Nursery Crops Research Laboratory, Delaware, Ohio. During his career, he served as research plant pathologist, research leader, and research and location leader at that laboratory. Schreiber did

extensive research on Dutch elm disease, a project that led to the commercial release of two DED-tolerant cultivars of elm. His research on this disease and on Verticillium wilt diseases of shade trees included new methods of chemical control and development of resistance. He and colleagues evaluated many fungicidal chemicals for control of diseases of ornamentals and their phytotoxicity. He retired in 1994.

Daniel B. Houston (1941–). B.S. (1963) and M.S. (1968), both from the State University of New York, College of Environmental Science and Forestry, Syracuse; Ph.D. (1971), University of Wisconsin. Houston served in the U.S. Army from 1964–66. He was assistant professor in the department of forestry at Southern Illinois University (1970–71), then was appointed assistant professor in the Department of Forestry at OARDC, Wooster. He was promoted to associate professor in 1977. In 1985, he was appointed a courtesy faculty member in the Department of Plant Pathology to assist in graduate training and research in forest genetics and disease resistance. Houston's research involved the genetic, physiological, and biochemical bases of tolerance to air pollutants; resistance to Fusarium stem canker; and isozyme genetics of American beech in relation to resistance to beech bark disease. He retired in 1995.

James R. McClenahen (1941–2014). B.S. (1963), M.S. (1964), Ph.D. (1974), all in forestry from Pennsylvania State University. He did postdoctoral research (1972) in the Laboratory for Environmental Studies (LES), and was appointed as assistant professor in LES and the Department of Forestry at OARDC, Wooster in 1974. He was promoted to associate professor in 1982. LES was located in Selby Hall and McClenahen was appointed a courtesy faculty member in the Department of Plant Pathology in 1985. He had a close working relationship with several faculty members, and co-advised several graduate students working in forest pathology and the ecological impacts of air pollutants. McClenahen's research centered on air pollutant effects on forest trees, including pollutant effects on tree establishment, growth, and productivity; pollutant impacts on radial increments of forest trees; elemental analysis of tree rings in relation to soils; and atmospheric deposition and air pollutant effects on growth of white pine. He retired in 1995.

Pappachan E. Kolattukudy (1937–) B.S. (1957), University of Madras, India; M.S. (1959), University of Kerala, India; Ph.D. in biochemistry and organic chemistry (1964), Oregon State University. Kolattukudy was assistant biochemist at the Connecticut Agricultural Experiment Station (1964–69). He then moved to Washington State University, where he was associate agricultural chemist and associate professor (1969–73), agricultural chemist and professor (1973–80), then fellow and director of the Institute of Biological Chemistry and professor of biochemistry (1980–86). He came to The Ohio State University in 1986 as professor of biochemistry and Director of the OSU Biotechnology Center. Kolattukudy was appointed a courtesy faculty member in the Department of Plant Pathology (1987) to assist in the coordination of biotechnological research activities in biochemistry and molecular biology. He relocated to the University of Central Florida in 2003.

Desh Pal S. Verma (1944–). B.S. (1962) and M.S. (1964), both from Agra University, India; Ph.D. in physiology and biochemistry (1970), University of Western Ontario. He did postdoctoral research at the Institute for Cancer Research, Philadelphia (1970–72), then was appointed research associate (1972–74) at McGill University, Montreal. He joined the faculty there in 1974 and became professor (1983), as well as Canadian Pacific Lecturer in Agricultural Biotechnology and Director of the Centre for Plant Molecular Biology. In 1988, he was appointed professor in the Department of Molecular Genetics at The Ohio State University and Associate Director of the OSU Biotechnology Center. He has served as a courtesy faculty member in the Department of Plant Pathology since 1988 to collaborate on research on the molecular biology of plant–microbe interactions.

Edison R. Fowlks (1939–). B.S., Prairie View A&M University, Texas; M.S., Michigan State University; Ph.D. in plant pathology (1965), The Ohio State University. He was professor of biology at Hampton University, Virginia, as well as Director of the biotechnology laboratory and Director of The Howard Hughes Medical Institute (HHMI) Undergraduate Education Program housed in the Department of Biological Sciences there. He taught

genetics, bioinformatics, and genomics and he and his students use the tools of genomics, metagenomics, bioinformatics, and synthetic biology to focus on research topics in biology and medicine. Fowlks served as adjunct professor in the Department of Plant Pathology (1992–94) to serve in an advisory capacity in strengthening science education for minorities.

Maxine F. Highsmith (1943–). Ph.D., North Carolina State University. Highsmith was professor in the Division of Science and Technology, Shaw University, Raleigh, North Carolina. She served as adjunct professor in the Department of Plant Pathology (1992–94) to work with department faculty to enhance existing science education and research programs with minority students in collaboration with Shaw University.

Keith R. Davis, B.A. (1979–), Albion College Michigan; Ph.D. (1985), University of Colorado. Davis did postdoctoral research at the University of Georgia (1985–86) and from 1986–89, served as a research fellow, Department of Molecular Biology, Massachusetts General Hospital, and Department of Genetics, Harvard Medical School. He joined the faculty in the Department of Plant Biology and the Biotechnology Center at The Ohio State University in 1989. From 1991–99, he was a courtesy faculty member in the Department of Plant Pathology, working with T. L. Graham on phenylpropanoids of *Arabidopsis* and their role in disease resistance. He relocated to a private-sector biotechnology firm in 1999

Wolfgang "Dietz" Bauer (1939–2011). B.S. (1961), Utah State University; Ph.D. (1971), Colorado State University. In 1974, Bauer joined the Battelle Kettering Laboratories in Yellow Springs as a staff scientist. When these laboratories closed, he joined the faculty in the OSU Department of Horticulture and Crop Science (1986), where his research focused on signal exchange in plant–bacteria interactions and biological nitrogen fixation. Bauer held a courtesy appointment in the Department of Plant Pathology from 1994 to 2005 to facilitate interactions with faculty and students with joint interests in this area. He collaborated extensively with T. L. Graham and D. L. Coplin, studying how both bacterial symbionts and pathogens seek out plant roots, attach to infection sites via lectins, and activate genes for symbiosis and pathogenesis in response to both plant and bacterial quorum sensing signals. He was also a leader in forming and managing the interdisciplinary Plant Molecular Biology and Biotechnology Program. Bauer and Coplin co-taught an advanced graduate course dealing with the molecular interactions between plants and bacteria. He served on student advisory committees for several Plant Pathology graduate students. Bauer retired in 2005, but continued grant-supported research in the Agronomy department at the University of California, Davis, until his death in 2011.

James A. Chatfield (1951–). B.S. in botany (1975), Ohio University; M.S. in plant pathology (1979), The Ohio State University. From 1975–77, he managed a commercial greenhouse operation in Denver, Colorado. He then worked as Ohio Plant Pest Survey coordinator (1983–84) and as a plant pathologist and horticulturist at ChemLawn Diagnostic Laboratories, Delaware, Ohio (1984–87). At ChemLawn, he diagnosed infectious disease, pest, and abiotic woody ornamental samples and did diagnostic training sessions throughout the country. In 1987, Chatfield was appointed to the faculty of The Ohio State University Extension (OSUE), serving as a county agent (1987), district specialist (1989), and state Extension specialist (1993) in landscape horticulture. Since 1993, he has held a courtesy faculty appointment in the Department of Plant Pathology to facilitate interactions in Extension outreach on landscape and nursery ornamentals. Chatfield is involved closely with the Ohio green industry, and serves as a member and leader of the OSUE Nursery, Landscape, and Turf Team and the OSUE *Why Trees Matter* program. He is a writer and educator in Ohio, and nationally, in horticulture and plant pathology. Chatfield is the president of the International Ornamental Crabapple Society, for several years was registrar of ornamental *Malus* for the Royal Horticultural Society, and has conducted crabapple disease evaluations throughout the U.S. Recently he has been involved in urban forestry and tree evaluations designed to assess the economic value of the environmental benefits provided by trees in community forests.

David M. Bisaro (1952–) B.S. (1974) and Ph.D. (1981), both from Wayne State University, Detroit, Michigan. Bisaro did postdoctoral research at Imperial College, University of London, U.K. He began his academic career in the Department of Botany and Microbiology, Auburn University Alabama, and joined the Department of Molecular Genetics at Ohio State in 1987. His research has been focused on the molecular biology of plant-infecting geminiviruses, including viral pathogenesis and the regulation of viral gene expression and DNA replication. He has held a courtesy appointment in the Department of Plant Pathology since 1995. Bisaro has collaborated on published research projects with several faculty, including J. A. Lindbo on the mechanism of action of a geminivirus silencing suppressor; M. G. Redinbaugh, D. T. Gordon, and R. Louie on a method to transmit viral RNA and DNA to maize kernels; and L. R. Stewart, F. Qu, and D. Mackey to generate viral vectors for gene expression and gene knock-down in plants. He served with D. T. Gordon as co-advisor for a Ph.D. student.

David Mackey (1968–). B.S. (1991), Pennsylvania State University; Ph.D. (1997), University of Wisconsin. Mackey did postdoctoral research at the University of Wisconsin (1997–98) and North Carolina State University (1999–2002). In 2001, he joined The Ohio State University faculty, appointed jointly in the Department of Horticulture and Crop Science and the Department of Molecular Genetics. His research is focused on virulence factors (effector proteins and toxins) produced by plant pathogenic bacteria. Using these factors as an entrée to identify targets in plant cells, his laboratory is studying how pathogens perturb plants to promote susceptibility and how plant immune systems recognize these perturbations to induce resistance. Mackey has held a courtesy appointment in the Department of Plant Pathology since 2012 to facilitate his research collaborations with several faculty, including D. L. Coplin, G-L. Wang, P. Bonello, and most recently Y. Xia. He co-advises Plant Pathology graduate students and, in 2006, received the OARDC Director's Award for Excellence in Graduate Research Mentorship.

Saskia A. Hogenhout (1969–) M.Sc. (1994), de Vrije University, Amsterdam, the Netherlands; Ph.D. (1999), Wageningen University and Research Centre, the Netherlands. In 1999, she joined the faculty of The Ohio State University in the Department of Entomology at Wooster, with responsibilities for research in the area of insect vector relationships with virus and mycoplasma pathogens of plants. Hogenhout was appointed a courtesy faculty member in the Department of Plant Pathology in 2002. She had collaborative research projects with S. A. Miller, M. G. Redinbaugh, T. Meulia, and E. D. Ammar, and co-advised students and postdocs in Plant Pathology. Her research collaborations led to characterization of several phytoplasma strains from lettuce and their genome sequence and virulence proteins; characterization of several rhabdoviruses from maize and their insect transmission; and transmission electron and confocal microscopy studies of the sub-cellular localization of viruses, spiroplasmas and rhabdoviruses in insects and plants. She left the university in 2009 and relocated to the U.K. to pursue a position as a project leader at the John Innes Centre (JIC), Norwich, England, and later became Honorary Professor at the School of Biological Sciences, University of East Anglia, England.

Parwinder Grewal (1961–) B.Sc. (1981) and M.Sc. (1983), both from Punjab Agricultural University, Ludhiana, India; Ph.D. (1990), Imperial College, University of London, England. Grewal joined the faculty of The Ohio State University in 1997 in the Department of Entomology, Wooster, with responsibilities for research in the areas of turfgrass entomology and biological control. He was appointed a courtesy faculty member in the Department of Plant Pathology in 2001, where he had collaborative research projects with S. A. Miller, B. McSpadden-Gardener, and S. Kamoun. He also co-advised three Plant Pathology doctoral students. His research collaborations focused on both plant-parasitic nematodes in vegetables and field crops and on nematodes as soil health indicators in organic and conventional farming systems and in urban ecosystems. These research collaborations led to several competitive grants and a series of journal publications. He also assisted in the identification of plant-parasitic nematodes in crop and soil samples submitted by commercial growers. Grewal left Ohio State in 2013 to become Head of the Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, and is currently Dean of the College of Sciences, University of Texas, Rio Grande Valley.

Chapter 10

Staff on the Columbus and Wooster Campuses

Staff are the critical component that makes everything work. Faculty make detailed plans for research, teaching, and Extension programs, and often obtain outside funding through grants, but it takes dedicated laboratory and programmatic staff to make it all happen, along with office, greenhouse, and field staff to keep everything running smoothly. It's all a team effort.

Department staff considerably outnumber faculty, and they vary widely in how long they remain in their positions. Some staff are with the department for only a year or two, while others stay for a career of varying lengths. Over the years, there have been more departmental staff at Wooster than on the main campus, and they tend to remain longer in their positions. Perhaps that is because staff at the OARDC at Wooster work on a small research campus in a small town, while those at the very large OSU campus, in the metropolitan area of Columbus, have many more employment options, or are living there only temporarily.

Because of all these variables, staff are presented in this history in two ways. All those who worked in the department for two years or more are listed in the tables associated with this chapter. There are many staff who served less than two years, but they are not included in the tables because records of their service are very incomplete. On the other hand, there are many who made a career of their department service for at least ten years (eight years in Columbus), and were major contributors to the long-term success of many department programs. In honor of their long service, these "career staff" are highlighted here with a biography and photo, when one was available.

Columbus Career Staff

Office Management Staff

Veronique "Niqui" Beckrum • B.A. in French, The Ohio State University (1990). Beckrum started her career in the Department of Plant Pathology, Columbus, as an account clerk in 2005 and has been the finance manager for the department since 2015. Her role is to manage overall departmental finances as well as that of individual faculty programs. She manages and coordinates business functions, serves as fiscal compliance officer, and trains administrative staff and students who perform fiscal duties. She also assists with some human resource functions. Beckrum served as the post-award grants manager for the department from 2005–2014, prior to the hiring of additional administrative staff to perform that role, and continues to oversee post-award activity for faculty programs. She is currently involved with the College of Food, Agricultural, and Environmental Sciences, serving in various roles when needed and on committees for the college Finance Office.

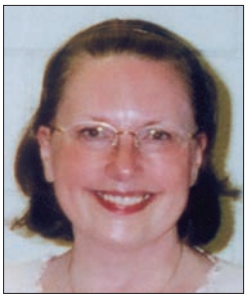
Barbara Dille • She was the first department secretary in Columbus, working with Ira Deep and the faculty on the many tasks that were needed as the new department began. Her service spanned the early years of the department when policies and procedures for the new administrative office were being developed. Dille's duties continually expanded due to the increased

enrollment of undergraduate and graduate students, as well as the new faculty who joined the department. She served from 1968 until her death in 1978.

Jeanne M. Kiser • After attending The Ohio State University for one year as a music major, Kiser enrolled in Miami Jacobs Business College in Dayton and graduated as a trained executive secretary. After working as a secretary in two Columbus firms, Kiser joined the Department of Plant Pathology as the Extension secretary in 1979. Her duties included processing Plant Disease Clinic samples, typing Extension fact sheets and correspondence, supervising a student worker, and serving as receptionist in the Extension office. She retired in 1987 and continues to sing solos in her church.

Brian Mowery • B.A. University of Kentucky (1997). Mowery joined the Department of Plant Pathology, Columbus, in 2004 as the Information Technology (IT) Systems Developer. He was responsible for maintaining department computer systems and IT infrastructure. He worked with faculty, staff, and graduate students to assist them in using current technology to meet needs in teaching, research, outreach, and administration. Mowery was responsible for improving the department's web presence, implementing distance education technologies, and increasing the use of cloud computing. He received the Gamma Sigma Delta Service Award of Merit (2014) and the Chadwick Arboretum and Learning Garden Collaborators Award. He left the department in 2014 to become the IT systems manager for the OSU Graduate School.

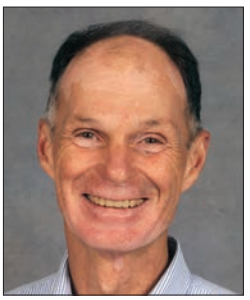
Ramona I. Powell • B.A. in Hebrew, The Ohio State University (1977). After attending Ohio University from 1969–1973, Powell traveled to Kibbutz Gat, Israel, to study Hebrew on a six-month ulpan. She stayed and worked as a kibbutz volunteer for another year after the outbreak of the Yom Kippur War. She then worked for a year in West Germany before returning to the United States. She enrolled at The Ohio State University in the summer of 1976. After graduation she held two concurrent part-time jobs at OSU—one in the Department of Hebrew and one in the Spanish Individualized Program where her excellent typing skills in Hebrew and Spanish were utilized.



Powell was hired as the secretary of the Department of Plant Pathology, Columbus, in October 1978 by I. W. Deep. Her initial duties included typing correspondence, exams, and manuscripts; processing graduate student applications, human resources paperwork, and supply orders; and serving as receptionist. Over her many years in the department office, her work has expanded into administrative duties which include serving as administrative associate to the department chairperson and associate chairperson, supervising and training office staff in Columbus and Wooster, managing human resources for the department, budgeting and finance, and oversight of the Columbus and Wooster offices. Powell has served as administrative associate to every department chairperson since the department was founded, including six regular or acting department chairs and several associate chairs. She is always the "go-to" person for department personnel with questions about department or university functions and operations.

Department Support Staff

Joseph W. Rimelspach • B.S. in landscape horticulture (1973), and M.S. in plant pathology (1982), both from The Ohio State University. Rimelspach began his career with ChemLawn Services Corporation (1973–1991) where he served as horticulturist/plant pathologist in their diagnostic center. There he was responsible for diagnosing plant problems submitted from across the U.S. and Canada. He also conducted ornamental plant diagnostic training clinics throughout the Midwest and many east coast areas. He was president of the Ohio



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Chapter of the International Society of Arboriculture and was active on the board of directors. In his last eight years at ChemLawn he was the regional technical manager for much of Ohio and parts of Kentucky and West Virginia. That position involved technical training of employees; developing and monitoring maintenance programs for turfgrass, trees, and shrubs; resolving customer relations issues; addressing environmental concerns and fostering sound environmental stewardship; and administrating employee health and safety programs. He was co-author of *Woody Ornamentals: Plants and Problems*, published by ChemLawn.

In 1992, he joined the Department of Plant Pathology at The Ohio State University, Columbus, where his major responsibility has been to the turfgrass and green industry, working on turfgrass diseases and integrated turfgrass health management strategies. Currently Rimelspach serves as program specialist in the OSU Turfgrass Pathology Program. He works through the C. Wayne Ellett Plant and Pest Diagnostic Clinic, identifying and diagnosing turfgrass problems and making recommendations to resolve disease problems. He provides support to OSU county Extension offices and personnel in the area of turfgrass diseases and management of healthy turfgrass and is a member of the OSU Extension Nursery Landscape and Turf Team. He also works with the Ohio Turfgrass Foundation, Ohio Lawn Care Association, Ohio Sports Turf Managers Association, and the five Ohio chapters of the Golf Course Superintendents of America. Additional areas of responsibility include research studies on the impact of management practices on turfgrass health and disease development; evaluation of fungicides, new products, and turfgrass management procedures on turfgrass disease management; and diagnoses of turfgrass problems, both in the field and with submitted samples. Rimelspach teaches the *Turfgrass Disease and Integrated Turf Health Management* course in Plant Pathology. He presents training to industry personnel and Extension audiences on various aspects of turfgrass diseases and turfgrass health management, and distributes information and updates through the internet, videos, and social media on current turfgrass health issues, diagnostics, and disease development prediction and management. For his work, he has received several awards including the Ohio Turfgrass Foundation Professional of the Year (2013), and the Jack Kidwell Personal Excellence Award (2016) from the Central Ohio Golf Course Superintendents Association. He is a member of the American Phytopathological Society, Crop Science Society of America, and the Golf Course Superintendents of America Association.

Nancy J. Taylor • B.S. in plant science, West Virginia University (1973); M.S. in plant protection, Virginia Polytechnic Institute and State University (1974). Taylor was employed by the West Virginia Department of Agriculture for three years, the University of Tennessee for eight years, and then joined the Department of Plant Pathology, The Ohio State University, Columbus, as a research assistant for the Plant and Pest Diagnostic Clinic in 1986, working with Dr. Steve Nameth. She became PPDC Director in 2001. Her role has been to diagnose and provide management recommendations in response to plant disease samples submitted to the Clinic as well as to manage budgets, coordinate samples in other disciplines, and serve as Ohio's Clinic representative in the National Plant Diagnostic Network (NPDN). She is active with OSU's Extension Nursery Landscape and Turf Team, Floriculture Industry Roundtable of the Midwest, and participates in the Agronomic Crops Team and Vegetable Team. Taylor has contributed articles to the *Buckeye Yard and Garden Line* and the *Greenhouse Industry Roundtable of the Midwest* blog and has co-authored fact sheets and *Disease Notes*. She provides Master Gardener Volunteer Training in basic plant pathology, and also provides plant disease training to various components of Ohio's Green Industry. As a participant in the National Plant Diagnostic Network she provides First Detector Training to citizens and businesses in Ohio.


OARDC

Sarah D. Williams • B.S. in Agriculture (2007); M.S. in Plant Pathology (2009), both from The Ohio State University. Williams began her department career as a lecturer in 2009. Over the years, she has assumed additional teaching responsibilities, particularly for teaching the *General Plant Pathology* class, and an online social impact course, *Sick Plants and a Hungry World*.

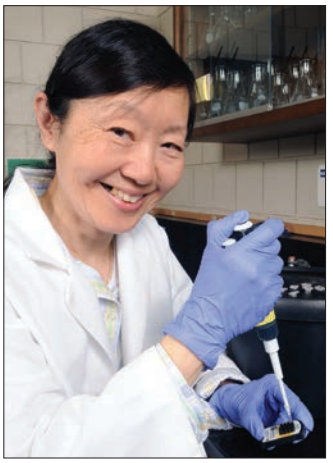
Her major achievements in the department include: assisting faculty with details of the university quarter-to-semester change that was effective in 2012, creating program and course assessment plans involving the production of rubrics, assisting with publishing of the field guide *Mushrooms and Macrofungi of Ohio in the Midwestern States*, and development of online courses and programs. She serves as the distance learning coordinator for the Master in Plant Health Management program. Williams is active on the department Academic Affairs Committee, CFAES Staff Council, CFAES Assessment Action Team, Office of Distance Education and eLearning (ODEE) Steering Committee, and serves as an ODEE Affiliate. She coordinates scheduling, supplies, teaching assistants, and guest lecturers for department classes; assists in advising of undergraduate students; and works with faculty on various small projects.

Greenhouse Management Staff

Harold D. Brown • B.S. in Plant Pathology, The Ohio State University (2002). Brown came to the Department of Plant Pathology in 1985 as a student research assistant with C.C. Powell, working with greenhouse crops and ornamentals. In 1988, he took the position of greenhouse superintendent at Kottman Hall in Columbus. In this position, he was in charge of caring for and watering experimental plants, making pesticide applications, and maintaining potting soil and supplies in the headhouse. Brown worked closely with plant pathology faculty, staff, and students, often building specialized environments for specific research projects. He worked closely with the facility expansion that took place in 1990–91. He installed a rolling bench system to maximize valuable greenhouse space for an expanding department. In the latter time of his 15 years in the department, he took on added responsibilities by managing the Kottman greenhouse facility for the Department of Horticulture and Crop Science as well. He left the university in 2004.

Senior Research Staff

Lian-mei "Madge" Y. Graham • B.S. in Agricultural Chemistry, National Taiwan University (1968); Ph.D. in Biochemistry, Purdue University (1973). Following Ph.D. training in biochemical genetics and gene expression in bacteria, she worked in several postdoctoral positions conducting research in DNA technology, nucleic acid manipulation and analysis: University of Denver (1974–1975), University of Wisconsin (1976–1977), and Washington University, St. Louis (1978 to 1985). She joined the Department of Plant Pathology, Columbus, in 1986 as an extramurally-funded research associate with appointments through the OSU Biotechnology Center and OARDC. She was appointed research scientist in 1997, and was designated senior staff/research scientist with programmatic space in the department since 2005. She has been a member in both the campus-wide PMBB program and statewide OPBC program since their inception in 1997 and 1999, respectively.



Graham's research has been centered on soybean. After a short transition of cloning genes from soybean (ubiquitin and oncogene counterparts) she worked on genes, markers, and genomic structures of the bacterial pathogen, *Pseudomonas syringae* and the oomycete pathogen, *Phytophthora sojae*. The bulk of her efforts have been subsequently devoted to the regulation and expression of soybean defense/disease resistance related genes. Pathogen surface molecules (e.g. cell wall glucan from *Phytophthora*) and cell death inducing chemicals (e.g. herbicides or fungal toxins) were employed as triggers. Her initial focus was on a few genes and later on global up-regulation of large sets of genes. Furthermore she has investigated, through collaborations on gene silencing, the functions of some selected key genes in soybean resistance. These efforts made important contributions to uncover the differential resistance pathways and networks of soybean defense systems. It is also beneficial in defining potential targets for molecular genetic manipulations and candidates for

bioactivator chemicals for soybean protection. In her research, she has collaborated with T. L. Graham, A. F. Schmitthenner, A. E. Dorrance, S. K. St. Martin (Department of Horticulture and Crop Science), and Oliver Yu (Danforth Plant Science Center).

Graham has presented her research at many meetings and symposiums, participated in seminars and colloquiums, and presented guest lectures in several graduate courses. Her work has been published in several journals and she serves as ad hoc reviewer for *Physiological and Molecular Plant Pathology, Plant Physiology, Plant Science, Physiological Plantarum*, and *Canadian Journal of Botany*. She has also participated in training and mentoring of graduate and undergraduate students.

Technical Research Staff

Tamara H. Anderson • B.S. in Horticulture, The Ohio State University (1985). Anderson joined the department in 1986 and worked as a research assistant for L. H. Rhodes, assisting with research on diseases of alfalfa. She isolated and cultured fungi in the laboratory and assisted with greenhouse and field research. She left Ohio State in 1998 to pursue a degree in elementary education at Ohio Dominican University.

Maria Bellizzi • B.S. in Microbiology (1979), University of Los Andes, Bogota, Colombia. She began her career in plant pathology working with ornamental plants in the cut-flower industry in Colombia, where she served as the plant pathology laboratory manager. Following immigration to the U.S., she worked in medical research in endocrinology and neurology at the University of Kansas. She relocated to Ohio in 1999, worked for a year in the OSU College of Internal Medicine, Department of Transplantation, then came to the Department of Plant Pathology in 2000. She has worked as a laboratory technician under the supervision of several faculty members: jointly with P. Bonello and G-L. Wang (2000–2004), G-L. Wang (2004–2015), jointly with G-L Wang and Y. Xia (2015–2016), and jointly with G-L. Wang and F. P. Hand (2016–present).

Bellizzi's expertise is in medical, and industrial microbiology. She has served as lab manager in several faculty research laboratories. Her duties have included organizing laboratory chemical inventories according to current university safety and biosafety protocols, ordering and tracking supplies and chemicals, and handling costs, suppliers, and grant accounts. She assists the principal investigators, post-docs, and graduate students in conducting research experiments, and often trains graduate and undergraduate students in laboratory methods and techniques required for their research, and in techniques used in greenhouse and field studies.

In G-L. Wang's lab, she has participated in research dealing with plant–pathogen molecular interactions of rice diseases. She is the rice seed curator and is in charge of maintaining the collection of *Magnaporthe oryzae* pathovars. Bellizzi is an expert in rice genetic transformation and has provided training to several members of the laboratory. She has successfully transformed more than 30 genes into rice plants that are used in Wang's research program and by some of his collaborators. She has been involved in relevant rice genetics and rice disease resistance research studies, contributing data, analysis, and experimental results, and has been a co-author in more than fifteen research papers. In Hand's research program, she is beginning to work with molecular diagnostic techniques used for pathogen identification in ornamental plants, and also is assisting in evaluation of fungicides.

Todd E. Hicks • B.S. in Agronomy, The Ohio State University (2001). Hicks started his career in the Department of Plant Pathology, Columbus, as a student researcher (1997–2001), and has worked in the turfgrass pathology lab since 2001. His role is to coordinate the turfgrass pathology fungicide and bio-control evaluation program,

and to serve as primary contact for agrichemical and industry representatives working with the program. He supervises seasonal field staff and mentors graduate and undergraduate students working on turfgrass special projects in the lab. He coordinates the turfgrass education and demonstration plots at the Farm Science Review. Hicks also conducts visits to turfgrass sites for disease diagnostics, presents educational lectures, writes articles on turfgrass disease management, and assists in teaching *Turfgrass Diseases and Integrated Turf Health Management*.

Michael R. Kelly • B.S. in Biology (2006), M.S. in Food Science and Technology (2012), both from The Ohio State University. Kelly started in Plant Pathology in 2005 as a student research assistant with L. H. Rhodes, assisting in research on fungal diseases of pumpkin and alfalfa. After obtaining his B.S. degree, he received a full-time research assistant position in 2008, and then continued working in the department following his M. S. degree in 2012 as a research associate. He has assisted L. H. Rhodes in forage crop pathology, D. J. Lewandowski and F. P. Hand in ornamental pathology, T. L. Graham and L. Y. Graham in molecular and biochemical research of soybeans, and currently has a split appointment with Justin Morse in the greenhouse and Stephen Opiyo in the Molecular and Cellular Imaging Center (MCIC), Columbus.

Doris R. Majerczak • B.A., Ohio Wesleyan University (1983). Majerczak joined D. L. Coplin's laboratory on the Wooster campus in 1983 as a laboratory technician. She assisted with research on the molecular biology of plant-bacteria interactions, particularly focused on studying the genetics of a corn bacterial pathogen. In 1988, Coplin relocated to the Columbus campus and she made the move with him. Her duties included supervision of laboratory operations in Coplin's research program, maintaining laboratory supplies and equipment, and working closely with graduate students and post docs. She also took charge of the laboratory portions of Coplin's bacterial plant pathogen's classes. Majerczak served as the department safety officer in Columbus. After Coplin's retirement in 2010, she worked in the laboratory of David Mackey in the Department of Horticulture and Crop Sciences, studying the modification of maize metabolism by a bacterial pathogen. She retired in 2013.

Wooster Career Staff

Office Management Staff

Helga Beke • Born and raised in Vienna, Austria, Beke earned an Associate degree in hotel management. After some working experience in the Hotel Imperial in Vienna, Beke came to Ohio in 1966, and has lived here ever since. Following computer training at Wayne County Community College, she joined the Department of Plant Pathology at Wooster in 1992, working in the main office. Originally, her duties were typing and providing secretarial assistance to faculty and graduate students. She enjoyed helping orient graduate students, many from other countries, as they adapted to working in a large, American university and living in Ohio. During her time in the department, the university moved to total electronic processing of business functions, which required considerable training, including many sessions in Columbus. Later in her career, Beke focused her efforts mostly on handling fiscal details of extramural grant accounts, and aspects of travel approvals and expense reimbursements. In all this, she worked closely with department faculty and with office staff counterparts in Columbus. She retired in 2006.

Vita Carbould • She began as a clerk in the OAES Botany department in 1919, working under A. D. Selby. Carbould was the first long-term person to work in the department office at Wooster, serving for 26 years. She is thought to be the department's first true "head secretary" with diverse duties dealing with typing, personnel, and other office management tasks.

For several years, she also assisted Harmon Runnels in weed identification. She retired in 1945.

Joanne Hershberger • A graduate in secretarial science from the Wooster Business College, Hershberger had some commercial business experience when she joined the department in 1971. Her first duties were as receptionist and typist, and in that role she was the front office face of the department in Selby Hall for many years. When Bonnie Littleton retired as leader of the office staff in Wooster, Jo assumed that position in 1992. In that role, she supervised others working in the department office in Wooster, worked closely with the faculty handling administrative details, served as administrative associate to R. C. Rowe during the 10 years he was department chairperson, and worked closely with her department counterparts in Columbus. In her 34 years of service to the department, she saw the duties of the department office staff change entirely, from typing letters and manuscripts with carbon paper, to total electronic processing of all information. She also helped implement complete changes in financial and personnel management procedures following the merger of the OARDC with the university in 1982, and then subsequent decentralization and continual change of university fiscal and human resource management processes that resulted in considerably increased departmental responsibilities. She retired in 2005.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Bonnie Littleton • Following graduation in 1950 from the Hammel-Actual Business College in Akron, Ohio, and several years' employment with the Council of Profit Sharing Industries in Akron, Littleton joined the department in 1965. Her initial duties were as support secretary and typist. In 1967, she was promoted to head secretary, serving the department in that position for 25 years. Beginning as head secretary just as the Department of Plant Pathology was born, she served through the greatest period of departmental change. During her time, the new department was organized and more than doubled in numbers of faculty and staff. She played an important role as administrative associate to L. E. Williams, associate department chairperson. Littleton provided much organizational leadership on the Wooster campus as the department grew and developed into a nationally and internationally respected organization. She faced many challenges as the department moved from Thorne Hall to new facilities in Selby Hall and then, following the merger of OARDC with the university in 1982, totally new management procedures for personnel, accounting, and purchasing. Office procedures grew exponentially as the department expanded into an operation with a considerable budget and expenditures. When Littleton retired in 1992, she was succeeded as head secretary by Jo Hershberger.

Marilyn Snyder • Millersburg High School graduate (1964). Snyder joined the Department of Plant Pathology in 1985 as receptionist in the main office in Selby Hall. She was responsible for various office procedures, including state vehicle check-out, working with purchase requisitions, and sorting mail. She worked with Lansing Williams to do all the typing for the first edition of the department history book. Snyder retired in 2000.

Lynn West • Dalton high school graduate (1973). West joined the Department of Plant Pathology in 1999 as receptionist and typist in the main office. In 2005, her responsibilities were expanded to include human resource management and fiscal processing for the department at Wooster, as well as serving as administrative assistant to the department chairperson. Since 2015, with the addition of a second office associate in the main office at Wooster, her duties are now focused entirely on human resources and fiscal management. In her position, West interacts considerably with faculty and many other staff, both in Wooster and on the Columbus campus.

Department Support Staff

Laurel Leedy • She began at the OARDC in 1986 and then joined the Department of Plant Pathology in 1998. Leedy had responsibilities for cleaning and stocking glassware, and running autoclaves, and the water distiller and deionizer in Selby Hall. Later, she assumed responsibilities for inventory of research equipment in both Wooster and Columbus, ordering research supplies, handling package mail delivery, making arrangements for room assignments, orientation, and other details for graduate students, and many other tasks that helped the department run smoothly. In 2012, Leedy received the Shirley Brooks Jones Staff Citizenship Award from the college. She retired in 2012.

Dennis Mills • B.S. (1970) The Ohio State University. Following a 30-year career as a sales representative for several agrichemical companies, Mills joined the department in 2000 as an Extension associate with the field crops team. He developed and revised teaching resources for use by Extension educators and co-authored fact sheets and bulletins. His work also included developing websites and maintaining new electronic information resources. Mills was a member of the OSU Extension Agronomy Team and organized and conducted on-farm research, along with assisting in applied research studies. Participating in state, district and county Extension programs and teaching sessions for pesticide applicator training, certified crop advisor training, pest scout training, and OSU IPM programs were all part of his many duties. During his last two years at OSU, he split his time with the pesticide education program in Columbus, where he helped write new exams and study materials for state pesticide applicator licenses, trained pesticide applicators, and developed training videos for use by county educators. He retired in 2011.

Donna Shilling • Northwestern High School (West Salem) graduate. She joined the Department of Botany and Plant Pathology in 1965 to clean and stock glassware when the department was located in Thorne Hall. She also made culture media for various laboratory research programs. In 1972, Shilling moved to Selby Hall with the new Department of Plant Pathology and worked in the centralized dishwashing facility. She continued to clean and stock glassware, ran the autoclaves, and managed the department water distiller. She retired in 1984.

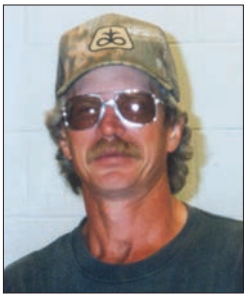
Jeanette Tennant • A graduate of Norwayne High School (Creston), she joined the Department of Plant Pathology in 1984. Tennant had responsibilities for cleaning and stocking glassware, and running autoclaves, and the water distiller and deionizer. She also handled package delivery, inventory, and filled in as receptionist when needed. Tennant occasionally worked in various faculty research programs, when extra help was needed in various laboratory and greenhouse procedures and in harvesting field plots. She left the department in 1998.

Greenhouse and Field Management Staff

William Bardall • Bardall joined the Department of Plant Pathology at OARDC in 1976, after graduating from high school, and worked as part of the department greenhouse and field research operations staff. Working under Arden Carson, he gained wide experience in both field and greenhouse research philosophy and procedures. After 11 years, when Carson retired in 1987, he took the role of supervisor of department field and greenhouse operations, generally supervising 3–4

staff working under his direction. In this role, Bardall worked closely with all faculty conducting research in the field and greenhouse, and contributed greatly to the success of their research. During his nearly 20 years in this position, the department field research plots increased greatly in number and complexity. His expertise in the operations of the greenhouse, the phytotron growth chambers, and farm equipment was well respected by faculty and staff. Towards the end of his career, Bardall also took additional supervisory responsibilities for some of the field and greenhouse research activities of the Department of Entomology. In 2006, OARDC administration consolidated all field operations under a centralized staff, and he was transferred from the department to that group, though he still worked closely with Plant Pathology faculty. He retired in 2014.

Randall E. Berry • He joined the Department of Plant Pathology at OARDC in 1988 as part of the department greenhouse and field research operations staff. Growing up on a local farm, Berry gained much experience at a young age, as he learned about field equipment and crops from his father and grandfather. He graduated from Northwestern High School/ Wayne County Joint Vocational School, where he excelled in Ag Mechanics and also received the FFA American Farmer Degree. Working under Bill Bardall, Berry's well-rounded experience was very useful as he worked for many years at Snyder Farm preparing fields for various experimental plots. He planted, sprayed, and harvested grain crops, small fruit crops and vegetables. Berry excelled at developing experimental methods to meet the requirements for many field projects. As with some others, he was transferred from the department in 2006, when OARDC administration centralized field staff, though he still worked closely with Plant Pathology faculty. He retired in 2014.



Arden Carson • A graduate of the Wooster Business College, Carson joined the department in 1956 to work with A. F. Schmitthenner as a laboratory and field technician. He assisted with research on the effects of soil fungal populations and crop sequences on soilborne diseases and the development of *Phytophthora*-resistant soybean cultivars. In 1969, Carson was appointed the supervisor of greenhouse and field operations for the department. Although he had no previous experience in this area, he rapidly developed and gained wide respect in this supervisory role. His excellent personnel management skills and knowledge of greenhouse and field operations were widely appreciated by the faculty. Under his tenure, many new research facilities were designed and instituted and new research tools employed. He retired in 1987.

John Huston • B.S., Ohio University. Huston joined the department in 1957 and assisted J. D. Wilson with laboratory and field research on chemical control of vegetable diseases, particularly in soil fungal and nematode studies. Beginning in 1967, following Wilson's retirement, Huston became a member of the department greenhouse and field operations staff, retiring in 1986.

Robert James • He first worked in the Plant Pathology department from 1973–76 and then returned to the department again in 1987, where he continues to the present. James is the key staff person working in the Selby Hall greenhouses and headhouse area. He has general responsibility to provide day-to-day management of the growth chambers and greenhouse facilities. His regular responsibilities include watering and fertilizing of experimental plants throughout the greenhouse ranges, preparing pots for planting, managing the disposal of soil and plant wastes, and helping set up research assignments, as needed. He is in charge of controlling insect pests in the greenhouses and all routine pesticide applications, taking special care to know applicable APHIS regulations and guidelines. James is well-known for the friendly, courteous, and helpful manner in which he interacts with a broad range of faculty, staff, and students. In 2012, he received the OARDC Outstanding Staff Award.

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Harold Lee • He came to the OAES following high school graduation in 1934. Lee's first five years were spent assisting USDA/ARS pathologist R. U. Swingle with his research on Dutch elm disease. In 1939 Lee was appointed supervisor of department greenhouse and field operations. During his 30 years of leadership in that position, he helped usher in many modern management systems in plant disease research. Lee retired in 1969.

Senior Research Staff

El-Desouky Ammar • B.Sc. (1961), Cairo University, Egypt; Ph.D. (1969) Nottingham University, England.

Ammar was a Fulbright Scholar with L. R. Nault and D. T. Gordon in 1982–83. He then returned to the department twice (1986–89; 2002–09) in visiting professor and research scientist roles as an electron microscopist and vector biologist working with the Maize Virus Research Program. His research dealt with many aspects of the characterization of maize viruses, including cytopathology of two isolates of maize chlorotic dwarf virus (MCDV); retention sites of MCDV in its leafhopper vector; replication and route of maize mosaic virus (MMV) in its planthopper vector; cytopathology of Iranian MMV; infection of maize protoplasts with MMV and maize streak viruses; interaction of maize chlorotic mottle and maize dwarf mosaic viruses in maize; interactions of MMV and maize stripe viruses in maize and in their planthopper vector; the search for a vector of maize white line mosaic virus; and reovirus-like and bacilliform particles in the leafhopper vector *Graminella nigrifrons*. On other maize pathogens, Ammar studied the cytopathology of corn stunt spiroplasma and maize bushy stunt phytoplasma in maize and in their leafhopper vector, cytopathology and transmission mode of Stewart's wilt disease bacterium in maize and the flea beetle vector. Ammar gave lectures in plant virology on the morphology and architecture of plant viruses and the cytopathology and ultrastructure of viruses *in situ* in host plants and vectors, as well as demonstrations and workshops on the electron microscopy of plant viruses and disease vectors. He is now research scientist at the University of Florida, Ft. Pierce.

Gilbert Daft • B.S., Marietta College, Ohio; M.S. (1961) and Ph.D. (1970), both from The Ohio State University. After finishing his M.S. degree under the direction of C. W. Ellett, Daft joined the department in 1961 as a research associate working with Curt Leben in his program studying epiphytes and pathogens living in the phyllosphere of soybean leaves. The last several years, he also worked on his Ph.D, with both Leben and Ellett, completing that in 1970. He then served in several postdoctoral and staff positions from 1971 to 1978 with H. A. J. Hoitink, working on physical properties of soil potting mixes and biocontrol of Phytophthora root rot. He left the department in 1978.

Arthur Olah • B.A. (1963) and M.A. (1965), both from Miami University, Ohio; Ph.D. (1970), North Carolina State University. Olah was assistant and associate professor of biology (1970–74), Frostburg State College, Maryland, then became a wetlands officer (1974–77) in Fairfield, Connecticut. After postdoctoral research (1978–80) in electron microscopy at the University of Rhode Island, he came to Plant Pathology in 1980, as a postdoctorate working with A. F. Schmitthenner and Alan Walker, soybean breeder, Department of Agronomy. His research dealt with the physiology of durable resistance in soybean to *Phytophthora sojae*. Olah's work led to the understanding of an alternate disease-protective system in soybean, other than phytoalexins, when he showed that some cultivars had reduced disease without glyceollin enhancement. After Walker left the OARDC, Olah continued working with Schmitthenner as research associate, then senior researcher, with considerable independence in research and seeking extramural funding. He excelled

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in the development of research techniques, developing new procedures of inoculation and slant-board plant growth systems, HPLC and bioassay systems to quantitate the fungicide metalaxyl in soils and plants, and improved leaf-disc baiting assays for *Phytophthora* in soils. Using tissue culture techniques with cuttings and somatic embryo stimulation on immature cotyledons, he screened several thousand soybean progenies for tolerance to Phytophthora root rot. In the late 1980s, Sclerotinia (white mold) disease reappeared in Midwest soybean fields, and Olah developed laboratory and greenhouse procedures to complement field evaluations of soybean varieties. He served as national editor for the *Sclerotinia Newsletter*, a primary source of information for 500 researchers. He left the department in 1998.

Technical Research Staff

John Abt • B.S. (1974) Kent State University; M.S. (1983) The Ohio State University. Abt joined


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John Abt on right with Ray Louie in greenhouse

the department in 1974 and spent his long career as a USDA/ARS employee working on the biology and control of virus diseases of corn in the research programs of R. Louie (1974–2000) and M. G. Redinbaugh (2001–2007). His work dealt with research on the genetics of virus resistance in corn, and on the etiology and ecology of corn virus diseases. He was exceptionally proficient in the mechanical transmission of obligately vectored corn viruses using the vascular puncture inoculation (VPI) protocol. Abt was responsible for training numerous students, technicians and visiting scientists on the efficient use of this technique. He was the first to isolate and help characterize maize fine streak virus from Georgia sweetcorn and to characterize maize resistance to an obligately insect-transmitted virus, using the VPI protocol. He retired in 2007.

William Beery • B.S. Heidelberg College, Ohio. Beery first joined the department in 1968 and worked as a laboratory technician with C. Leben, assisting with research on bacterial diseases of soybeans and the epiphytes and pathogens found in the phyllosphere of soybean leaves. He left in 1980, but returned in 1984 to join the research program of R. C. Rowe. During 14 years in this position, he took full responsibility for supervision of laboratory and field operations in Rowe's research program on potato and other vegetable crop diseases. His expertise in laboratory management, fungal cultural techniques, details of field plot research, and preparation and organization of research data was considerable. Beery supervised temporary program staff and worked closely with graduate students and post docs working in the laboratory. He left the department in 1998.


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Sue Ann (McClure) Berry • B.A. Kentucky Christian College. Berry began her long career in the department in 1981 and first worked as laboratory and field technician in the research program of A. F. Schmitthenner, assisting with his research on diseases of soybean. When Schmitthenner retired in 1996, she transitioned to the program of his successor, A. E. Dorrance. In this role she was promoted to research associate and managed Dorrance's field research program, which evalu-


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ated management strategies for Phytophthora stem rot, Sclerotinia stem rot, and *Pythium* spp. She also trained numerous scientists from private and public institutions on how to work with *Phytophthora sojae*, as well as many graduate students and others working in the laboratory. She retired in 2011.

Ed Bosler • B.A., The Ohio State University. Bosler was first employed by the OARDC swine research center from 1953 to 1963. He moved to Plant Pathology in 1963, to work in the research program of L. E. Williams. In that role, he was involved with greenhouse research and field studies, and with field surveys in the maize virus program. After Williams became associate chairperson in 1968, He worked with D. T. Gordon in the maize virus research program. He then worked a short time with L. J. Herr, involved in soil microbiology research, until his retirement in 1978.

Susan Carson • Associate of Applied Science, The Ohio State University Agricultural Technical Institute. Carson joined the department in 1979 as a research technician in the laboratory of A. F. Schmitthenner, working on Phytophthora root rot of soybean, identifying races of the pathogen, and developing tolerant or resistant cultivars. After Schmitthenner's retirement in 1996, she continued her work with his successor A. E. Dorrance, until she retired in 2001.

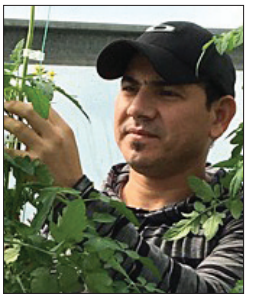
Leona Horst • B.S. (1976) and B.A. (1990), both from University of Akron; M.S. (1997), The Ohio State University. Horst came to OARDC in 1977 to work in the USDA Soft Wheat Quality Lab, where she assisted with chemical analyses of wheat and flour for quality factors, and later as a Physical Science Technician. In 1990, she moved to the Department of Plant Pathology as a USDA Biological Laboratory Technician, working with C. R. Krause. Initially, her responsibilities were for providing electron microscopy, microbiological methods, and techniques in support of research dealing with abiotic and biotic problems of nursery crops, host–parasite relationships, and drift from spray application. Her M.S. research with H. A. J. Hoitink and C. R. Krause, in the mid-1990s, concerned the suppression of Botrytis blight of Begonia by *Trichoderma hamatum* 382 in peat and compost-amended potting mixes. Later in her career, her duties expanded to include the operation of scanning electron microscopes under a variety of conditions and sample types, including pesticide characterization and deposition, and presentations of collaborative studies at local and national meetings. Most recently, her responsibilities expanded to include field research director of trials for the IR-4 minor crop pesticide use program on fruit and vegetable crops. Horst has been involved in studies that led to a number of journal publications dealing with sprayer configurations for improved pesticide efficacy, biological control of Fusarium head blight, and other subjects.

Audrey Johnston • After high school graduation, Johnston joined the OARDC in 1977, first working jointly with R. C. Rowe and A. R. Mosley, Department of Horticulture. She assisted with programs in potato disease control and development of resistant cultivars. Johnston worked for the Departments of Entomology and Agronomy from 1979–85. She returned to Plant Pathology in 1985, working in the research program of P. E. Lipps, dealing with research on diseases of corn and small grains. Her primary responsibilities were to assist in evaluating fungicides for control of leaf and head diseases of wheat and maintaining corn and wheat field nurseries for the evaluation of disease resistance. Her participation in field evaluation trials resulted in the release of several wheat varieties with resistance to powdery mildew, and identification of corn germplasm with resistance to gray leaf spot, and moderate resistance to Fusarium head blight and Stagonospora blotch. After Lipps' retirement in 2005, she continued her work with his successor, P. A. Paul until her retirement in 2008.

Mark Jones • B.S., University of New Hampshire; M.S., The Ohio State University. Jones began at OARDC in 1979, with the USDA/ARS Corn and Soybean Research Unit, working in the Department of Agronomy with W. R. Findley, assisting with corn breeding and genetics of virus resistance. He helped map the first gene for resistance to maize dwarf mosaic virus and three genes for resistance to wheat streak mosaic virus. He came to Plant Pathology in 1985, and worked with R. Louie, except for 1987–92, when he was back in the Department of Agronomy. Following Louie's retirement in 2000, Jones worked with R. E. Gingery (2001–06) and M. G. Redinbaugh (2007–present). In these programs, he took major responsibilities for research to identify and isolate virus resistance genes and used molecular markers to characterize the genetic basis of plant responses to virus infections. After he helped in the registration of the first highly tolerant maize chlorotic dwarf virus (MCDV) inbred OH1VI, he made significant contributions that identified specific molecular markers associated with a high degree of resistance to MCDV infection. He currently is genotyping and phenotyping uniquely developed corn populations and genetic stocks to explore the genetic and molecular basis of virus resistance.

Tom Lanker • B.S., University of Illinois. Lanker came to Plant Pathology in 1988 to work with R. E. Gingery (USDA/ARS) assisting with research on the biochemistry, serology, and purification of maize viruses. When Gingery took a position in Washington DC in 1993, Lanker moved to the research program of R. Louie. In this position, he assisted in research on host–virus relationships related to resistance of corn, and the biology and ecology of maize virus diseases. He left the department in 1998.

Jhony Mera • Associate of Applied Science (2012), The Ohio State University Agricultural Technical Institute. Mera joined Plant Pathology in 2000, working with S. A. Miller. He manages the applied field portion of the OSU Vegetable Pathology Program, conducting product evaluations and systems research in open field and protected culture (greenhouse and high tunnel), taking data, and preparing reports. Recent projects have dealt with bacterial spot in peppers and tomatoes, and several diseases in radish. Mera has supervisory responsibilities for summer interns and other field staff, and interacts directly with growers and crop protection industry personnel. He is a co-author of 91 *plant disease management reports.* Mera was the recipient of the IR-4 North Central Region Technical Service Award in 2013.



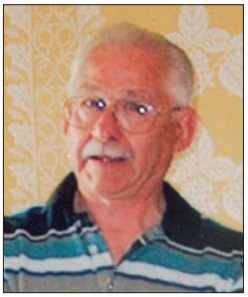
Carol Musselman • B.S., Malone College. Musselman began her work in Plant Pathology in 1969, assisting with research dealing with the development of disease resistant greenhouse tomato cultivars, first with L. J. Alexander, then with J. D. Farley. When Farley moved to the Columbus campus in 1974, Mussleman began working in the research program of H. A. J. Hoitink, assisting with work on composted bark, municipal sludges, and other waste products and their applicability as disease-suppressive container media for ornamental plants. She took responsibility for maintaining laboratory supplies and equipment, and assisted graduate and postdoctoral students working there. She also managed demonstration trials at commercial nurseries and composting facilities. She retired in 2003.

John Nixon • Associate of Applied Science (1977), The Ohio State University Agricultural Technical Institute. Nixon joined the Department of Plant Pathology in 1977, first working in the fruit pathology program of R. A. Spotts. When Spotts left the university, he began working half-time each in the fruit pathology program of M. A. Ellis and the cereal pathology program of P. E. Lipps (1979), then full time with Lipps in 1983. In both programs, he helped with field research plots and in conducting greenhouse and laboratory experiments.

He also worked some with L. J. Herr on diseases of sugarbeets, primarily on Rhizoctonia root rot. Nixon transferred to the Department of Poultry Science at OARDC in 1990.

Gene Oakes • B.S., Colorado State University. Beginning in 1957, Oakes worked with L. J. Alexander, in the Plant Pathology greenhouse tomato breeding program. He gained wide expertise in making genetic crosses, culturing, and evaluating lines of germplasm to develop the disease resistant cultivars needed by the large Ohio greenhouse tomato industry. When Alexander retired in 1970, program leadership transferred to J. D. Farley until he left the university in 1981, when leadership for the breeding program moved to faculty in the Department of Horticulture. Throughout all these leadership changes, Oakes' appointment remained in Plant Pathology and he was the essential "glue" that kept the breeding program together. Faculty who led the program relied heavily on his experience and knowledge in working with this specialty crop. He retired in 1986.

Richard Ritter • B.S., The Ohio State University. Ritter came to Plant Pathology in 1961 to work with L. E. Williams, assisting with his research investigating factors affecting soil mycoflora and soilborne diseases of field crops. In the mid-1960s, when severe outbreaks of corn viruses developed in Ohio, the program shifted emphasis to concentrate on viruses affecting corn and wheat. After Williams became associate chairperson in 1968, Ritter continued to assist him with research during the southern corn leaf blight epidemic and in aspects of the Maize Virus Research Program. Beginning in the early 1970s, he served as Williams' administrative assistant, taking on numerous general support duties for the department. Among these included answering queries that came to the department regarding poisonous plants and mushrooms. In the last decade of his service, Ritter also worked with D. T. Gordon to assemble and publish MAVIS, the *Maize Virus Information Service*, a summary of world literature on maize virus and virus-like diseases. Yearly updates were sent to 500–600 researchers and numerous libraries worldwide, which was a very significant service prior to the internet and on-line sources. Ritter retired in 1988.



Jean Vacha • B.A. Malone College. After graduation with a degree in biology, Vacha began at the OARDC in 1985 as a research technician with the USDA/ARS Corn and Soybean Research Unit. Working in the laboratories of R. Louie (1985–2000), R. E. Gingery (2001–2006) and M. G. Redinbaugh (2006–2007), she assisted in research to evaluate virus transmission to corn and in corn breeding programs. Her skill and dexterity in many precise laboratory techniques consistently achieved repeatable results among test replications. Vacha's work helped demonstrate the feasibility of achieving high consistent rates of transmission with the vascular puncture inoculation technique to screen for virus resistance to the obligately vectored maize rough dwarf virus. She left the USDA/ARS in 2007 to pursue a different career path, but then worked intermittently, until 2013, on projects to evaluate corn plants for the presence of viruses.

Kristen Willie • B.S.(1994) Indiana University. After serving in the Peace Corps, Willie began at the OARDC in 1998 as a biological research technician with the USDA/ARS Corn and Soybean Research Unit. While working in the laboratories of M. G. Redinbaugh (1998–present) and L. R. Stewart (2012–present), she primarily works on diagnostics of maize viruses and

molecular virology. Willie is responsible for training many students, technicians, and visiting scholars on lab techniques and practices, while also managing the laboratory. She was instrumental in diagnosing the viruses involved in maize lethal necrosis disease and developed infectious clones of maize dwarf mosaic virus and maize necrotic streak virus.

Lee Wilson • B.S. (1980) and M.S. (1988), both from The Ohio State University. Wilson joined the Department of Plant Pathology in Wooster in 1981, to work in the research program of M.A. Ellis. Wilson's primary responsibility is to assist with research involving the development and implementation of fruit disease management programs involving the use of cultural practices, disease resistant cultivars, and both biological and chemical control techniques. He also assists L.V. Madden with epidemiological research on strawberries and grapes. Following Ellis' retirement in 2014, he has continued his fruit pathology work with M. Lewis Ivey.


OARDC

In his long career in the department, Wilson has taken on many additional responsibilities. He manages the OARDC/OSU state-wide weather station network. He works with departmental graduate students, manages the department communication systems, serves as Selby Hall safety officer and building coordinator, and manages department growth chamber and greenhouse facilities. He is a charter member of the University Laboratory Safety Committee (2014), which represents all laboratories within The Ohio State University. He is also a member of the Wooster Campus Safety Committee and served as chairman (2007–2009) and secretary (2011–2012). Wilson serves as a conduit of information to faculty and staff from both of these committees. In 2000, he received the OARDC Outstanding Staff Award.

Table 1

Plant Pathology Staff at Columbus with at Least Two Years Service

Last Name	First Name	Position	Years of Service
Ahn	Il-Pyung	laboratory technician	2008–10
Anderson	Tamara	laboratory technician	1989–98
Beckrum	Veronique	office staff	2005–present
Bellizzi	Maria	laboratory technician	2000–present
Bloetscher	Barbara	PPDC staff	1992–2012
Bridgen	Margot	laboratory technician	1978–81
Brown	Harold	greenhouse staff	1988–2004
Chen	Songbiao	laboratory technician	2009–11
Coe	Lavida	office staff	1968–72
Dille	Barbara	office staff	1968–78
Gabriel	Colette	PPDC staff	2014–present
Graham	Lian-Mei (Madge)	research scientist	1986–present
Gray	Rebecca	office staff	2005–07
Hawley	Renee	office staff-PPDC	1990–92
Hicks	Todd	laboratory technician	2001–present
Hill	Amy	laboratory technician	2010–15
Honesty	Kathy	office staff	1994–2002
Huge	Ruth	laboratory technician	2005–07
Kamal	Lynn	academic program coordinator	2004–07
Kelly	Michael	laboratory technician	2008–present
Kim	Soonok	laboratory technician	2007–10
Kiser	Jeanne	office staff	1979–87
Landini	Serena	laboratory technician	1999–2002
Lighthiser	Ann	academic program coordinator	1997–04
Liu	Guifu	laboratory technician	2000–02
Lyon	Rebecca	laboratory technician	1999–2004
Majerczak	Doris	laboratory technician	1983–2010
Marquart	James	greenhouse staff	1984–87
Martin (Green)	Susan	office staff	1972–79
Meiring	Bridget	PPDC staff	2008–11
Meyer	Georgia	office staff-PPDC	1993–2003
Morse	Justin	greenhouse staff	2010–present

Mowery	Brian	office staff	2004–14
Neeb	Linda	office staff-PPDC	2003–10
O'Donnell	Judith	office staff	1989–95
Opiyo	Stephen	research scientist	2010–present
Park	Chan Ho	laboratory technician	2013–present
Pierson	Paulette	laboratory technician	1986–91
Powell	Ramona	office staff	1978–present
Price	Linda	office staff-PPDC	1992–93
Ralston	Timothy Izaak	laboratory technician	2012–present
Reinoehl	Catherine	office staff	1990–95
Rimelspach	Joseph	extension associate	1992–present
Riofrio	Marianne	PPDC staff	1992–2005
Russell (Werner)	Carol	laboratory technician	1981–83
Shambaugh	Timothy	laboratory technician	1981–89
Short	Patsy	office staff	1987–90
Shukla	Rajya	PPDC staff	2005–07
Sinden	Michelle	laboratory technician	2005–09
Steele (Neal)	Julie	PPDC staff	1986–2000
Stier (Dorn)	Valerie	laboratory technician	1985–92
Sutton	Gretchen	laboratory technician	1998–2005
Taylor	Nancy	PPDC director	1986–present
Tripp	John	office staff	1987–89
Veto	Angelo	office staff	2014–present
Wang	Duan	laboratory technician	2004–10
Williams	Barbara	PPDC staff	1986–92
Williams (Ellis)	Sarah	academic program coordinator	2009–present
Wutz	Laura	laboratory technician	1998–2003
PPDC = Plant Pest and Diagnostic Clinic			

Table 2

Plant Pathology Staff at Wooster with at Least Two Years Service

Last Name	First Name	Position	Years of service
Abdelalim	Fathy	laboratory technician	2002–04
Abt	John	laboratory technician	1974–2007
Akins	Peggy	office staff	1954–56
Ammar	El-DeSouky	research scientist	1986–89, 2002–09
Arny	Carol	laboratory technician	1985–89
Balk	Christine	laboratory technician	2011–14
Bardall	William	greenhouse & field	1976–2006
Beery	William	laboratory technician	1968–80, 1984–98
Beke	Helga	office staff	1992–2006
Berry	Randall	greenhouse & field	1989–2006
Berry	Sue Ann	laboratory technician	1981–2011
Bosler	Ed	laboratory technician	1963–78
Carbould	Vita	office staff	1919–1945
Carson	Judy	laboratory technician	1992–96
Carson	Arden	greenhouse & field	1956–87
Carson	Susan	laboratory technician	1979–2001
Creamer	Don	laboratory technician	1965–68
Crum	Dick	laboratory technician	1951–56
Daft	Gilbert	research scientist	1961–70, 1973–74
Davies	Kristen	laboratory technician	2011–13
Denning	Andrea	laboratory technician	1997–2000
DeRhodes	Robert	greenhouse & field	? – 1939
Dixon	Emilia Ana Guerrra	laboratory technician	2011–13
Dong	Shujing	laboratory technician	1998–2003
Duncan	Lee	greenhouse & field	1984–86
Fluke	Norman	greenhouse & field	1970–76
Fulton	David	laboratory technician	1985–2001
Gerdel	Grace	laboratory technician	1924–25, 1927–28
Gerig	Anna	laboratory technician	1981–88
Gessmann	David	laboratory technician	1994–99
Giovannini	Michele	laboratory technician	2003–06
Grant	Druscilla	laboratory technician	1974–81
Grimm	Laura	laboratory technician	1986–90

Gurel	Fulya Baysal	laboratory technician	2011–15
Han	Junping	laboratory technician	2009–present
Harper	Lauren	office staff	2006–2009
Heller	Joshua	greenhouse & field	1999–2006
Hershberger	Joanne	office staff	1971–2005
Horst	Leona	laboratory technician	1990–present
Huston	John	greenhouse & field	1957–86
Immel	Patricia	custodian	1977–85
Jager	Kerilynn	laboratory technician	2005–07
James	Robert	greenhouse & field	1973–76, 1987–present
Johnston	Audrey	laboratory technician	1977–79, 1985–2008
Jones	Rose	laboratory technician	1968–74
Jones	Mark	laboratory technician	1985–87, 1992–present
Kerby	Amanda	laboratory technician	2012–present
Khatri	Nitika	laboratory technician	2014–present
Kinney	Diane	laboratory technician	1998–2006
Kuter	Geoffrey	laboratory technician	1979–85
Lanker	Tom	laboratory technician	1988–98
Lee	Harold	greenhouse & field	1939–69
Leedy	Laurel	office staff	1998–2012
Liming	Ora	laboratory technician	1928–30
Littleton	Bonnie	office staff	1965–92
Lu	Ky	laboratory technician	1981–85
Lutton	Elizabeth	laboratory technician	2000–04
Markley	Joyce	laboratory technician	1967–68
Martin	Clifton	laboratory technician	2011–15
Marty	Dee Marie	laboratory technician	2014–present
Mathis	Fred	office staff	1911–12, 1916–18
McCartney	Martine	office staff	1946–54
Mekoleske	Barb	office staff	1979–84
Mendiola	Susan	laboratory technician	1981–83
Mera	Jhony	laboratory technician	2000–present
Miller	Therese	laboratory technician	1997–2000, 2012–present
Mills	Dennis	extension associate	2000–11
Moncada	Jorge David Salgado	laboratory technician	2007–08, 2015–present
Moyseenko	Jenny	laboratory technician	1998–2003
Murray	Deborah	laboratory technician	1977–83
Musselman	Carol	laboratory technician	1969–2003
Nanes	Kenneth	office staff	2015–present
Nanes	Angela	laboratory technician	1998–99, 2012–present
Nauth	Brittany	laboratory technician	2011–12, 2014–present
Negi	Lakshman	laboratory technician	1975–80
Neiger	Charles	greenhouse & field	1965–67
Nixon	John	laboratory technician	1973–90
Oakes	Gene	laboratory technician	1957–86

Olah	Arthur	research scientist	1983–98
Omer	Medani	laboratory technician	1999–2005
Phenix	John	laboratory technician	1970–72
Phillips	John	laboratory technician	1989–91
Poland	Walter	laboratory technician	1969–75
Ritter	Richard	laboratory technician	1961–88
Robinson	Kenneth	greenhouse & field	1965–69
Rowan	Peggy	laboratory technician	1980–84
Sanor	Miriam	office staff	1958–67
Schmidt	Calvin	greenhouse & field	1970–76
Schmitt	Lillian	laboratory technician	2014–15
Seliskar	C. E.	laboratory technician	1945–47
Shilling	Donna	laboratory technician	1965–84
Smith	Charlotte	laboratory technician	2012–14
Snyder	Marilyn	office staff	1985–2000
Spilker	Oren	extension	1951–58
Spreng	Floyd	laboratory technician	1968–70
Swinehart	Roy	office staff	1912–18
Tappan	Greg	laboratory technician	1994–02
Taylor	Leslie	laboratory technician	2009–present
Tennant	Jeanette	office staff	1984–98
Tilford	Esther	office staff	1945–46
Todd	Jane	laboratory technician	1984–98, 2001–03
Utt	Kim	laboratory technician	1977–80
Vacha	Jean	laboratory technician	1985–2007
Veney	Deloris	laboratory technician	2012–present
Villafuerte	Eden Fredy Cruz	laboratory technician	2005–11
Wallhead	Matthew	laboratory technician	2008–11
Walters	Pat	office staff	1956–59
Weber	Linda	laboratory technician	2014–present
Weiker	Audrey	laboratory technician	1986–89
West	Lynn	office staff	1999–present
Wickramasinghe	Damitha	laboratory technician	2010–15
Willie	Kristen	laboratory technician	1998–present
Wilson	Lee	laboratory technician	1981–present
Winger	Jonell	laboratory technician	2015–present
Winkler	Roy	greenhouse & field	1965–67
Wirt	Kenneth	greenhouse & field	1965–70
Woody	Shannon	laboratory technician	2005–07
Young	Harry Jr.	laboratory technician	1938–40
Zhang	Jianhua	laboratory technician	1997–2002

Chapter 11

Plant Pathology Extension and Outreach in Ohio

The Smith-Lever Act of 1914 provided federal legislation that created the Cooperative Extension Service, a nationwide system of community-based education established as part of each state's land grant university. Prior to this, in the early 1900s, some "Extension" work in agriculture was already underway at The Ohio State University. The Ohio General Assembly recognized the importance of community-based teaching when it passed a bill in 1909 authorizing the College of Agriculture to extend its teaching throughout Ohio. By this time, Extension agronomist **E. D. Waid** and Extension horticulturist **V. H. Davis** were on the college staff. Davis became well-known in horticultural circles throughout Ohio in later years. Waid and others put on pesticide spraying demonstrations.

By 1910, **Joseph E. Gourley** was Extension specialist in horticulture, and there were several specialists in crops and soils. In addition to production issues, these crop specialists undoubtedly dealt with plant disease problems. Some faculty at the OAES in Wooster, though hired to do research, were also involved in teaching about plant diseases and their management at Farmer's Institutes. **A. D. Selby** indicated that travel to these events by trolley and train was quite tedious, and some of his staff were reluctant to do so. Special railway trains, known as agricultural trains, operated in Ohio from 1906 to 1913. One such train, which ran through southeastern Ohio, had displays of spraying equipment and spray mixtures.

Following the Smith Lever Act of 1914, state Extension programs developed rapidly throughout the country. By 1916, more than 100 oat smut control demonstrations were held in seven Ohio counties and demonstrations took place of orchard spraying and potato scab and tobacco disease control. In 1918, **W. G. Stover** was appointed part-time Extension specialist in the Department of Botany, apparently taking on these duties along with his university teaching responsibilities. Some of his Extension activities relating to plant pathology included tobacco bed sterilization, barberry eradication, and corn root rot and oat smut control. Working with Extension specialists in horticulture, plots were established in seven Ohio counties to demonstrate spray programs that would reduce losses from the apple blotch disease. Stover remained as part-time Extension specialist until 1920, though he continued involvement in outreach activities throughout his career.

OSU Archives

Spraying commercial orchard trees with lime sulfur and salt to control disease and insects, 1910

Edward E. Clayton was appointed on the Columbus campus in 1920 as **the first full-time Extension plant pathologist in Ohio**. He was involved in cereal smut control, barberry eradication programs,

corn root rot studies, clover disease surveys, seed potato treatment demonstrations, and programs to encourage use of disease-resistant varieties. Clayton resigned in 1922 to accept a position with the New York Agricultural Experiment Station in Geneva. For six years following Clayton's resignation, Stover again devoted considerable time to Extension work, some officially, but much on top of full-time teaching. Ohio growers also received considerable help on plant disease problems from OAES plant pathologists in Wooster.

Arthur L. Pierstorff was hired as Extension plant pathologist in 1928. One of his major accomplishments was to take the Centralized Scab Spray Service for orchardists, originally pioneered and developed by W. G. Stover and H. C. Young Sr., to a degree of effectiveness that made it one of the best in the nation. Pierstorff was assisted in his Extension work by Russell Hyre (1930–31), who had just received a B.S. degree from Ohio State, and by Howard Lamb (1932–33), a graduate student in plant pathology. In 1938, Pierstorff resigned his Extension position to become a professor of botany in the department to help develop the graduate program in plant pathology. Unfortunately, his career was ended by his sudden death in 1942 at age 47.

Clyde C. Allison succeeded Pierstorff as Extension plant pathologist in 1938. He developed a comprehensive Extension program with meetings, short courses, and field demonstrations throughout the state and continued the Centralized Spray Service for orchardists. Allison worked closely with Ohio vegetable growers to help manage disease problems on their crops. He cooperated closely with H. C. Young Sr., J. D. Wilson, H. F. Winter, and plant pathologists at OAES on disease control programs for commercial growers of fruits and vegetables, especially apples and sour cherry, tomatoes, sugar beets, and cucurbit crops. One of Allison's first programs was a state-wide survey of wheat for incidence of stinking smut. This survey showed that stinking smut was present in 37 counties, with more than 30% losses in some fields. His meetings with county agricultural Extension agents and growers promoting use of fungicide seed treatment reduced this disease to insignificant levels. For parts of several years (1940–44), he received help in Extension programs from **C. Wayne Ellett**, who held an assistantship in Extension plant pathology during his graduate studies. Like Pierstorff, Allison resigned his Extension position and became a professor in the Department of Botany in 1946. Following WWII, he worked to develop the expanding graduate program in Plant Pathology and made major contributions in that capacity.

During WWII, an Emergency Plant Disease Survey Project was initiated by the USDA Division of Mycology and Disease Survey. At that time, food production was considered crucial to the war effort, and extra personnel were assigned to assist with Extension problems. Plant disease surveys were conducted so that potential epidemics could be dealt with at their onset. **Marion R. Harris** (Ph.D., 1932, University of Wisconsin) served as survey pathologist in Ohio from 1943–44, and **Alvin J. Braun** (Ph.D., 1947, Oregon State University) replaced Harris from 1944–45, when the project was terminated.

Though **Thomas King** served as Extension plant pathologist from 1946 until he left the university in 1948, it was not until 1950, when **Blair F. Janson** was appointed Extension plant pathologist, that extensive programming in plant pathology Extension resumed fully. Janson prepared numerous Extension publications on plant disease management, especially fruit and vegetable diseases, and worked closely with research faculty involved in those areas. He prepared many articles on plant diseases and disease control for various trade journals and agricultural organizations and interacted closely with agricultural interests throughout the state. Janson was an active member of the Ohio Pesticide Institute and the Ohio Pesticide Education Association. Throughout his long career, he played key roles in department Extension programming until his retirement in 1976.

Robert E. Partyka joined the faculty as a full-time Extension plant pathologist in 1957. For the first time, agricultural interests in Ohio were being served by two full-time Extension specialists in plant pathology. Partyka worked closely with vegetable growers and with disease problems of turfgrass, tobacco, and greenhouse crops, while Janson took responsibility for diseases of fruit, and agronomic crops. They shared responsibility for disease problems of ornamentals. Partyka was an invited speaker on control of vegetable and turfgrass

diseases at many meetings and conferences in the U.S. and Canada during the 1960s and early 1970s. Over time, his interests and expertise became more focused on turfgrass diseases and, in 1974, he resigned to become a plant pathologist for the ChemLawn Corporation, based in Columbus. He remained an adjunct professor in the department until he retired from ChemLawn nearly 20 years later.

After the establishment of the Department of Plant Pathology in 1967, additional faculty appointments in Extension were made. Until that time, all faculty appointments had been 100% in either resident instruction (OSU), agricultural experiment station (OARDC), or cooperative Extension (OCES). However, Ira Deep and Lansing Williams, the new department leadership team, saw the importance of tying these areas together by giving faculty split appointments with partial responsibility in two of these areas. This resulted in a larger number of faculty involved in the total Extension programming effort. Extension FTE grew from 2.75 in 1970, with three faculty involved, to 3.25 by 1992, with ten faculty having partial Extension appointments. This approach greatly drew together those doing Extension and research in various crop areas.

Brian M. Jones was appointed assistant professor in 1967. Located on the Wooster campus, Jones had responsibility for tree and small fruit crop diseases. A primary focus of his research and Extension program was on methods of chemical control and advanced testing of new fruit fungicides, particularly for apple. In 1974, Jones resigned to accept a fruit grower sales and service position with Grower Service Corporation.

Harry A. J. Hoitink was appointed assistant professor on the Wooster campus in 1967, with responsibility for research on bacterial pathogens and diseases of ornamental crops. Although he had no formal Extension appointment, throughout his career he worked closely with the ornamental industry in providing information on disease control that was developed in his research program. During the 1970s, Hoitink collaborated with A. F. Schmitthenner on studies of the etiology, epidemiology, and control of Phytophthora diseases of ornamental plants. Chemical, biological and cultural control practices for Phytophthora root rot of rhododendron were developed and provided to the industry. Hoitink's interest in compost science began after he found that composted tree bark suppressed root rots caused by *Pythium* and *Phytophthora* spp. With several collaborators, he developed procedures

Plant Pathology Department

Plant Pathology extension faculty, 1981.
Front row from left: M. Ellis, L. Williams, C. Powell, R. Riedel.
Back row from left: R. Rowe, J. Farley, P. Lipps, I. Deep, W. Ellett

for composting pine bark and its formulation into suppressive media for use in floriculture. These procedures and media are now used world-wide for controlling soilborne diseases of containerized plants. He retired in 2004.

Philip O. Larsen was appointed assistant professor on the Columbus campus in 1968, with responsibilities for research and teaching on diseases of ornamentals and turfgrass. Although he did not have a formal Extension appointment, he became a national leader in turfgrass pathology Extension. He and his students studied the influence of environmental and plant host factors on the development of fungal turfgrass pathogens; the epidemiology and control of Pythium blight on creeping bentgrass; Helminthosporium leaf spot; and Helminthosporium "melting out" on Kentucky bluegrass. He participated in many Extension field days and workshops. Larsen placed considerable emphasis on evaluating fungicides for management of turfgrass diseases. Data from this research was helpful in registration of new fungicides for commercial use on turf, particularly a new systemic fungicide. He resigned in 1984 to become head of the Department of Plant Pathology at the University of Minnesota.

OARDC

Phil Larsen (left) and R. Mack Riedel (center) discussing ornamental plant disease issues with attendee at field day, 1983

James D. Farley was appointed assistant professor on the Wooster campus in 1969 with responsibility for research on greenhouse and field tomato diseases. In 1974, following the retirement of Robert Partyka, Farley transferred to the Columbus campus. There he took primary responsibility for Extension (75%) in vegetable crop diseases, partnering with R. C. Rowe, in Wooster, who focused mostly on research in that area. Farley's Extension and research program initially dealt with diseases of field and greenhouse-grown tomatoes, but later focused exclusively on the Ohio greenhouse tomato industry, located primarily in the Cleveland area. He systematically evaluated fungicides and their application methods for disease control in greenhouse and field vegetables. He investigated the spread and control of bacterial canker in tomato transplants and developed a method of aerated steam treatment of greenhouse soils utilizing a low-temperature, air/steam pasteurization process. After the retirement of L. J. Alexander (1970), Farley assumed responsibility for the greenhouse tomato breeding program and screening of wild tomato accessions for resistance to several important diseases. In 1973, he identified a new and serious disease of greenhouse tomatoes, Fusarium crown and root rot (FCRR), caused by a new species of *Fusarium*, In the next few years, it spread widely throughout the Ohio and Canadian greenhouse tomato acreages and was found in seven other states. Yields were reduced 30–80% in affected ranges, and the Ohio industry was losing $7 million annually. Working with R. C. Rowe, together they developed a novel chemical control procedure based on fungicide treatment of freshly steam-pasteurized soil that likely saved the industry. Farley later found a source of resistance to FCRR in a wild tomato accession from Japan and transferred it into commercial greenhouse tomato lines. He resigned his position in 1981 to join the De Ruiter Seed Company as director of North American operations, concentrating on greenhouse-grown tomatoes.

Richard M. "Mack" Riedel was appointed assistant professor in 1970 on the Columbus campus, with responsibilities for research on nematode-caused diseases and teaching graduate-level courses in plant nematology. This was the first full-time appointment in nematology at Ohio State. Although he had no formal Extension appointment, he was heavily involved in many Extension activities. Riedel's early work resulted in many first reports for Ohio of plant parasitic nematodes from a wide variety of plants, fruits, vegetables, ornamentals, turfgrasses, and agronomic crops. As these problems were discovered, Riedel and

Plant Pathology Department

R. Mack Riedel examining diseased lettuce in commercial muck vegetable field, 1992

his students investigated several of them in detail and developed appropriate management systems. In collaboration with R. C. Rowe and graduate students, Riedel devoted considerable research effort to studying potato early dying disease, a serious problem of potato production which involved both the soilborne fungus *Verticillium dahliae* and a root-lesion nematode, *Pratylenchus penetrans*. Based on many years of data from controlled field inoculations, Riedel, Rowe, L. V. Madden, students, and postdoctoral scientists developed quantitative methods to forecast disease development based on pre-plant populations of these pathogens. In the mid-1980s, Riedel expanded the scope of his work to include fungal diseases of processing and fresh-market vegetables, especially those produced on muck soils, and took on formal Extension responsibilities. Much of his research and Extension efforts were aimed at the development of disease management programs that improved the timing of fungicide applications and minimized pesticide residues. In the early 1990s, soybean cyst nematode (SCN) became a significant problem with Ohio soybeans. Riedel and colleagues screened public and private varieties for resistance to six races of SCN and developed an effective control method using a nematicide placed in-furrow at below-label rates. Working in cooperation with colleagues in the Departments of Horticulture and Crop Science, and Entomology, an effective set of practices for management of SCN was developed. Riedel authored an extensive set of written materials providing information on management of vegetable crop diseases and nematodes. From 1981–85, he served as director of the Plant Disease Clinic, following the retirement of C. W. Ellett, and until the appointment of S. T. Nameth as director. He retired in 2004.

Charles C. Powell Jr. joined the faculty at Columbus in 1970. He took a new position in diseases of ornamentals, including turfgrass, with responsibilities in both Extension (75%) and applied research (25%). This was the first time that disease problems of ornamentals, at both the production and user levels, were receiving direct attention through Extension programs. Working closely with commercial nursery crops producers and florists, and leaders in these important areas of Ohio's agriculture, Powell identified major disease problems. Through both his Extension and research efforts, he developed and demonstrated improved disease management programs. Over the years, he defined and popularized the concept of holistic plant health management. He was prolific in writing Extension education materials and publishing articles on disease management of ornamental crops in commercial trade journals. He retired in 1994.

Beginning in 1974, when **James D. Farley** relocated from Wooster to Columbus to replace Partyka as Extension pathology specialist, a pattern was established to have two faculty working in each crops area. One was primarily responsible for Extension and one primarily responsible for research, but both worked together as a team.

Randall C. Rowe joined the faculty at Wooster, in 1974 as assistant professor with responsibilities for research (75%) and Extension (25%) in vegetable crop diseases. His investigations with a new disease of greenhouse-grown tomatoes (Fusarium crown and root rot) that was threatening the United States and Canadian industries revealed an unusual pattern of epidemiology that led to its control. Airborne microconidia of the pathogen, *Fusarium radicis-lycopersici*, escaped soil steaming and then rapidly recolonized the steam-disinfested soil. Collaborating with J. D. Farley, he found this could be prevented by drenching the fungicide captafol onto freshly-steamed soil. This process was quickly adopted by Ohio commercial greenhouse tomato

growers and rapidly eliminated this disease as a threat to the industry until disease-resistant cultivars were developed. Rowe was actively involved in problem-solving research for the Ohio vegetable industry throughout his career and participated in many field days and field visits for Ohio potato and vegetable growers. He and co-workers investigated powdery mildew, late blight, Verticillium wilt, and pink rot of potato; determined cultivar and environmental relationships for radish clubroot; evaluated the potential biocontrol of *Rhizoctonia* on radish; studied the effects of environment on gummy stem blight in greenhouse-grown cucumbers; and actively evaluated new fungicides and application schedules for disease control in several vegetable crops. He served on several industry research or advisory committees, wrote numerous Extension bulletins and trade journal articles, made many presentations to vegetable grower groups in Ohio and nationally, and served as editor and author of the APS Press book *Potato Health Management* (1993). He retired in 2006.

OARDC

Randall Rowe talking with commercial potato growers at field day, 1981

Robert A. Spotts was appointed assistant professor at Wooster in 1974 with responsibilities for research (75%) and Extension (25%) in diseases of fruit crops. Spotts' Extension programs on tree fruit diseases included evaluation of experimental fungicides and spray adjuvant effects on pathogen and host physiology. He also conducted an extensive research and Extension program on the epidemiology and control of black rot of grape. He developed and validated a disease-forecasting system for black rot based on leaf wetness duration and temperature. In 1978, Spotts resigned his position to accept a faculty position in the Department of Botany and Plant Pathology at Oregon State University.

Landon H. Rhodes was appointed assistant professor at Columbus in 1976. Though primarily responsible for classroom teaching, he had some Extension education responsibilities and often made presentations to various groups statewide on disease management in forage crops and pumpkins, and on tree decay and decay fungi. Because of his expertise in mycology, he spoke to various audiences on edible and poisonous mushrooms. Rhodes, along with colleagues and students, developed techniques for screening alfalfa germplasm and subsequently identified sources of resistance to *Sclerotinia*. He also developed a biological forecasting system that improved fungicidal control of Sclerotinia in alfalfa. Later in his career, working in collaboration with R. M. Riedel, R. J. Precheur, and J. R. Jasinski, he studied white speck of pumpkin *(Plectosporium tabacinum)* and developed methods to screen for resistance to this disease. He retired in 2010.

OARDC

Lanny Rhodes and graduate student examining test plants in Kottman Hall greenhouse, Columbus, 1984

Michael A. Ellis was appointed assistant professor at Wooster in 1979, with responsibilities for research (75%) and Extension (25%) in fruit crop diseases. Later in his career, he took on expanded Extension responsibilities in this area. Ellis' Extension and research programs were focused on development and implementation of integrated fruit disease management programs using cultural practices, disease-resistant varieties, and biological and chemical control. A large part of his work, in collaboration with L.V. Madden, research associate L. L. Wilson, and others, was aimed toward understanding the epidemiology of several diseases of strawberry, grape, and brambles and the development of disease-forecasting systems for the major diseases of fruit crops. Disease predictive systems were developed and validated for leather rot, Botrytis fruit rot, and anthracnose fruit rot of strawberry; and black rot, downy mildew, and Phomopsis cane and leaf spot of grape. A commercially available microprocessor-based disease predictor for grape black rot and downy mildew was marketed and used by several grape growers in the Midwest. His work with Phytophthora collar rot of apple led to the first federal label of a fungicide for its control. He maintained a strong program in the evaluation of new experimental fungicides for control of tree fruit and small fruit diseases. He

OARDC

Mike Ellis examining diseased grape plants, 1988

maintained a focus on developing integrated disease management programs for significant grape diseases and strawberry fruit rots in Ohio. Throughout his career, Ellis placed major emphasis on communicating his research findings to fruit producers and developing and delivering educational programs and materials to commercial growers, home producers, and other fruit industry clientele. He was instrumental in developing the "Midwest Fruit Publication" series, which included fruit production guides with disease and insect control recommendations for grape, strawberry, raspberry, blackberry, and blueberry. A commercial tree fruit and small fruit spray guide was also produced and regularly revised. These regional publications were used by 11 states throughout the Midwest. Ellis was widely sought as a speaker at fruit production conferences in Ohio and nationally. In 1993, he was appointed department Extension program leader. In 2000, he was nationally recognized for his work by receiving the Excellence in Extension Award from the American Phytopathological Society. He retired in 2014.

Patrick E. Lipps was appointed assistant professor at Wooster in 1979, with responsibility to conduct research on corn and wheat diseases and to develop an Extension education program for all field crop diseases. Lipps' research and Extension programs were focused on solving disease problems and developing disease management practices for growers in Ohio and the region. Working with crop breeders, he was instrumental in the development of several widely-planted commercial wheat cultivars with resistance to powdery mildew, Septoria diseases, and other pathogens. Lipps was a key player in the National Fusarium Head Blight Initiative and served as Epidemiology Research Leader for this nationwide program that coordinated both research and Extension efforts on this important wheat disease. Working with L. V. Madden and post-doctoral students, they developed a computer-based, nation-wide predictive system for Fusarium head blight, and made it available to all wheat growers and researchers. Throughout his career, Lipps led a nationally-recognized, region-wide Extension education program on the management of diseases of soybean, corn, and wheat. His program emphasized the use of integrated disease management strategies to successfully manage field crop diseases. His Extension programing was highly valued for clarity and quality by crop producers, crop consultants, agri-business representatives, and county Extension agents. Lipps was highly sought as a speaker for agronomic crop-producer meetings in Ohio and beyond. He also provided Extension expertise to international programs in central Africa

OARDC

Pat Lipps checking corn leaves for disease, 1988

(Uganda) and Eastern Europe (Ukraine). With local researchers, he developed many Extension bulletins and fact sheets as part of an International Integrated Pest Management Program. He was an integral part of the OSU Extension Agronomic Crops Team and a regular contributor to their weekly newsletter "C.O.R.N" For his many contributions, Lipps was presented the 2000 Excellence in Extension Award by the College of Food, Agriculture, and Environmental Science. In 2001, he was nationally recognized for his work by receiving the Excellence in Extension Award from the American Phytopathological Society. He retired in 2005.

Stephen G. P. Nameth was appointed assistant professor on the Columbus campus in 1985. When he first joined the department faculty, his major responsibility was in Extension, as director of the newly organized Plant and Pest Diagnostic Clinic (PPDC), in addition to some responsibilities in research and teaching. In 1993, his responsibilities changed from clinic director to Extension specialist responsible for Extension education and research in floral and nursery crops. His primary research and Extension programs focused on the development and application of novel methods of plant pathogen identification, using both immunological and nucleic acid technologies, and identification and characterization of viruses and virus-like agents in floral and vegetable crops. He was prolific in preparing Extension materials and writing articles on disease management published in trade journal magazines. In 2004, he resigned to become director of the OSU Agricultural Technical Institute, located at Wooster

William W. Shane was appointed assistant professor at Columbus in 1985, with responsibility for research, teaching and Extension on diseases of turfgrass. Shane's research and Extension programs emphasized the use of systems and epidemiological analysis for understanding the factors affecting pathogen multiplication. He and his students developed and published improved methods for detection of Pythium blight and necrotic ring spot diseases of turfgrass. He made research and Extension presentations to turfgrass professionals throughout Ohio and prepared Extension fact sheets and bulletins on turfgrass diseases. He conducted fungicide evaluation trials for control of turfgrass diseases to develop data in support of disease control recommendations. He resigned in 1991 to take a position at the Michigan State University's Southwest Michigan Research and Extension Center in Benton Harbor.

Sally A. Miller was appointed assistant professor at Wooster in 1991 with responsibilities for vegetable crop diseases, following R. C. Rowe, whose responsibilities had moved primarily to department administration. Her research and Extension programs with vegetable crops, in both conventional and organic systems, focused on development of sustainable disease management practices, including biological and cultural tactics and responsible pesticide use, and on understanding the relationship of plant diseases and management practices to microbial food safety. Applied research on biological control of postharvest diseases caused by *Botrytis, Penicillium, Rhizopus* and *Alternaria* and on use of effective sanitation practices has led to recommendations widely adopted by the greenhouse tomato industry. Communication of science-based solutions to vegetable disease management problems has been a major focus for Miller. She has provided grower groups throughout Ohio, other U.S. states, and Canada with timely, in-person information on disease management in field, high tunnel, and greenhouse-produced vegetables, particularly tomatoes. Her lab

annually diagnoses several hundred physical samples of vegetable problems, and many digital samples imaged and sent electronically. Miller has made extensive use of the internet to increase the reach of her vegetable disease management program, including both basic (English and Spanish) and advanced versions of fact sheets, and specific information for diagnosticians. She uses various social media options to alert growers, Extension educators and others to critical disease outbreaks and to her blog "Ohio Veggie Disease News." A significant portion of her website and blog readership comes from outside the U.S.

Michael J. Boehm was appointed assistant professor at Columbus in 1996, with responsibilities for teaching, research, and Extension focused on the integrated management of turfgrass diseases. His Extension educational program provided leadership for all Extension-outreach activities related to turfgrass disease management and plant health at Ohio State from 1996 to 2010. During that time, **J. W. Rimelspach**, Turfgrass Pathology Extension Associate, partnered with Boehm as a team that diagnosed numerous turfgrass disease

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Joe Rimelspach (left) greeting attendees at turf field day

samples, put on many workshops, and made many site visits to golf courses, sod farms, and athletic fields. In 2005, the team developed and provided golf course superintendents with an integrated dollar spot management strategy that effectively reduced by up to 50% the need for fungicide applications on fairways. Boehm became department chairperson in 2008, and then left the department in 2011. Rimelspach has led turfgrass disease Extension activities since then.

Anne E. Dorrance was appointed assistant professor at Wooster in 1997, with responsibility for research and Extension on diseases of soybean. Dorrance and her students have identified and characterized several new sources of resistance to *Phytophthora sojae*, cause of Phytophthora root rot, and several *Pythium* spp, as well as to *Fusarium graminearum*. She works with a team of OSU soybean breeders that have developed and released soybean cultivars with high levels of resistance to *P. sojae*. She has led efforts regionally to evaluate the potential threat of soybean rust and develop educational materials for industry professionals regarding this new disease. Dorrance and her students were the first to identify the presence of metalaxyl-insensitive strains of *Pythium* spp. in Ohio corn and soybean producers' fields, and to characterize the wide diversity of *Pythium* species within Ohio. Collaborations with industry specialists led to identification of new active ingredients that could be used successfully as seed treatments.

Her Extension programs have had a major impact on the education of growers, county educators, and crop consultants in Ohio and the region. She is a major contributor to the OSU Extension Team Newsletter "C.O.R.N" which is viewed online by over 30,000 readers per month, having a large impact on Ohio farmers and associated agricultural professionals. Much of this impact results from information leading to increased crop yields and reduced fungicide use on large acreages statewide. With her Extension colleagues, particularly P. E. Lipps, Dorrance has designed and delivered numerous, intensive hands-on workshops for

OARDC

Anne Dorrance and Pat Lipps in OARDC greenhouse, Wooster

producers and crop consultants to bring the "biology" of disease management directly to their county. She is regularly invited to present her applied research findings to producer groups in Ohio and beyond. Dorrance has been widely recognized for her excellence in applied research and Extension by several awards including the Outstanding Achievement Award from the Ohio Soybean Council (2002), the Special Meritorious Award from the American Soybean Association (2008), and the Excellence in Extension Award from the American Phytopathology Society (2009).

James A. Chatfield was appointed to The Ohio State University Extension (OSUE) faculty in 1987, serving as a county agent (1987), district specialist (1989), and assistant state specialist (1993) in landscape horticulture. Since 1993, he has held a courtesy faculty appointment in the Department of Plant Pathology. Chatfield is involved closely with the Ohio green industry, and serves as a member and leader of the OSUE Nursery, Landscape, and Turf Team and the OSUE *Why Trees Matter* program. He is a highly active writer and educator in Ohio, and nationally, in horticulture and plant pathology. Chatfield is president of the International Ornamental Crabapple Society, for several years was registrar of ornamental *Malus* for the Royal Horticultural Society, and has conducted crabapple disease evaluations throughout the U.S. Recently he has been involved in urban forestry and tree evaluations designed to assess the economic value of the environmental benefits provided by trees in community forests.

Jim Chatfield at plant disease diagnostic workshop, 2012

Brian McSpadden Gardener was appointed assistant professor at Wooster in 2000, with responsibilities for research in molecular microbial ecology related to plant disease suppression. He developed outreach programming related to biopesticides and microbial inoculants, giving presentations at various grower meetings. As a member of the OARDC's Organic Food and Farming, Education and Research (OFFER) team, he led or co-led a number of projects on multiple topics related to improving soil and crop health in organic farming systems. He was an active member and regular presenter at the Ohio Ecological Food and Farming Association annual meetings. In 2012, he was appointed the Director of OFFER developing new programming to connect stakeholders to researchers on projects aimed at improving the success of organic producers in the state. He resigned his position in 2015 to pursue a career in the private sector.

Pierluigi "Enrico" Bonello was appointed assistant professor at Columbus in 2000, with responsibilities for research, Extension and teaching in the area of tree pathology. His Extension activities have been focused on participation in activities of the Extension Nursery, Landscape, and Turf Team, including occasionally teaching in the OSU Nursery Short Course. He has contributed research-based information on the ecology and impacts of both indigenous and exotic pathogens of North American forest and landscape trees through invited presentations to various groups and by preparation of informational materials and fact sheets.

Dennis J. Lewandowski was appointed assistant professor at Columbus in 2005, with responsibilities for management of diseases of floriculture and nursery crops. His applied research and Extension efforts were focused on the efficacy of disinfectants to control major greenhouse pathogens on contaminated surfaces, particularly TMV. He developed and implemented effective TMV management practices that were valuable to large vegetative propagators producing millions of petunia cuttings, and to local growers of annual bedding plants. As a member of the interdisciplinary OSU Extension Floriculture Industry Roundtable of Ohio, Lewandowski traveled statewide with colleagues making regional "Extension Reloaded" presentations to the floriculture industry that recapped a day's worth

of interactive greenhouse tours and discussions. He was also a member of the OSUE Nursery Landscape and Turf Team. He resigned his position in 2011.

Pierce A. Paul did postdoctoral research in the department at Wooster with P. E. Lipps and L. V. Madden (2003–06). Following P. E. Lipps' retirement, he was appointed assistant professor at Wooster in 2006 with responsibility for research and Extension in diseases of field crops. Paul's research and Extension programs deal with the epidemiology and management of diseases of field crops, primarily wheat and corn. His primary focus has been Fusarium head blight of wheat (FHB, caused by *Fusarium graminearum)*, the most economically important disease of cereal crops in the U.S. since the stem rust epidemics of the 1950s. Paul has been a leading member of several national teams of researchers studying FHB and the associated DON toxin produced by the pathogen. He has coordinated national efforts to develop integrated management programs for FHB, and through collaborations with the wheat breeder at OSU, has contributed to the release of multiple soft red winter wheat cultivars with moderate resistance to FHB. He takes leadership for Extension and outreach activities in corn and wheat pathology, providing Ohio's producers, county Extension educators, crop consultants, and agricultural industry with research-based management recommendations. Based on his applied research, he develops economically sound integrated management recommendations for corn and wheat diseases. He works closely with members of OSUE's Agronomic Crops Extension teams to provide clientele with up-to-date information by way of Extension publications, trade journal articles, technical reports, in-service training sessions, workshops, seminars, and electronic newsletter articles. Through on-site visits, telephone conversations, email messages, and laboratory processing of samples, he contributes to the diagnosis of plant health-related problems in corn and wheat. A major part of his Extension focus has been to help wheat growers and millers evaluate the risk of FHB development and mycotoxin accumulation in wheat through a weather-driven, web-based forecasting and alert system. A major outcome of his Extension-outreach program has been the successful generation, synthesis, and dissemination of multi-state information to stakeholders pertaining to timing, efficacy, and economics of fungicides for disease management in wheat and corn.

Plant Pathology Department

Pierce Paul showing wheat disease specimen to students

Francesca Peduto Hand was appointed assistant professor at Columbus in 2013, with responsibility for research, Extension, and teaching in both turf and ornamental crop diseases. Hand uses conventional and molecular techniques, combined with greenhouse and field studies, to investigate disease epidemiology, biology and ecology of plant pathogens in an effort to improve disease control strategies in economically important crops. The overarching objective of her program at OSU is the development of plant health management strategies that will effectively address disease problems faced by Ohio floriculture, nursery, and turf industries. Her Extension responsibilities entail providing Ohio's horticultural growers, county Extension educators, crop consultants, and various professionals in the green industry with research-based information on the etiology and management of diseases of turfgrass and ornamental crops. Through on-site visits, telephone conversations, email messages, and laboratory processing of submitted samples, she also contributes to the diagnosis of plant health-related problems in turfgrass and ornamental crops.

Terry L. Niblack was appointed professor and chairperson of the Department of Plant Pathology in 2011, located on the Columbus campus. Her research and Extension programs have focused on root-pathogenic nematodes, primarily the soybean cyst nematode, *Heterodera glycines*. She began this work

while at the University of Illinois, as this new disease spread throughout the major soybean production regions of the U.S. Her work, both at Illinois and since coming to Ohio State, has contributed greatly to the support of Extension programs for Midwestern soybean producers and their support industries. In this department, she has continued collaborative research and Extension activities with colleagues in Ohio and throughout the Midwest on the biology and distribution of the soybean cyst nematode.

Sidebar 5

The Plant and Pest Diagnostic Clinic

Extension plant pathologists **Robert Partyka** and **Blair Janson** saw the need for an organized plant disease clinic and, in 1963, established a part-time clinic, with Partyka taking the lead. The Clinic operated this way until 1970 with as much time as the Extension plant pathologists could spare. Soon after establishment of the Department of Plant Pathology in 1967, the Plant Disease Clinic was given increased visibility in 1970 by the appointment of **C. Wayne Ellett** as Clinic director and supervisor. He was given a 25% Extension appointment, resulting in the Clinic becoming a recognized part of the Extension plant pathology program.

OARDC

Wayne Ellett examining plant specimen in the Plant Disease Clinic, 1974

Need for the Clinic grew out of the inability of the Extension pathologists to adequately respond to the many diagnostic requests because of numerous other responsibilities. Traditional procedures—visual, microscopic, and cultural—were used in diagnosing submitted samples. As their schedules permitted, the Extension plant pathologists continued to examine and diagnose samples. Plant pathology faculty in research and resident instruction also were very helpful when consulted on problems of crops in their specialty areas.

In addition to diagnostics, the Clinic also provided excellent training for graduate students, and soon a graduate student assistantship was added from Extension funds. This provided much-needed assistance, especially during the growing season when up to 60 samples would be received daily and as many as 900 monthly. The number of specimens received by the Clinic during the 10-year period (1970–80) varied from 2,200 in 1970 to 4,540 in 1973. Samples of insect problems were referred to Extension entomologists, and a few specimens were sent to the Departments of Agronomy and Horticulture. In several instances, research on problems diagnosed in the Clinic resulted in papers published in the research journals *Plant Disease Reporter* or *Plant Disease*, with the graduate student involved as co-author. From 1971 to 1981, many diseases were reported in Ohio for the first time. In some instances these reports alerted research faculty to problems requiring further investigation.

OARDC

R. Mack Riedel examining plant specimen for disease, 1983

Following Ellett's retirement in 1981, **Richard M. Riedel** became Clinic supervisor. This coincided with the move of the Department of Plant Pathology to new quarters in Kottman Hall, when it was a new building on the Columbus agricultural campus. Riedel's primary responsibility, since his appointment to the plant pathology faculty in 1970, had been teaching and research in the area of nematology. Under his leadership, the Clinic continued to provide commercial growers and homeowners with timely diagnosis and understanding of disease problems.

In 1985, it was decided to give the Plant Disease Clinic increased visibility and support through establishment of a multidisciplinary Plant and Pest Diagnostic Clinic (PPDC). A faculty member was placed as director of the new Clinic and **Stephen T. Nameth** was hired for this position. The primary purpose of the PPDC was to integrate into one centralized facility the diagnostic expertise of five disciplines in the College of Agriculture, including agronomy, entomology, horticulture, plant pathology, and the School of Natural Resources. This allowed for cross-disciplinary examination of plant problems not easily diagnosed by individual specialists. Faculty in all of the participating areas assisted in diagnoses when needed. In 1986, **Nancy J. Taylor** was appointed research assistant in plant pathology and full-time diagnostician in the PPDC. The departments of entomology, horticulture, and agronomy appointed technical staff for varying periods of time to serve as clinicians to handle specimens in their areas. By 1987,

OARDC

Left-to-right, Julie (Neal) Steele, Steve Nameth, Nancy Taylor in floriculture greenhouse, 1986

the PPDC was processing over 4,000 samples annually. Beginning in 1988, a nominal charge per sample was established, which resulted in a drop in the number of samples received to about 2,500 annually by the early 1990s.

When Nameth was appointed to the plant pathology faculty, his responsibilities included the overall supervision of the PPDC and the development and incorporation of diagnostic biotechnology procedures into Clinic operations. By 1990, new procedures were being used in addition to traditional diagnostic procedures. These included a dsRNA analysis technique for virus identification, immunoassays (ELISA), and fatty acid analysis. Some traditional diagnostic procedures were also improved with the help of other department research faculty. The PPDC continued as an excellent opportunity for graduate students and others to become acquainted with plant disease diagnostic techniques. Several graduate students chose thesis research topics for advanced degrees based on problems associated with or first diagnosed in

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Nancy Taylor showing graduate students diseased pumpkin, PPDC, 2008

the Clinic. The PPDC also hosted visiting students and scientists from other states and countries for varying periods of time to observe Clinic operations and become familiar with diagnostic techniques. Often, samples sent to the PPDC resulted in new disease reports for Ohio and sometimes the first reports of a pathogen in the state. At least one fungus was described and named as a new species as a result of diagnostics in the Clinic.

Plant Pathology Department

Joe Rimelspach examining diseased turf samples, PPDC, 2008

Because of the increasing number of commercial turfgrass samples coming to the Clinic, **Joseph W. Rimelspach** was hired as Extension associate in 1992, with major responsibility for turfgrass disease diagnostics. He works through the PPDC, identifying turfgrass problems, and providing support for county Extension offices as they deal with turfgrass disease management issues. Nameth left his position as PPDC director in 1993 and took responsibilities as Extension specialist in floral and nursery crops diseases and for research on virus-caused diseases of ornamentals. Nancy Taylor was appointed PPDC director in 1994. In early 1996, the PPDC was renamed the **C. Wayne Ellett Plant and Pest Diagnostic Clinic** in honor of Ellett's many contributions to the Clinic and to the University.

The C. Wayne Ellett Plant and Pest Diagnostic Clinic's operation as a multidisciplinary unit celebrated its 30th year in 2015. Its primary focus remains the identification and diagnosis of plant disease and insect problems and environmentally induced cultural problems in both agronomic and horticultural situations. Sample numbers continue to vary from year to year. During 2006–2010, the average number of samples processed was 1,315. In 2006–2007, the

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Nancy Taylor, PPDC director, at microscope, Columbus, 2008

Past and current directors of the Plant and Pest Diagnostic Clinic at ceremony naming the PPDC for Wayne Ellett, 1996. Left-to-right: C. Wayne Ellett, Mack Riedel, Steve Nameth, Nancy Taylor

Clinic cooperated in the soybean rust sentinel plot program and processed 608 samples for that program. Also in 2006–2007, the Clinic partnered with the Ohio Department of Agriculture to process 804 samples for sudden oak death detection. The Clinic continues to charge a fee for its diagnostic services, which varies depending on the procedures required. In the past 10 years, concurrent with declining Extension budgets, the Clinic experienced a steady decline in personnel support from the various departments participating in the program. From a high of three diagnosticians with Clinical assignments (plant pathology, entomology, and horticulture/agronomy) and an office associate, the Clinic is now staffed by the Clinic director, Nancy J. Taylor, who works within the Department of Plant Pathology and across departmental lines to accomplish the mission. The turfgrass disease diagnostic program is managed wholly by Joe Rimelspach with some support from Taylor. The Clinic's entomology program is now being coordinated by faculty in the Department of Entomology.

The Clinic is a participant in the National Plant Diagnostic Network (NPDN), and has used funding from that source to improve its infrastructure and to support diagnostic staff. NPDN funding has supported an entomology intern during the summer. The Clinic is also a partner in the Ohio Plant Diagnostic Network (OPDN). The OPDN mission is to facilitate the protection of Ohio's plant-based agricultural and natural plant systems through a multi-institutional consortium engaged in the detection and diagnosis of and surveillance for plant-related problems and threats, in support of coordinated response and recovery efforts, and in the development of education and outreach programs in support of this mission. The OPDN concept first emerged when the C. Wayne Ellett Plant and Pest Diagnostic Clinic adopted the Plant Diagnostic Information System as its data management system which enabled coordination of sample data among multiple locations. It expanded when Dr. Sally Miller obtained funding to support diagnostic stations at OARDC's Muck Crops and North Central Agricultural Research Stations and

Dr. Anne Dorrance coordinated establishment of a similar diagnostic station at the Western Agricultural Research station. In addition, diagnostic laboratories at OSU's Columbus and Wooster campuses serve as diagnostic stations.

In 2009 a major programmatic change was undertaken with the formal implementation of the Ohio Plant Diagnostic Network. The OPDN now involves diagnostic laboratories associated with The Ohio State University (OSU) and the Ohio Department of Agriculture (ODA). The C. Wayne Ellett Plant and Pest Diagnostic Clinic (OSU) is now co-located in the ODA Plant Health Laboratory in Reynoldsburg, Ohio. The 3,000 square foot laboratory space provides the Clinic with ample space to move forward in its efforts to adopt and implement newer diagnostic protocols and programs. By co-locating these diagnostic programs, the ODPN's co-directors (Nancy J. Taylor, OSU, and David McCann, ODA) can access additional revenue streams unavailable to each laboratory individually. One benefit of the co-location has been joint support of a research assistant who provides technical assistance to both laboratory programs. While the two diagnostic programs are co-located, program missions remain unique and each program maintains separate data and reporting systems. At the same time, OSU's Clinic maintains diagnostic space on the Columbus campus with an emphasis on turfgrass diagnostics, led by Joe Rimelpsach.

Chapter 12

Leadership in International Programs by OSU Plant Pathology Faculty

OSU plant pathologists have a long history of international research, teaching and capacity building, beginning very early with the exploits of Professor Kellerman in Guatemala in the early 20th century.

International Exploration

As chairperson of the OSU Botany Department, **William A. Kellerman** was well known as a highly enthusiastic and energetic scientist. After his untimely death in 1908, while on an expedition in Guatemala, one of his many students, J. R. Taylor, wrote, "… it is hardly more than literal fact to say that he fairly danced and sang over his microscopes." While he lectured in botany and was the author of two botany textbooks, he was a mycologist at heart, and his enthusiasm for both fields was manifest in his early interest in, and contributions to, the field of plant pathology. He organized and taught the first plant pathology courses at Ohio State. According to his students R. F. Griggs, F. L. Landacre and J. C. Hambleton, Kellerman was known for "his love of nature and passion for study and collection in the field." Between 1905 and 1908, he conducted four winter expeditions to Guatemala to collect fungi and plant specimens. He provided details about these expeditions in the *Journal of Mycology* and the *Mycological Bulletin*, for which he served as editor for many years. His entries were written in a comfortable, yet detailed, style that is similar to, but predates by a century, the blogs that are common today. He described Guatemala as "a country where nature is kind, where birds sing and flowers blow, a land of sunshine and gladness, where it is summer all winter!" Kellerman collected thousands of fungal specimens, of which at least 455 were catalogued. He crossed the country from Port Barrios on the Gulf of Honduras to San Jose on the Pacific coast. Travel was very difficult then, moving by train, mule and on foot. His expeditions worked through a wide variety of terrains from which samples were collected, including the volcanoes Agua, Atitlán, and Santa Maria. Fifty-two species of Guatemalan fungi were described in the M. A. thesis of Kellerman's student Opal I. Tillman, based on material collected in the 1905 and 1906 expeditions. Kellerman named several new species, and described others in the genera *Melampsora, Puccinia, Ustilago* and others, for the first time in the region. In 1907, he obtained authorization from OSU to institute the Tropical School of Botany, attached to the

Taxon • used with permission

William Kellerman examining fungi near Lake Atitlan, Guatemala, 1908

Department of Botany. He selected three students to accompany him on the 1908 Guatemala expedition. Unfortunately, nearing the end of this expedition, Kellerman became ill with "a tropical fever" and died in Zapaca, where he was buried. In the absence of his leadership, the Tropical School of Botany, proposed to be the first of its kind in the U.S., never developed. Nearly a century would pass until department efforts in Guatemala would start again (see International Development).

Robert F. Griggs was an early member of the faculty of the OSU Department of Botany, joining in 1906 as an assistant professor, the same year that Freda Detmers joined the department as an instructor. He was a student of William Kellerman (see OSU Botany Field Trip photo on page 8), and earned a B.S. in botany from OSU in 1903, followed by a M.A. from the University of Minnesota in 1906, and a Ph.D. in botany from Harvard University in 1911. Following Kellerman's death, he taught several plant pathology courses in the OSU Botany Department. He began exploring early in his career, having traveled to Guatemala and Puerto Rico on botanical collecting trips prior to 1902. He made his first expedition to Alaska, then a U.S. Territory, in 1913, following the explosion of the Katmai volcano in 1912, the largest eruption of the 20th century. He led subsequent field expeditions to Katmai between 1915 and 1919, spending at least one quarter of each year in Alaska. During his 1916 expedition, he and his team discovered the Valley of Ten Thousand Smokes, a large area of volcanic smoke and steam vents. He published an account of the Alaskan Katmai region in *National Geographic Magazine* in 1918, and the book, *Valley of Ten Thousand Smokes* in 1922. As an early conservationist, he led a national effort advocating that the 1,700 square mile Katmai region be made a national park, noting the similarities to Yellowstone Park. The area was designated the Katmai National Monument in 1918. The monument grew in size over the years and eventually became Katmai National Park in 1980. In 1959, in recognition of Griggs' pioneering activities in the region, the second highest peak in Katmai National Park, overlooking the Valley of Ten Thousand Smokes, was renamed Mt. Griggs. His remains, along with those of his wife and son, are buried on the peak.


National Park Service

Robert F. Griggs on Alaskan expedition (1916–1919)

During Griggs' tenure at OSU, the research reputation of OSU's Department of Botany was growing nationally and internationally as a result of his work and that of several other faculty members. However, in 1921 he resigned from the department following a dispute with his department chairperson over the amount of time spent on research away from campus. He joined the faculty of George Washington University in 1921, where he remained until 1947. He was a professor of field biology from 1947 until 1952 at the University of Pittsburgh, and finished his career as a field investigator for the National Park Service in Colorado in 1953. In addition to his early discoveries in Alaska, Griggs was known throughout his career as an important ecologist, interested in plant re-colonization of marginal areas. He was a founder of the Ecological Society of America, which was organized in 1914 in Columbus, and served as its president in 1944.

Between 1977 and 1979, **Raymond Louie** led a corn virus research program in the USDA/USAID Food Crops Research Project in Kenya at the Kenya Agricultural Research Institute in Mugugu. That program provided the Kenyan government with vital knowledge on the epidemiology of sugarcane mosaic virus (SCMV) in Kenya and on the resistance in recently released hybrids and introduced germplasm. Louie first conducted an extensive survey of maize-growing regions, collecting hundreds of samples of maize and weed species from 34 of 41 districts in Kenya. The

virus was found in 20 districts in the western plateaus, Central Highlands and Rift Valley. He also documented for the first time natural infection of SCMV in several grassy weeds. Later, in studies on resistance and yield loss in Kenyan maize, no Kenyan hybrids were found immune to SCMV, but several were found moderately tolerant, despite their susceptibility to infection.

Richard "Mack" Riedel served as a visiting scientist at the International Center for Tropical Agriculture (CIAT) in Palmira, Colombia from September to December 1978. During this period he conducted intensive surveys for parasitic nematodes in beans, maize, sugarcane, sorghum and other plant species. With colleagues from CIAT, Riedel collected over 200 soil samples from the Carimagua, El Limonar, La Selva, Palmira, Pasto, Popayán, Potosí, Restrepo, Río Negro, Santander de Quilichao, Tenerife, and Providencia regions. He found abundant and widespread root knot nematodes reducing yields in beans. The nematode species varied by location and environment: *Meloidogyne hapla* in the higher elevations, *M. incognita* and *M. arenaria* in warmer regions, and *M. javanica* in very warm production areas. Root-lesion nematode, *Pratylenchus* spp., was also found, as were several other nematode species. Riedel used these findings to suggest directions for research programs to mitigate the effects of *Meloidogyne* and *Pratylenchus* in bean and other crop production systems in the tropics.

From 1978 through 1984, **Lowell R. "Skip" Nault**, a member of the OARDC-USDA/ARS Maize Virus Research Team, worked with plant pathologist Jaime Castillo from the National Agricultural University, La Molina, Peru, to survey the principal maize growing regions in Peru for arthropod-transmitted viruses and mollicutes. They traveled through the coastal valleys between Lima and Barranca, the Andean valleys of Urubamba and Calca, a high tropical valley near Tarapato, and Callejon de Huaylas, a mountain valley between Malpaso and Caraz. The Maize Virus Research Team confirmed corn stunt spiroplasma, maize bushy stunt mycoplasma (now phytoplasma), maize rayado fino virus, maize mosaic virus, maize stripe virus, maize dwarf mosaic virus strain A, and maize chlorotic mottle virus in samples brought back to Wooster. Their vectors were also identified, including those causing major diseases in Peru, an accomplishment unrealized in other Latin American countries at that time. Nault later assisted in the discovery and identification of insect-borne maize pathogens and their vectors in Mexico, Costa Rica, Argentina, Colombia, and Brazil. Other members of the Maize Virus Research Team, Ray Louie, Roy E. Gingery, and Donald T. Gordon, traveled to China in 1991 to survey for maize viruses and develop cooperative research for their control.

August F. "Fritz" Schmitthenner was invited to conduct a survey of soybeans for Phytophthora root rot in northeastern China in 1996. Although China is the botanical origin of soybeans, the disease was not considered important there, and had been first reported only in 1993. However, Schmitthenner found that Phytophthora root rot was widespread, occurring in about one-third of the fields he visited.

Sally A. Miller collaborated with Nenita Opina, University of the Philippines Los Baños (UPLB), to characterize the strain structure of *Ralstonia solanacearum* in Laguna, Pangasinan, Nueva Ecija, Batangas, and Quezon, major eggplant-producing provinces in the Philippines. More than 300 cultures were isolated and identified to biovar at UPLB, then sent to Miller's lab for molecular characterization. Miller, Melanie Lewis Ivey, then a research associate in the Miller lab, and Brian McSpadden Gardener fingerprinted the strains and noted correlations of clonal populations with geographic origin at the province level.

Working with the USAID Regional Integrated Pest Management Collaborative Research Support Program (IPM CRSP) in West Africa, Miller, Robert Gilbertson (University of California, Davis) and Michael Osei (CSIR-Crops Research Institute, Kumasi, Ghana) surveyed tomatoes for diseases in the Northern, Ashanti and Brong Afaho regions of western Ghana in 2012. They documented numerous viral, viroid, bacterial, and fungal diseases, including the first report of bacterial wilt caused by *Ralstonia solanacearum*. Molecular analyses of the strains showed that half were of Asian descent and half of African descent, an unusual finding indicating possible introductions of Asian strains into the region. Tomato apical stunt viroid and potato spindle tuber viroid were also reported for

the first time following testing of tomato samples with "rasta" symptoms collected during this survey.

Margaret G. Redinbaugh and **Lucy R. Stewart** began collaborating in 2012 with OSU faculty in the Department of Horticulture and Crop Science, and with scientists from the International Center for Maize and Wheat Improvement (CIMMYT) and the Kenya Agriculture and Livestock Research Organization (KALRO) to understand the epidemiology of maize lethal necrosis (MLN) in sub-Saharan East Africa. They identified maize chlorotic mottle virus (MCMV) and sugarcane mosaic virus (SCMV) as causal agents of the disease, and later demonstrated a role for Johnsongrass mosaic virus. Redinbaugh worked with CIMMYT and KALRO researchers to develop protocols for screening maize responses to MLN and identified lines with tolerance to MCMV and resistance to SCMV.

Margaret Redinbaugh in Kenya, 2016

Redinbaugh and Stewart led surveys of maize and associated cereals and weeds for MLN in Kenya and Uganda in 2013–2014 with scientists from Venganza, Inc., CIMMYT, the National Agricultural Research Organization (NARO: Uganda) and One Acre Fund, finding very high incidence of the causal viruses. These surveys demonstrated that the genome sequences of MCMV isolates did not vary much across East Africa or the world, however the East African SCMV isolates were highly diverse. Similar surveys carried out in Rwanda and Tanzania in collaboration with the Rwandan Agricultural Board, Sokoine University of Agriculture (SUA:Tanzania), and Selian Agricultural Research Institute (Tanzania), also indicated high rates of infection with MCMV and SCMV.

Sally Miller and graduate student Anna Testen (center) in Tanzania, 2014

S. Miller and her Ph.D. student Anna Testen surveyed the Morogoro region of Tanzania in 2014 for tomato diseases causing significant losses in yield and quality in collaboration with Delphina Mamiro and other SUA colleagues. Numerous common tomato diseases were catalogued, including early blight, late blight, bacterial wilt, bacterial spot, Tomato yellow leaf curl virus, and root knot nematode, as well as two tomato diseases not previously reported in Tanzania: pith necrosis, caused by *Pseudomonas cichorii*, and tomato big bud, caused by a phytoplasma.

Intercontinental Research

Faculty in the Department of Plant Pathology have been involved in several collaborative programs with Israeli colleagues through the U.S.–Israel Binational Agricultural Research and Development program. During the 1990s, R. C. Rowe and R. M. Riedel collaborated with Lea Tsror (Gilat Agricultural Research Center) and Daniel Orion (Volcani Center) studying the interactive roles of root-lesion nematode species *(Pratylenchus)*, and *Verticillium dahliae* in potato early dying disease. **David L. Coplin** collaborated with David Gutnick (Tel Aviv University) to study the genetics of extracellular polysaccharide production in *Pantoea stewarti*, and with Isaac Barash (Tel Aviv

University) and Shula Manulis (Volcani Center) to study the role of bacterial Hrp effectors as virulence factors in diseases caused by several *Pantoea* spp. **Harry A. J. Hoitink** and Fred Michel (OSU Department of Food, Agricultural and Biological Engineering) collaborated with Y. Hadar (Rehovot University) and Dror Minz (Volcani Center) to investigate microbial communities active in soil-induced systemic plant disease resistance.

Guo-Liang Wang was appointed adjunct professor in the Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China in 2011. In collaboration with Wende Liu and Yuese Ning, he focused on dissecting resistance pathways in rice against the fungal pathogen *Magnaporthe oryzae*. Wang advised M.S. and Ph.D. students and postdoctoral researchers in China on their experiments, and trained them on how to summarize results and write manuscripts. Several of the students and postdoctoral researchers also visited Dr. Wang's lab in Columbus to learn advanced techniques. This highly productive collaboration resulted in more than ten papers published in international journals and training of three M.S. and two Ph.D. students, and two postdoctoral fellows in five years. Wang was appointed adjunct professor at the Hunan Agricultural University in 2002, and was a FuRong Scholar there from 2004–2009.

M. Redinbaugh collaborated from 2004–2010 with OSU faculty in the departments of Horticulture and Crop Science and Entomology, and with scientists in the Institute for Plant Protection and Environment (Serbia) and CABI to manage maize redness (MR) disease, which caused 40–90% losses in the Serbian South Banat Region in 2000–2003. They identified the pathogen as stolbur phytoplasma, and the cixiid planthopper, *Reptalus panzer,* as the vector. The disease cycle was determined and plant reservoirs were identified. The team determined that hybrids commonly used by producers in the region were all highly susceptible to losses from MR. Results indicated that the maize–wheat rotation commonly used in the region exacerbated the disease problem, and the team suggested potential management strategies including alternative rotations and seed treatments for wheat and maize crops.

Brian McSpadden Gardener worked in residence for eight months between 2009 and 2011 as a Visiting Professor and World Class University (WCU) Scholar in Gwangju, South Korea. He connected students, researchers, and companies on both sides of the Pacific who were interested in learning what it takes to successfully develop and apply biological controls for plant diseases. Working with collaborating laboratories of Young Cheol Kim and Hunseung Kang of Chonnam National University, he helped identify diverse plant-associated bacteria with biopesticidal potential and guided the genomic analyses of four different biocontrol strains. Furthermore, he assisted with the metabolomic analyses that led to the identification of a novel antifungal agent, began characterizing the effects of such agents on plant physiology at the cellular and whole plant levels, and catalyzed the initial work to determine the activities and commercial potential of such agents as biopesticides. McSpadden Gardener made significant contributions to the graduate education of students in the cooperating labs. He taught *Biological Control of Plant Diseases* (2009), *Quantitative Methods in Applied Biology* (2010), and *Phytobacteriology* (2011), courses developed to meet both OSU's departmental needs and to support the WCU project. Approximately half of the content was delivered via the internet after he had returned to Ohio. Content was focused on issues topical to both Korean and Ohio agriculture. McSpadden Gardener also developed and distributed materials detailing how to critically read manuscripts and write research papers more efficiently.

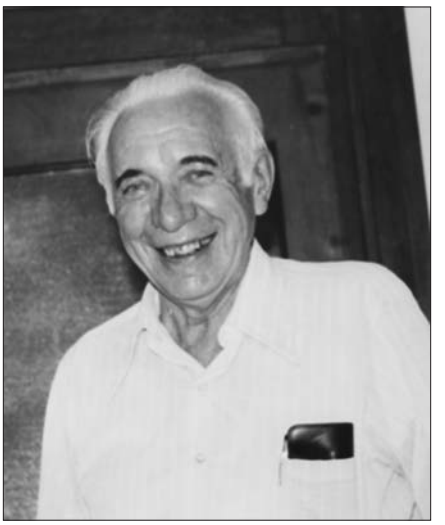
In 2011, McSpadden Gardener began collaborating with Richard Dick, OSU School of Environment and Natural Resources, to examine the contributions of rhizosphere microorganisms to productivity enhancements provided to millet by a co–cultivated perennial shrub in the Sahel region of Senegal. McSpadden Gardener supervised graduate student Spencer Debenport, who conducted research for two years in Senegal. The work represented one of the earliest metagenomic studies of plant microbiomes, particularly in Africa. Results suggested that intercropping with this shrub can promote recruitment of beneficial microbes to the millet root zone and potentially improve yield of this subsistence crop. During the summer of 2012, McSpadden Gardener also co-taught a short-course in tropical microbial ecology, focusing on methods and data analysis.

Laurence V. Madden collaborated with leading epidemiologists in several international research projects, including: 1) Quantification of the spatial component of plant disease epidemics, development of new indices of spatial patterns, and effects of spatial aggregation on disease development, sampling, and prediction, with Gareth Hughes of the University of Edinburgh (Scotland) and Xiangming Xu of Malling Research (East Malling, U.K.); 2) Development of risk assessment models for decision making in plant disease epidemiology and management, with Neil McRoberts of the Scottish Agricultural College (Edinburgh, Scotland; later with University of California, Davis), and Gareth Hughes; 3) Theoretical assessment of pathogen transmission characteristics and virus-vector and virus-plant interactions on the epidemics of plant diseases, with Mike Jeger of Imperial College (London, U.K.) and Frank van den Bosch of Rothamsted Research, (Harpenden, U.K.); and 4) Determination of the basic reproduction number for heterogeneous and complex plant disease epidemics, with Frank van den Bosch and Mike Jeger. Madden was the Fisher Lecturer at Rothamsted Research, England, and was awarded the Jakob Eriksson Prize and Gold Medal from the Swedish Academy of Science in 2008.

International Development

Clyde C. Allison was one of the most active participants in international development programs among Ohio State plant pathology faculty. Among the 45 Ph.D. and 50 M.S. students he advised and supervised during his career, many were international students. Allison focused the latter part of his career on international plant pathology, contributing his expertise to improving teaching, research, and Extension programs in several countries. He held a Fulbright Lectureship for eight months at the University of Rhodesia in 1960. On his return trip he stopped in India, visited several colleagues, and presented seminars. In 1966, he consulted with Indian plant pathologists at Banaras Hindu University and Punjab Agricultural University. He also participated in technical and scientific missions in Germany, South Africa, Thailand, Japan, and the U.K.

Allison was a key participant in a USAID program that connected the OSU College of Agriculture with the Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ) of the University of São Paulo (USP) in Piracicaba, Brazil. Program objectives were to improve and coordinate teaching, research and Extension programs in ESALQ, and to develop a graduate program at both M.S. and doctoral levels. During this period, and with the assistance of Allison and other OSU faculty, ESALQ adopted the North American model of graduate training with a disciplinary focus. Several OSU faculty took short- and long-term assignments to participate in this program. From 1964 to 1969, Allison was in residence in Piracicaba and was instrumental in developing their graduate program in plant pathology. Always an enthusiastic teacher, Extension specialist and advisor, he mastered the Portuguese language early in his assignment, which allowed him to teach *Principles and Concepts of Plant Pathology* in Portuguese. According to retired ESALQ/USP professor Elke Cardoso, who knew Allison when he was in Brazil and then obtained her doctoral degree in plant pathology at Ohio State in 1971, Allison had a very peculiar way of teaching. He formulated rhetorical questions and then let the students formulate their own answers without offering a direct response. To students, this was an engaging and innovative approach that emphasized the learning process, leading them to dub the course "philosophical plant pathology". L. E. Williams and A. F. Schmitthenner, emeritus faculty in OSU Plant Pathology, had similar memories of Allison's teaching techniques when they were OSU graduate students (see Sidebar 2)



C. C. Allison at the University of São Paulo, Piracicaba, Brazil 1964–69

Correspondence in 2016 between S. Miller and Professor Luis Camargo, Department of Plant Pathology

and Nematology, ESALQ/USP, and his discussions with others there, confirmed the considerable influence that Allison had during the five years he was in Brazil. He established a seminar series, originally intended for graduate students, which also brought together plant pathologists from ESALQ, the Agronomical Institute and the Biological Institute. These seminars were very popular, even though they were offered on Saturday mornings. Over time, they inspired the beginnings of a phytopathological society in the State of São Paulo named Grupo Paulista de Fitopatologia. Allison worked behind the scenes during this process. The society then began publishing a journal, *Summa Phytopathologica*, which remains active today. Allison's actions also inspired formation of the Brazilian Society of Phytopathology in 1966. He served as a councillor of the society for several years and was elected an honorary member for his assistance in its foundation. He also proposed and promoted publication of the *Manual de Fitopatologia* (600 pages) by the faculty of the Department of Plant Pathology, USP. A tribute to him, written by Ferdinanda Galli, appears in Volume I of the Society's journal, *Summa Phytopathologica*.

For more than 20 years, the Ohio State Department of Plant Pathology has contributed to the USAID Feed the Future IPM Innovation Laboratory (IPM IL; formerly IPM CRSP), a global development program to enhance IPM practices among smallholder horticultural crop growers and to improve economic and environmental sustainability in agricultural systems. To date, the IPM IL has engaged in five 5-year project phases, all managed by Virginia Polytechnic Institute (VPI) with multi-disciplinary, multi-institutional collaborations.

In the first two phases (1993–2004), S. Miller participated as a co-P.I. in the Philippines and Bangladesh sites, and then served as chairperson for the Philippines site (1998–2006). She collaborated with entomologist Edwin Rajotte (Pennsylvannia State University), economist George Norton (VPI), and many scientists and students from the Philippines Rice Research Institute, UPLB, Central Luzon State University, Leyte State University, the International Rice Research Institute (IRRI), the Asian Vegetable Research and Development Center (AVRDC), and the Bangladesh Agricultural Research Institute (BARI). Miller's emphasis in the Philippines was on management of the rice root knot nematode, pink rot, anthracnose and bulb rot in onions, and bacterial wilt in eggplant. The IPM CRSP Team received the Philippines Department of Agriculture Bureau of Agricultural Research Director's Award in 2001 to recognize the outcomes of this collaborative research. In Bangladesh, research focused on bacterial wilt, root knot nematode, and soilborne fungal pathogens of eggplant. The Miller lab also contributed to the IPM CRSP project in East Africa led by Mark Erbaugh, OSU Office of International Programs in Agriculture. She and **Melanie L. Ivey** worked with David Geiser (Pennsylvannia State University) and Georgina Hakiza (Coffee Research Institute, Uganda) to confirm the molecular phylogenetics of the causal agent of coffee wilt, *Gibberella xylarioides*. In 2002, Miller received the APS International Service Award, based primarily on her work in Asia. **Michael A. Ellis** was a co-P.I. for the Ecuador site from 1998–2005. He cooperated with Ecuadorian scientists on disease management methods for Fusarium wilt, root rot, and seed piece decay of babaco (native fruit of Ecuador), vascular wilt of naranjilla, black sigatoka of plantain, vascular wilt of highland papaya, and potato late blight.

The IPM CRSP expanded regionally in the third and fourth phases (2005–2014). In the East Africa program (Uganda, Kenya, Tanzania) led by Ohio State, M. Redinbaugh collaborated with colleagues at Makerere University to characterize the potyvirus associated with passion fruit woodiness disease, an economic constraint to passion fruit production in Uganda. She also provided training in molecular virology in her lab. Miller participated in the South Asia (India, Bangladesh, Nepal), West Africa (Mali, Senegal, Ghana), and East Africa programs, and directed the International Plant Diagnostic Network (IPDN) in four regions. Research objectives included management of bacterial wilt and root knot nematode in tomato and eggplant using resistant cultivars and grafting desirable scions onto disease-resistant rootstocks, understanding the biology of the bacterial wilt pathogen, *Ralstonia solanacearum*, and biological control of soilborne diseases. The IPDN was modeled after the National Plant Diagnostic Network hub-and-spoke system. Hub labs in Guatemala, Kenya, Nigeria and, India coordinated regional research and training efforts in 12

countries. The chief goal of the global IPDN program was to improve plant disease and insect pest diagnostics at the clinical level. Miller organized and/or conducted 14 intensive 2–5 day-long plant disease and insect pest diagnostic workshops in Benin, Mali, Ghana, Uganda, Kenya, Tanzania, Indonesia, Kyrgyzstan, Guatemala, and Senegal, training more than 400 international plant protection professionals and students in classical and modern diagnostic technologies. The IPM CRSP team was the 2009 recipient of the International IPM Excellence Award given by the International IPM Symposium. The Bangladesh program of the South Asia project was awarded the Ryutaro Hashimoto Asia-Pacific Forum for Environment and Development silver medal in 2008 and it was one of three finalists for the Ashoka Change Makers 24th Collaborative Competition in 2009. Miller was awarded the Gamma Sigma Delta International Award of Merit in 2007.

The fifth phase of the IPM IL began in 2015, with programs in East Africa, South and Southeast Asia, and South America. Miller is co-PI on two projects: Vegetable Crops and Mango IPM in Asia, led by VPI beginning in 2015, and Vegetable Crops IPM in East Africa, led by Ohio State since 2016. Miller's work is focused on developing and incorporating disease management approaches into IPM packages for major vegetable crops, building on progress in the previous IPM IL programs in Nepal and Bangladesh, and extending the technologies to Cambodia. Similarly, emphasis in East Africa is on extending previously developed technologies and developing new approaches for disease management in vegetables in commercial fields and home gardens in Ethiopia, Kenya, and Tanzania.

The Pest and Pesticide Management Program began in 1997 as a USAID training program for Ukrainian collective farm managers and private farmers in four regions of Ukraine. Miller participated in a two-week training program, presenting lectures and leading discussion on disease management in D'nepropetrovsk oblast, in southeastern Ukraine. A follow-up research program was initiated in 1997 and continued until 1999, in which Miller and **Patrick E. Lipps** cooperated with Ukrainian scientists from D'nepropetrovsk Agrarian University and the Grain Institute on development of management strategies for tomato and wheat diseases. This work culminated in the publication of full color bulletins, in Ukrainian, on tomato and wheat disease management.

Between 2004 and 2008, M. Ellis and Roger Williams, OSU Department of Entomology, participated in a pest management project to develop research capabilities with the faculty of EARTH University in Costa Rica. Ellis and Williams developed IPM programs for important insect pests and diseases on banana and pineapple.

In 2005, Miller traveled to Egypt where she worked with Egyptian scientists, Extension personnel and farmers to assess vegetable disease problems and make management recommendations, with special emphasis on white rot *(Sclerotium cepivorum)* of onion and garlic, an emerging disease. In attempts to improve soil fertility, farmers had moved soil from onion and garlic production areas on the banks of the Nile River inland, introducing *S. cepivorum* at the same time. Botrytis neck rot, downy mildew, and purple blotch were endemic, but also caused serious losses. Miller presented three workshops on vegetable disease management and diagnostics, shared fact sheets and other management materials, and provided advice to Egyptian scientists on proposal preparation and program management.

In 2007 and 2008, several OSU Plant Pathology faculty and staff (Miller, Ellis, **Michael J. Boehm** and **Sarah Ellis**) worked with OSU's Office of International Programs in Agriculture to conduct a faculty exchange program. The purpose was to develop graduate and undergraduate curricula related to sanitary/phytosanitary issues in trade of agricultural and horticultural crops, including specialized courses in plant disease diagnosis and management. Five faculty members of crop protection departments in Ghana, Senegal, Swaziland, and Nigeria collaborated with members of our department during their stays at OSU. After the exchange programs were completed, new collaborations were generated with Nigeria, Senegal, and Ghana.

The Department of Plant Pathology, in cooperation with the OSU Department of Entomology, has conducted the OSU International Diagnostics Short Course: *Pest and Disease Diagnostics for International Trade and Food Security* annually since 2007. Through 2016, more than 80 plant pathologists and entomologists, primarily from developing countries, have been trained in advanced diagnostics. The two-

week intensive course, led by Miller and Luis Cañas, OSU Department of Entomology, provides intensive training in classical and modern plant disease and insect pest diagnostics, data management, networking, and sanitary/phytosanitary issues that affect international trade. Other faculty and staff from Plant Pathology (M. Redinbaugh, L. Stewart, **Pierluigi (Enrico) Bonello**, **Tea Meulia**, **Christopher G. Taylor**, **Pierce A. Paul**, and **Nancy J. Taylor**) and Entomology (Andy Michel and Hans Klompen) have contributed lecture and lab material to support this training.

Pierce Paul teaching plant disease diagnostics workshop, Selby Hall, Wooster, 2009

S. Miller directed an "Immediate Impact Project" under the USAID Horticulture CRSP in Nigeria, in cooperation with Kenneth Shenge, Ahmadu Bello University. This 18-month project, which began in 2010, assessed plant disease and food safety issues pre- and post-harvest in Nigerian fresh market tomatoes. The study showed that both on-farm and market sources of coliform bacteria contributed to tomato contamination. Jeff Lejeune, OSU Food Animal Health Research Program, and M. Erbaugh, OSU Office of International Programs in Agriculture, were project collaborators.

From 2013 to 2017, G-L. Wang and **Thomas K. Mitchell**, in collaboration with Nicholas Talbot (University of Exeter, U.K., used a combination of next-generation DNA sequencing and genome-wide association studies to carry out genotypic and phenotypic diversity research on the rice blast pathogen, *Magnaporthe oryzae*, in Africa. Target countries were Kenya, Uganda, and Burkina Faso, where rice blast was a major disease constraint that significantly impacted grain yields. The ultimate goal of this project was to develop a strategic and efficient method to breed for improved disease resistance based on pathogen diversity and availability of host resistance genes. The project brought together leading international scientists from the rice blast research community with complementary expertise in pathogen biology and genomics, rice blast resistance genetics and breeding, and local expertise in rice blast resistance deployment and rice breeding.

Guo-Liang Wang in Tanzania, 2015

Several Plant Pathology faculty members participated in the USAID Innovative Agricultural Research Initiative (iAGRI) program. iAGRI's goal was to improve food security and agricultural productivity in Tanzania through advanced degree training, collaborative research, and human and institutional capacity development initiatives in partnership with five U.S. universities, SUA, and the Tanzania Ministry of Agriculture, Food Security and Cooperatives (MAFSC). G-L. Wang and T. Mitchell trained an OSU doctoral student from MAFSC, who conducted research in Ohio and four African countries on rice blast resistance and *Magnaporthe oryzae* diversity. L. Stewart and M. Redinbaugh supervised an OSU Ph.D. student from SUA whose research focused on maize viruses. S. Miller and B. McSpadden Gardener collaborated with David Francis (OSU Department of Horticulture and Crop Science), Steven Culman (OSU School of Environment and Natural Resources), Delphina Mamiro and Hosea Mtui (SUA), and Ernest

Mbega (Tanzanian Ministry of Agriculture) on a project to improve soil health and tomato germplasm in Tanzania. **Anna Testen**, an OSU doctoral student with S. Miller, conducted the research in Tanzania in 2014, which included introduction and evaluation of a low cost soil test kit and soil health cards, participatory tomato variety evaluation and selection, and an ethnophytopathological analysis of farmers' knowledge of plant diseases and their management.

In 2014, R. Rowe began a USAID/FAS project dealing with potato disease identification and management in Guatemala. Working with two Guatemalan plant pathologists, they visited several potato production areas and talked with growers who farm small fields in the highlands at 8,000–10,000 feet elevation. Potato production is critically important to over 160,000 indigenous growers in Guatemala, since potatoes are both their primary cash crop and a dietary staple. He found that late blight and Rhizoctonia stem canker were very significant production issues. In addition, due to the very limited availability of high-quality certified seed potatoes, smallholders often use their own potatoes as seed for the next crop, resulting in high levels of virus infection. Working with his Guatemalan colleagues, Rowe developed a set of Spanish language, plastic-coated cards with photos for field use to assist growers and field technicians to identify and manage important potato diseases. During three trips to Guatemala and one to Honduras in 2014–2016, he and colleagues presented several two-day workshops on potato disease identification, biology, and management, covering topics in both a lecture format and then in the field. Going forward, the project will focus on helping to develop a certified seed potato program in Guatemala. In this phase, a second set of informational cards will be developed on principals of quality seed potato production, storage, and use. Workshops will be presented on these topics at several locations in the Guatemalan highlands.

M. Ellis participated in a USAID project in The Republic of Georgia in 2015, where he developed training materials on the production and pest management of fruit and vegetable crops. PowerPoint presentations and Extension bulletins and fact sheets (both printed and electronic), were translated into the local language and used to support development of an Extension program, and for training Extension personnel on fruit and vegetable production and pest management. While there, Ellis presented four 2-day workshops at different locations across the country.

Randall Rowe teaching potato disease identification workshop in Guatemala, 2014

Chapter 13

Undergraduate and Graduate Education in Plant Pathology at The Ohio State University

Education of students in the discipline of plant pathology has a proud history at The Ohio State University, extending back over 125 years. Direct contributions to this educational effort by many faculty and staff over the decades have been profiled in other sections of this book. This chapter provides an overview of the changes in undergraduate and graduate curricula and programs in plant pathology, as they have evolved to the present day. It also recognizes key individuals who devoted much of their professional talents to teaching students about aspects of the discipline.

Curriculum and Courses in Plant Pathology

The Early Years in Botany

The beginnings of education in plant pathology at Ohio State took place in the Botany department. As the first botany courses were organized by **William R. Lazenby** in the early 1880s, diseases and disease-causing fungi were mentioned in courses on fruit culture. Rusts, mildews, and blights were covered in an early botany course. After **William A. Kellerman** came as chairperson of Botany in 1891, he developed the first course actually focused on plant pathology. First listed in the course catalog in 1891, *Botany 3: Special Botany* was taught all three terms, with the third term focusing on Vegetable Pathology. The course, taught by Kellerman, attracted 14–20 students in its first few years. In 1896, two courses in plant pathology were offered, *Botany 8: Economic Botany and Vegetable Pathology* and *Botany 64: Structure and Diseases of Timber*. By 1901, *Botany 8: Vegetable Pathology* was offered for five hour's credit, with three lectures per week, plus twice weekly laboratory and field work. In addition, a second course was offered, *Botany 11: Special Investigations in Economic Botany and Vegetable Pathology*. By 1903, 36 students were enrolled in *Vegetable Pathology*. This success was followed by two additional plant pathology courses, *Botany 18: Normal and Pathological Histology of Wood* and *Botany 19: Forest Ecology and Pathology*. By 1907, *Vegetable Pathology* was a required course for students in several majors.

OSU Archives

Early botany classroom at OSU, Columbus, 1900

William Kellerman was clearly the founder of the plant pathology curriculum at Ohio State. He established the discipline of plant pathology within the Department of Botany and taught all the early courses. Unfortunately, he died in 1908 while on a botanical collecting trip to Guatemala (see Chapter 12 for details). Following Kellerman's death, **Robert F. Griggs** took responsibility for instruction in plant pathology. In 1908, Griggs created and taught the first dedicated course, *Botany 8: Plant Pathology*. He

continued to teach that for several years, but then handed the bulk of teaching and advising in plant pathology to Wilmer Stover, when he was appointed to the faculty in 1912.

A Plant Pathology Curriculum Emerges

For 40 years, from his appointment in 1912 to his retirement in 1952, **Wilmer G. Stover** was extensively involved in teaching and in the training of undergraduate and graduate students in both plant pathology and mycology. Griggs continued to help with instruction until he left Ohio State in 1921. The Botany department moved to the new Botany and Zoology building in 1914, which provided considerably more space and improved teaching facilities. An expanded curriculum in plant pathology began to emerge, including two academic levels of *General Plant Pathology*, both taught by Stover, *Methods in Plant Pathology*, and *Research in Plant Pathology and Mycology*. By the early 1920s, courses in *Diseases of Fruit Crops, Diseases of Garden Crops*, and *Diseases of Farm Crops* were added.

OSU Archives

Botany classroom at OSU, Columbus, 1938—
note the changes from 1900 photo

From 1935 to 1939, **Benjamin H. Davis** shared teaching responsibilities with Stover. He helped teach introductory plant pathology and developed a special introductory plant pathology course designed for students of floriculture and ornamental horticulture. **Arthur L. Pierstorff** shared the teaching load with Stover from 1938 until his early death in 1947. **C. C. Allison** then joined the teaching program, just as many new students began to swell the campus rolls in the years following WWII. Over his 40 years of teaching, Stover's work brought plant pathology to a visibly strong aspect of training within the Department of Botany, and he followed in the role of Kellerman as a primary founder of the plant pathology curriculum at Ohio State.

Wayne Ellett showing student John Sage disease symptoms
on ornamental shrub, 1975

During the post-World War II years, plant pathology expanded at Ohio State as a major strength, and the department name was changed to Botany and Plant Pathology. Throughout the 1950s and early 1960s, Allison taught nearly all the plant pathology courses. **C. Wayne Ellett** joined the teaching program in the late 1940s and took major teaching roles from the late 1940s through the 1970s. Ellett's interests were in both plant pathology and mycology. Early in his career, he took primary responsibilities in the heavy teaching load of *General Botany*, but later he also taught courses in *Diseases of Field Crops* and *Diseases of Ornamental Crops*. **William D. Gray** joined the Botany department in 1947 as a mycologist. He taught mycology and industrial mycology until he left OSU in 1964. **Allen W. Troxel** joined the faculty in 1954 and introduced the first course in *Plant Virology*. **Glenn E. Smith** followed in 1957 and developed the first course in *Phytonematology*.

Majors and Curricula in the New Department of Plant Pathology

In 1967, the Department of Botany and Plant Pathology was split to form a separate Department of Plant Pathology. **Ira W. Deep** was hired as the

new chairperson and several new faculty joined the department in the next few years. Deep quickly worked with the faculty to revise the plant pathology curriculum, moving it away from an emphasis on crop disease courses to an emphasis on principles. *General Plant Pathology* was strengthened, and Deep taught that course the first few years. The several "diseases of …" courses were combined into *Economic Plant Pathology* and *Field Plant Pathology*. Three advanced principles courses were established: *Bacterial, Fungal and Nematode Pathogens; Epidemiology and Control of Plant Diseases*; and *Virology and the Physiology of Parasitism*. An undergraduate major in Plant Pathology was established. Total credit hours taught in the department jumped from 75 to 473.

Revisions in the curriculum continued to occur over the next several years. **Donald T. Gordon** took responsibility for teaching *Plant Virology* in 1969, and continued with this for the next 30 years. In 1968, **Philip O. Larsen** and **Michael O. Garraway** joined the faculty, and both played key roles in the teaching program of the new department. Larsen initiated a program in turf pathology and developed a course in *Diseases of Turfgrasses*, primarily aimed at Turfgrass Science students in Horticulture. He also taught *Epidemiology and Control of Plant Diseases* and co-taught several other courses. Early in his career, Garraway taught *Plant Virology* and then later developed graduate courses in *Physiology of Fungi* and *Physiology of Parasitism*.

In 1976, Deep chaired a college committee to create an interdisciplinary undergraduate program in Plant Protection where students could major in one of four participating departments, agronomy, entomology, horticulture, or plant pathology. Once established, Larsen was chosen to lead this program. He held the title "Professor of Plant Protection," until he left the university in 1984. The undergraduate Plant Protection major appealed to students seeking industry careers in integrated plant pest management. The program included a diverse curriculum pertaining to plant pest management that spanned several disciplines, and included a widely-recognized internship program that provided work opportunities in production agriculture and agribusiness. Larsen established ties with many agribusiness companies across the country and used those connections to place students into internships, many of which fostered careers in the field. In 1977, the program enrolled 22 students with several department faculty serving as advisors. During the 1980s, the number of undergraduate Plant Protection majors remained steady at about 20, but by the early 1990s, enrollment had declined considerably.

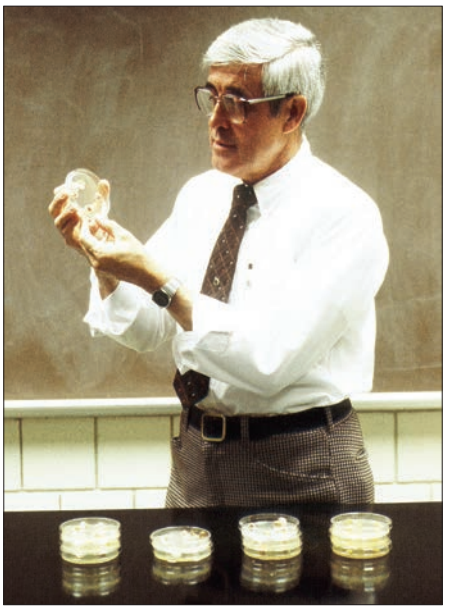
R. Mack Riedel joined the faculty in 1970 as a plant nematologist, following the departure of Glenn Smith in 1967. He developed key graduate courses in *Plant Nematology* and *Advanced Nematology* which he taught for many years. Later in his career, he also taught *Fruit and Vegetable Crop Diseases* and several other courses. **Landon H. Rhodes** joined the department in 1976 and quickly became well recognized as a dedicated teacher, noted for his teaching excellence and talent for working closely with students. He immediately took responsibility for teaching *General Plant Pathology*, and taught the course for over 20 years, introducing many innovations throughout that time. He also adapted and taught *Forest Pathology*, aimed at undergraduates in the School of Natural Resources. Rhodes was an accomplished mycologist and later developed *Field and Woodland Fungi*, a field-based course in which students took forays into area woodlands where mushrooms and other macrofungi could be observed in their natural habitats. For over 10 years, Rhodes taught *Mycology*, a comprehensive course on the taxonomy and biology of fungi. Since the Botany department had been dissolved and the faculty split among several other departments, mycology was no longer being offered in any department as a comprehensive course. From here

Plant Pathology Department

Landon Rhodes with students in plant pathology laboratory course

forward, Plant Pathology took leadership in teaching that course. Rhodes taught several other courses throughout his career and was a major contributor to the department teaching program. He was widely recognized for his teaching excellence with numerous awards.

Throughout his time as department chairperson and afterwords, Deep maintained a heavy teaching load, instructing in *General Plant Pathology, Plant Pathogenic Fungi, Field Crop Diseases*, and the *Plant Protection Seminar*. He continued significant involvement in the


OARDC

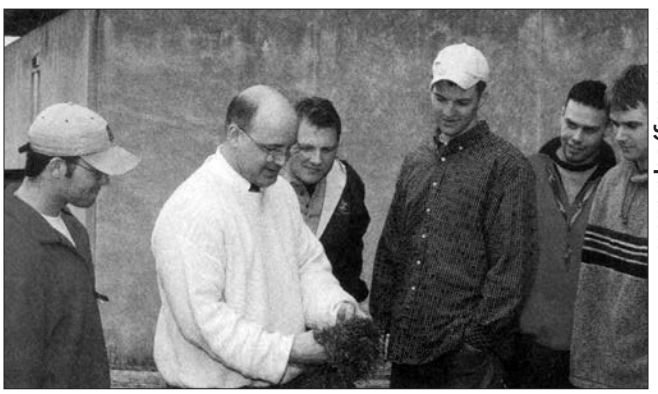
Ira Deep in classroom showing fungal cultures, 1984

teaching program for several years after his retirement in 1998. Though many other faculty participated in department teaching and student advising during this period, these key faculty were the ones who primarily shepherded the department teaching program in the early years of the new Department of Plant Pathology, and established and championed the undergraduate Plant Protection Program.

Changes in University Priorities Emphasizing Undergraduate Teaching

In 1984, **Charles R. Curtis** joined the department as chairperson and brought with him many new ideas regarding department teaching. At the same time, great changes in priorities were developing across the university that placed considerably increased emphasis on undergraduate teaching. This led to pressure on the department to increase the involvement of all faculty in teaching, and to expand the curriculum and total credit hours taught. Like Deep before him, Curtis was highly engaged in the educational mission of the department. Over the next decade, several initiatives were undertaken to increase undergraduate enrollment in department courses. Curtis developed and taught a new course *Social Impact of Plant Diseases in Shaping Human Society* that was aimed at a wide undergraduate audience. Later, in response to university requests for departments to provide courses that gave undergraduate students exposure to contemporary issues often not covered in existing courses, another course *Societal Issues: Pesticides, Alternatives and the Environment* was developed by Deep and other faculty. This was team taught by various faculty and offered several times each year, resulting in a significant increase in undergraduate credit hours taught by the department.

During the early 1990s, enrollment in the Plant Protection major had declined considerably, so this was dropped in 1994. It was replaced with a new major in Plant Health Management, a program designed to give undergraduate students strong practical and theoretical training in plant pathology. Expanded undergraduate enrollment was fostered further through the rejuvenated program in turf pathology that came with the hiring of **Michael J. Boehm** in 1996, who taught two turfgrass pathology courses. Boehm also took the lead for teaching *General Plant Pathology*, and his teaching expertise and many innovations led to increased student enrollment in that course. Boehm was a highly talented classroom teacher who connected well with students and was very innovative in his teaching approaches. He received many teaching awards from various university and professional sources. Boehm also


Plant Pathology Department

Mike Boehm with students looking at diseased turf grass

worked with Rhodes to develop a new undergraduate Minor in Plant Pathology that attracted students from other departments to enroll in plant pathology courses. Other courses that brought in additional undergraduates were *Field and Woodland Fungi* taught by Rhodes, course expansion and an evening session of *Diseases of Ornamental Crops*, taught by **Steven G. P. Nameth**, and later, *Bioterrorism: An Overview*, taught by Boehm and others. For several years, Nameth also taught sections of *General Biology*. The success of all these initiatives was documented by a 75% increase in undergraduate enrollment in department courses and an 80% increase in credit hours taught between 1995 and 2000, plus another 20% increase in the following decade.

Plant Pathology Department

Terry Graham lecturing to students in modern plant pathology classroom at OSU, Columbus

Video-conferencing, On-line Courses, and Distance Education

The fact that department faculty reside at two locations, on the Columbus and Wooster campuses, has provided strong incentive to use electronic technology to bridge this distance. The first widespread use of electronic technology by the department was the video-linking of the department seminar series. As early as the 1980s, using the fairly primitive technology then available, the department abandoned the hosting of separate seminar speakers on each campus and established a joint, video-linked seminar series, broadcast simultaneously to both locations. Not only was this more efficient, it did much to bring together all the faculty and students on a weekly basis. As technology continually improved over time, the unified seminar became so well established that eventually no one thought much about it. Whether the speaker was live in Columbus or Wooster made no difference.

As video-conferencing technology continued to improve, and facilities became available on both campuses, the department began to video-link some of its courses, so that students residing at both campuses could have equal access to the coursework they needed. Beginning in 2008, the lectures in *General Plant Pathology* were video-linked to students on both campuses, with laboratory sections offered live at both locations, making this the first department video-linked lecture/lab course. Later, *Phytobacteriology* and *Plant Virology* were also video-linked, with some live demonstrations given by instructors at each location. By 2011, the department offered nearly all its graduate-level courses, 13 in total, via video-link to both campuses. This technological innovation has been a very significant advantage to students advised by Wooster-based faculty, allowing them to more easily work required department courses into their schedules, regardless of their campus location. Two of these advanced courses, *Plant Disease Epidemiology*, taught by **Laurence V. Madden**, and *Quantitative Methods for Agricultural Scientists*, taught by **Brian McSpadden Gardener**, have at times been video-linked not only to both campuses, but to other campuses outside of Ohio.

Among his teaching innovations, Curtis had a passion for on-line teaching, and strongly encouraged the faculty in that direction. He was the first to offer a true distance education course by designing and offering a totally online section of his course *Social Impact of Plant Diseases in Shaping Human Society* that he taught from 2001 until his retirement in 2006. More recently, this has become the current online course *Sick Plants and a Hungry World* taught by **Sarah Williams**. The department has extended its online course offerings into Extension public education with *Fruit Diseases of the Midwest* and *Introduction to Plant Diagnostics for Master Gardeners: Approaches to Plant Pest Diagnosis* which are offered through eExtension.

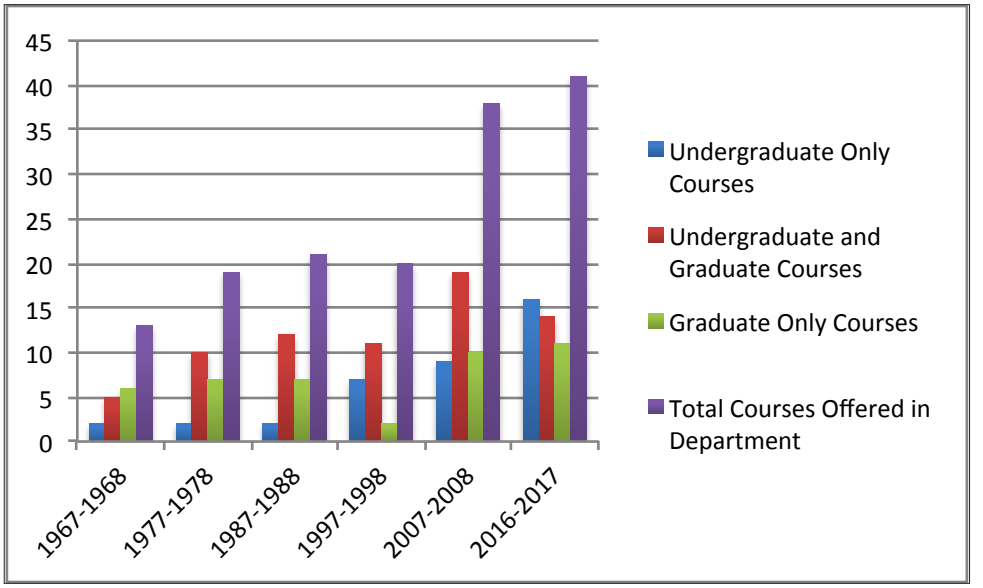
A Twenty-First Century Undergraduate Plant Pathology Curriculum

Significant recent changes in the undergraduate plant pathology curriculum were precipitated by the

the university decision to move from the quarter system to the semester system, which was implemented in 2012. During the previous two years, the faculty spent a considerable amount of time re-envisioning the structure and course curriculum for each undergraduate and graduate program in the department. This required them to deconstruct the programs, redesign each major and minor, construct and map courses to fulfill the desired learning goals, and design assessment plans for each program. This re-invention of the entire department educational program was led by **Thomas K. Mitchell**, who joined the department in 2007. Mitchell had major teaching responsibilities in the department at that time, teaching or co-teaching over eight courses, including a biology course for non-science majors *Mushrooms, Molds, and Mankind; Mycology; Advanced Fungal Physiology and Genetics*; and *History of Plant Pathology*.

During the conversion process, the department added a second undergraduate major called Plant Pathology, in addition to the current major in Plant Health Management. The rationale for the new major was to provide a curriculum that would better prepare undergraduate students for graduate study. Some of these students had interests in molecular aspects of plant pathology and needed a stronger background in genetics, organic chemistry, and microbiology. The Plant Health Management major was updated, and is now offered jointly in conjunction with the Department of Entomology, to provide strong interdisciplinary training in pest management for students planning to enter professional careers after they graduate. Both majors were re-designed to allow increased flexibility for students to customize their degree. These changes have been successful in attracting more students to the department, with about 25 undergraduate students currently enrolled in both majors. In the new curriculum, the minor in Plant Pathology was retained to offer strong training in plant pathology to students majoring in other departments. About 12 students are currently enrolled in the Plant Pathology minor.

Implementation of the new, semester-based curriculum was guided by department chairperson, **Terry L. Niblack**, who joined the department in 2011 and now teaches *General Plant Pathology*. The important task of advising the growing numbers of undergraduate students rested with Boehm and Mitchell. When Boehm left the department for a position in the Provost's office, Mitchell assumed undergraduate advising responsibilities, with strong staff support from **Sarah Williams** and **Monica Lewandowski**, who both also had direct teaching responsibilities for several undergraduate courses. Lewandowski later became a Clinical Professional Practice faculty member, the first in the department, specializing in plant pathology teaching and outreach. **Francesca Peduto Hand** also shared in undergraduate advising when she joined the faculty in 2013. As numbers of students and courses grew, but faculty numbers did not, the department made increased use of lecturer positions.



Numbers of courses taught in the OSU Department of Plant Pathology, by decades

Table 3

Courses Taught in the Department of Plant Pathology, by Decades, Since Its Founding in 1967

Years	Course Number	Course Title	Academic Level
1967–1968	470	General Plant Pathology	Undergraduate
	471	Diseases of Ornamentals	Undergraduate
	670	Plant Pathology	Undergrad/Graduate
	671	Diseases of Cereal and Forage Crops	Undergrad/Graduate
	672	Diseases of Vegetable Crops	Undergrad/Graduate
	675	Diseases of Fruit Crops	Undergrad/Graduate
	871	Principles of Plant Pathology	Graduate
	872	Bacterial Plant Pathogens	Graduate
	873	Plant Virus Diseases	Graduate
	874	Nematode Diseases of Plants	Graduate
1977–1978	401	General Plant Pathology	Undergraduate
	510	Forest Pathology	Undergrad/Graduate
	601	Advanced Plant Pathology	Undergrad/Graduate
	610	Diseases of Ornamentals	Undergrad/Graduate
	612	Turfgrass Diseases	Undergrad/Graduate
	615	Economic Plant Pathology	Undergrad/Graduate
	615.01	Fruit and Vegetable Crop Diseases	Undergrad/Graduate
	615.02	Field Crop Diseases	Undergrad/Graduate
	685	Field Plant Pathology	Undergrad/Graduate
	830	Physiology of Parasitism	Graduate
	832	Bacterial Plant Pathogens	Graduate
	834	Plant Virology	Graduate
	836	Plant Nematology	Graduate
	861	Physiology of Fungi	Graduate
1987–1988	401	General Plant Pathology	Undergraduate
	510	Forest Pathology	Undergrad/Graduate
	596	Plant Protection Seminar	Undergrad/Graduate
	601	Advanced Plant Pathology	Undergrad/Graduate
	602	Plant Disease Epidemiology	Undergrad/Graduate
	610	Diseases of Ornamentals	Undergrad/Graduate

	612	Turfgrass Diseases	Undergrad/Graduate
	615	Economic Plant Pathology	Undergrad/Graduate
	615.01	Fruit and Vegetable Crop Diseases	Undergrad/Graduate
	615.02	Field Crop Diseases	Undergrad/Graduate
	685	Field Plant Pathology	Undergrad/Graduate
	830	Physiology of Parasitism	Graduate
	832	Bacterial Plant Pathogens	Graduate
	838	Plant Virology	Graduate
	840	Plant Nematology	Graduate
	861	Physiology of Fungi	Graduate
1997–1998	201	Societal Impact of Plant Diseases in Shaping Human Society	Undergraduate
	300	Field and Woodland Fungi	Undergraduate
	401	General Plant Pathology	Undergraduate
	501	Diseases of Ornamentals	Undergrad/Graduate
	510	Forest Pathology	Undergrad/Graduate
	530	Plant Responses to Environmental and Biotic Stresses	Undergrad/Graduate
	597	Societal Issues: Pesticides, Alternatives, and the Environment	Undergraduate
	600	Introduction to Bacterial and Viral Pathogens of Plants	Undergrad/Graduate
	636	Plant Nematology	Undergrad/Graduate
	685	Field Plant Pathology	Undergrad/Graduate
	702	Plant Disease Epidemiology	Undergrad/Graduate
	730	Fungal Parasitism of Plants	Undergrad/Graduate
	832	Plant-Bacteria Interactions	Undergrad/Graduate
2007–2008	201	Societal Impact of Plant Diseases in Shaping Human Society	Undergraduate
	300	Field and Woodland Fungi	Undergraduate
	395	Plant Health Forum	Undergraduate
	401	General Plant Pathology	Undergraduate
	455	Bioterrorism: An Overview	Undergraduate
	501	Diseases of Ornamentals	Undergrad/Graduate
	597	Societal Issues: Pesticides, Alternatives, and the Environment	Undergraduate
	600	Introduction to Bacterial and Viral Pathogens of Plants	Undergrad/Graduate
	602	Plant-Microbe Interactions	Undergrad/Graduate
	603	Plant Disease Management	Undergrad/Graduate
	604	Research Methods in Plant Science	Undergrad/Graduate
	610	Diseases of Forest and Shade Trees	Undergrad/Graduate
	612	Turfgrass Diseases	Undergrad/Graduate
	613	Integrated Turf health and Pest Management	Undergrad/Graduate
	615	Fruit and Vegetable Crop Diseases	Undergrad/Graduate
	636	Plant Nematology	Undergrad/Graduate
	655	Quantitative Methods in Appied Biology	Undergrad/Graduate
	660	Mycology	Undergrad/Graduate
	685	Diagnostic Field Plant Pathology	Undergrad/Graduate

	702	Plant Disease Epidemiology	Undergrad/Graduate
	703	Agricultural Genomics: Principals and Applications	Undergrad/Graduate
	704	Advanced Topics in Fungal Biology	Undergrad/Graduate
	832	Plant-Bacteria Interactions	Graduate
	838	Plant Virology	Graduate
	839	Plant Virology Laboratory	Graduate
	841	Molecular Mechanisms of Pathogenicity	Graduate
	842	Biochemistry of Plant Responses to Infection	Graduate
	843	Ecology of Plant Associated Microbes	Graduate
2016–2017	1100	Exploring Plant Pathology	Undergraduate
	2000	Molds, Mushrooms, and Mankind	Undergraduate
	2001	Sick Plants and a Hungry World	Undergraduate
	3001	General Plant Pathology Lecture	Undergraduate
	3002	General Plant Pathology Lab	Undergraduate
	3195	Plant Health Science Forum	Undergraduate
	4191	Internship Experience in Plant Health Management	Undergraduate
	4550	Bioterrorism: An Overview	Undergraduate
	4597	Societal Issues: Pesticides, Alternatives, and the Environment	Undergraduate
	5010	Phytobacteriology	Undergrad/Graduate
	5020	Introductory Plant Virology	Undergrad/Graduate
	5030	Plant Nematology	Undergrad/Graduate
	5040	Science of Fungi: Mycology Lecture	Undergrad/Graduate
	5041	Science of Fungi: Mycology Lab	Undergrad/Graduate
	5110	Ecology and Management of Pathogens and Insects Affecting Trees in Forest and Urban Environments	Undergrad/Graduate
	5120	Diseases of Ornamental Plants	Undergrad/Graduate
	5130	Turf Diseases and Integrated Turf Health Management	Undergraduate
	5140	Diseases of Field Crops	Undergrad/Graduate
	5150	Fruit and Vegetable Diseases	Undergrad/Graduate
	5550	Quantitative Methods for Agricultural Scientists	Undergrad/Graduate
	5603	Plant Disease Management	Undergrad/Graduate
	5604	Capstone Course: Problem-Based Studies in Plant Health	Undergraduate
	5685	Plant Disease Diagnosis	Undergrad/Graduate
	6001	Advanced Plant Pathology	Graduate
	7002	Plant Disease Epidemiology	Undergrad/Graduate
	7003.01	Agricultural Genomics: Principles and Applications	Undergrad/Graduate
	8300	Current Topics in Plant Pathology	Graduate
	8300.01	Molecular Fungal Biology, Genetics, and Genomics	Graduate
	8300.02	Host Resistance: History and Future implications for Deployment	Graduate
	8400	Molecular Bases of Plant Host-Microbe Interactions	Graduate

Engaging Undergraduate Students in the Department

In the early 2000s, the **Plant Health and Resource Management (PHARM)** undergraduate student organization, was established to foster interaction among students and members of the department, and to help students become engaged in department activities. PHARM members are primarily Plant Pathology and Plant Health Management majors, although membership is open to all majors. Activities include field trips, career exploration visits to industry employers, fundraisers, department social events, and community service. These activities enable students to interact professionally and socially with people from various fields to discuss courses, career options, research, and graduate study. PHARM members represent the department at college and university-wide events, and actively promote awareness about the discipline of plant pathology to students and other audiences. In 2016, PHARM established a large-scale campus event, "Examine the Famine," aimed at increasing awareness among Ohio State students about important plant health issues tied to global food security.

Recognition of outstanding undergraduate students in the department has been facilitated by the **A. J. Hoffman Award**, first given in 1980. This award was established in memory of Ohio greenhouse vegetable producer Arthur J. Hoffmann, and is awarded annually to honor one or two undergraduate students for high achievement and excellence. Following graduation, many of these students have gone on to professional careers of their own or have furthered their education through graduate studies in plant pathology or other fields:

1980 • Susan Leigh Stanton
1981 • Corinne Johnson-Glebe
1982 • Timothy E. Mills
1983 • (not awarded)
1984 • Robert B. Fuller
1985 • Patricia J. Dudash
1986 • Patricia J. Dudash and Scott D. Mills
1987 • Rene M. Walen
1988 • Scott T. Adkins and Shu Ming Lim
1989 • Scott T. Adkins
1990 • John M. Humphreys
1991 • Mark R. Apelt and Sara L. Warner
1992 • Julie L. Barnes and Shelia L. Schmitz
1994 • Melissa A. Keeley
1995 • Glenn Curtis Colburn and Troy D. Markham
1996 • Justin G. York
1997 • Nathan T. Tuttle
1998 • Rebecca S. Lyon
1999 • Maria K. Berg
2000 • Katherine R. Whitten
2001 • Jennifer H. Wagner
2002 • Melissa L. Bogart
2003 • Sarah M. Johnson
2004 • Kelly S. Cassidy and Gina N. Wirthman
2005 • Amy L. Niver
2008 • Laura J. Bruner, Kate M. Gearhart, Amanda J. Hayes, Kara J. Riggs, Jessica R. Schafer and Nicholas H. Weidenbenner
2009 • Amber Hoffstetter and Kara J. Riggs
2010 • Timothy Frey and Amber Hoffstetter
2011 • Timothy Frey
2012 • Katherine Gambone and Shan Lin
2013 • Edward Luersman and John Schoenhals
2014 • Paige Thrush and Alyssa Zearley
2015 • Paige Thrush and Alyssa Zearley
2016 • Jenna Moore and Kristi Walker

In the over 100 years since plant pathology was first taught at Ohio State, it has taken several forms and name changes, and always relied on dedicated, visionary leaders for guidance. At a time when the majority of U.S. universities teaching plant pathology have eliminated their undergraduate programs or merged them with other disciplines, Ohio State has maintained a strong and comprehensive plant pathology teaching program, and now has two independent undergraduate majors from which students can choose: Plant Health Management and Plant Pathology. Undergraduate student enrollments in department courses continue to increase, and we expect that trend will continue. One sign of the strength of department undergraduate courses is that the introductory *General Plant Pathology* course has enrolled about 90 students each fall.

The Plant Pathology Graduate Program

Development of Plant Pathology Graduate Education in the Department of Botany

The first graduate work dealing with plant pathogens at Ohio State was done in the Department of Botany under the leadership of **W. A. Kellerman**, who was the first chairperson of the department. He was a significant mentor for Frederica Detmers, and, in 1891, she received the first M.S. degree presented by the Department of Botany that was based on research with plant pathogens. This was followed in 1906 by a second M. S. student in the area of plant pathology mentored by Kellerman. Following Kellerman's death in 1908, leadership in Botany passed to **J. H. Schaffner**. Although a classical botanist, he advised a third M.S. student whose research dealt with a plant pathogen, awarded in 1913, and then two more in 1915, that were jointly advised by Schaffner and **W. G. Stover**. Stover joined the Botany department in 1912, and, for the next 40 years, he was the faculty member primarily responsible for developing the graduate program in plant pathology within that department. During that period, Stover taught most of the mycology and plant pathology classes offered by Botany. He served as advisor for 29 M.S. students, one of his last in 1947 being Blair Janson, who later became a member of the Plant Pathology faculty.

Blair Janson (left) and Wilmer Stover with graduate students on field trip, 1947

The Ph.D. program in plant pathology did not get started until the late 1920s. The first Ph.D. given for research in mycology or plant pathology came in 1929, to Minnie M. Johnson, advised by Stover, for her work with gastromycetes. The second Ph.D. came a year later to Ora N. Liming, also advised by Stover, for work on the toxicity of sulfur fungicides. From 1929 to 1955, Stover advised eight students who were awarded the Ph.D. based on research in plant pathology or mycology.

Plant Pathology Department

Faculty (in bold type) and graduate students at Columbus, 1948
Front row, left-to-right: Swank, Koshy, Rosberg, Reed
Second row, left-to-right: Spilker, Higgins, Palchefsky
Third row, left-to-right: Bart, Van Burgh, **Stover**, **Gray**, Kazmaier
Back row, left-to-right: Bell, Norton, Palmer, **Allison**, Janson, Crittenden

Beginning in 1946, when many post-WWII students were coming to campus, **C. C. Allison** took primary leadership for the plant pathology graduate program. Plant pathology had become a significant part of research in Botany by that time, and in 1948, the department name was changed to Botany and Plant Pathology. Allison was an extremely dedicated teacher and mentor who developed a strong graduate program in plant pathology. He personally advised nearly all the graduate students and taught most of the graduate courses in plant pathology. He hosted an informal department graduate seminar on Wednesday evenings. Though students received no academic credit for this activity, it was well known that "you had better be there." Reflecting back on his time as Allison's student in the early 1950s, Lansing Williams said of Allison "He was the whole graduate program. I think he had about 20 students at one


Plant Pathology Department

Faculty and graduate students at Columbus, 1959
Allison (in hat), Smith (on his right), Ellett (kneeling on his left); students not identified

time. He was a good advisor. He was not known as a great researcher. However, for the philosophy of plant pathology and making you proud of what you were doing, he was the best." (see Sidebar 2). Over his teaching career, from 1946 to 1971, Allison advised an astonishing 45 Ph.D. and 50 M.S. students. He received The Ohio State University Distinguished Teaching Award in 1964.

During this period, when the plant pathology graduate program was rapidly developing, a second primary figure was **C. Wayne Ellett**. He was hired as an instructor in 1946 to teach beginning botany courses. Ellett was Stover's last Ph.D. student, jointly advised by Stover and C. C. Allison. He completed his Ph.D. in plant pathology in 1955, and joined the faculty as assistant professor the following year. As soon as he had his Ph.D., Ellett began to share Allison's advising load, first with M.S. students, then in 1960, with Ph.D. students. He also assumed a large teaching load, continuing to teach introductory botany and handling courses in introductory plant pathology, and diseases of field crops and ornamentals. During Allison's tenure, Ellett was the only other faculty member teaching plant pathology.

Strengthening Graduate Education in the Department of Plant Pathology

Soon after the new department was established in 1967, the graduate curriculum was revised by establishing three advanced principles courses: *Bacterial, Fungal and Nematode Pathogens; Epidemiology and Control of Plant Diseases*; and *Virology and the Physiology of Parasitism*. These were designed to put the focus on plant pathogens and pathogenesis, rather than on diseases of various crops. Over time, these initial courses were further divided into full courses on each of the major pathogen groups. *Advanced Plant Pathology*, taught by **I. W. Deep**, focused on fungal plant pathogens, and *Plant Nematology*, taught by **R. M. Riedel**, *Plant Virology*, taught by **D. T. Gordon**, and *Bacterial Plant Pathogens*, taught by **D. L. Coplin**, provided detailed studies on each of those pathogen groups. *Plant Disease Management*, a team-taught course, concentrated on integrated disease management tactics, and brought together the expertise of a wide number of faculty. In addition to pathogen-focused courses, *Plant Disease Epidemiology*, taught by **L. V. Madden**, dealt with the movement of plant pathogens in time and space, and *Physiology of Parasitism*, taught by **M. O. Garraway**, covered physiological details of the movements of pathogens within plants and host responses to infection. The intent of this curriculum was to provide graduate students with current knowledge on the major plant pathogens and how they survived and behaved in the environment and within their host plants.

In the first five years after the department was established, the graduate program grew from 6 students to 17. Later, in the 1980s and 1990s, graduate student numbers were about 25. Expanded graduate student numbers led to more students being advised by Wooster-based faculty than had previously been the case. This created a logistical problem for Wooster-bound students. Standard practice at that time, for students advised by Wooster-based faculty, was to begin in Columbus and spend their first year or so there taking as many courses as possible before relocating to Wooster. Unfortunately, that approach often resulted in a delay in choosing their research topic and beginning their thesis research. Some students moved back and forth several times, but that too caused

many difficulties. At that time, the split of department faculty between two geographic locations very likely discouraged some prospective graduate students from joining the department. This issue slowly began to resolve through the use of the video-conferencing and distance education technology discussed earlier. The department seminar series was unified in the 1980s, which was the first use of this technology. Eventually, individual courses were offered simultaneously to graduate students on both campuses. This not only alleviated some logistical problems, but also brought more of the expertise of Wooster-based faculty into the graduate teaching program.

Enhancing the Graduate Student Experience

Unification of the department graduate program, with students based on two campuses, was further facilitated by establishment of the **Plant Pathology Graduate Students Association (PPGSA)** in 1996. This organization fosters professional and social interactions among all department graduate students and provides opportunities for graduate students to serve on some department committees and interact with faculty in various ways. Specific objectives are to 1) promote communication and interaction among students, faculty, staff, and administrators; 2) provide a forum to discuss pertinent issues; 3) provide a vehicle to address student requests for information and suggestions for broadening and improving the quality of their education experiences; and 4) promote the participation of graduate students at national and international scientific meetings. PPGSA activities include hosting seminar speakers, organizing field trips, and helping to recruit and welcome new graduate students. PPGSA organizes the department's annual spring symposium, where first-year students present their research proposals. PPGSA students are actively engaged in education and public outreach programs at college, university and national levels. One long-running activity is the student exchange with Pennsylvania State University and Cornell University, where graduate students from each institution have the opportunity to visit one of the other campuses and present a seminar. PPGSA fund raising activities, such as growing plants for public plant sales in Columbus and Wooster, help fund student travel to professional meetings and other professional development activities. Through

Plant Pathology Department

Design on T-shirt sold by Plant Pathology Graduate Student Association, 1997

PPGSA, students can be involved in the department by serving as officers or on department committees, including the Graduate Studies Committee, Academic Affairs Committee, Vision Committee, faculty search committees, and department social committees.

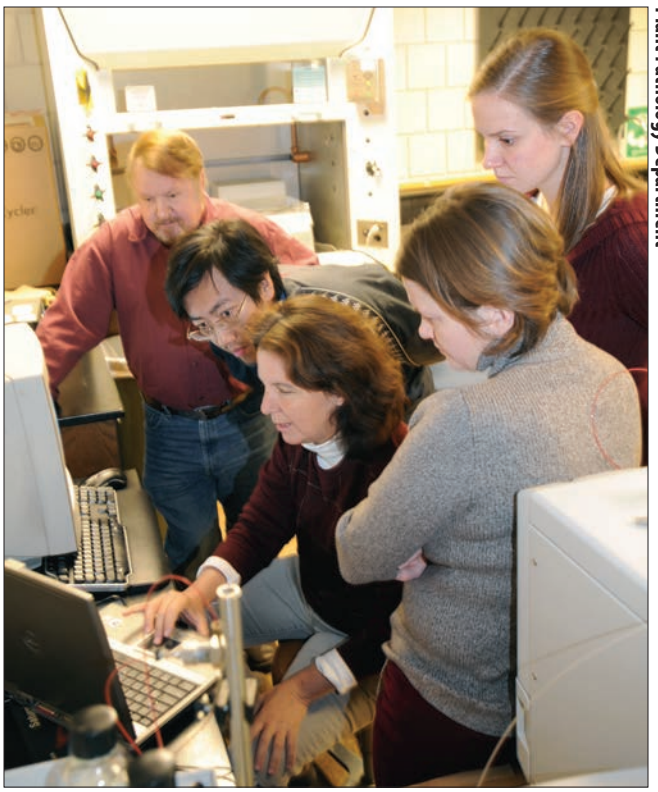
An outstanding graduate student award, named for Dr. Clyde C. Allison, was first presented in 1986. C. C. Allison had been an outstanding scientist and student mentor in the Department of Plant Pathology from the 1940s to 1970s. Through a significant contribution by Dr. Allison, and continuing contributions from students and friends, the C. C. Allison Fund in Plant Pathology was established in 1984. Proceeds from this fund are used to support annual presentation of the **C. C. Allison Award** to one or more graduate student(s) in recognition of high achievement in research and service to the Department of Plant Pathology. Many of these award recipients have gone on to excellent professional careers of their own:

1986 • Timothy W. Bischoff
1987 • Weidong Chen
1988 • Tony R. Joaquim
1989 • Ravindra Bhat
1990 • Marie J. Anderson
1991 • Michael J. Boehm and Nilceu R. X. de Nazareno
1992 • Robert Andy Hudson
1993 • Medani A. Omer

1994 • Marcella E. Grebus and Lydia I. Rivera-Vargas
1995 • Deborah R. Hanmer
1996 • Alexandra G. Stone and Maria C. Sanchez-Cuevas
1997 • Fikrettin Sahin
1998 • David Y. Han and William W. Turechek
1999 • J. Robert Fisher and Cerinda Loschinkohl
2000 • Matthew S. Krause
2001 • Christian Andrew Wyenandt
2002 • Massimo Merighi and Gertrude A. Torto
2003 • Mizuho Nita and Lirong Zeng
2004 • Edgar Huitema and Samantha L. Thomas
2005 • Jessica S. Engle and Chatchawan Jantasuriyarat
2006 • Angel Rebollar Alviter
2007 • Jorunn Bos and Maria Soledad Benitez
2008 • Kirk Broders, Nathan Kleczewski and Miguel Vega Sanchez
2009 • Chan Ho Park
2010 • Margaret Ellis and Jiye Cheng
2011 • Gautam Shirsekar and Dan Anco
2012 • Jorge David Salgado and Jinnan Hu
2013 • Xiaoqing Rong and Patrick Sherwood
2014 • Anna Conrad
2015 • Horacio Lopez Nicora
2016 • Ellie K. Walsh and David N. Showalter

Bringing the Graduate Curriculum into the Molecular Age.

Beginning in the mid-1980s and throughout the 1990s, the new science of molecular biology and its many practical applications rapidly became part of the discipline of plant pathology. This necessitated significant changes in the graduate curriculum, by integrating molecular biology into existing courses and adding new courses. Coplin and Gordon were the pioneers among existing faculty by integrating molecular biology into their courses on bacterial and viral pathogens. Several new faculty were hired primarily for their expertise in molecular aspects of plant–microbe interactions. **Terrence L. Graham**, a biochemist and molecular biologist, was heavily involved in the graduate program from the time he joined the department in 1986. He taught the advanced graduate class *Biochemistry of Plant Responses to Infection*. **Sophien Kamoun** and **Guo-Liang Wang**



Plant Pathology Department

Terry Graham in Kottman Hall laboratory with students, Columbus, 2008

joined the department in 1998 and 1999, respectively, bringing to the department their world-class research programs in molecular plant pathology. Together, they initiated a course in *Agricultural Genomics: Principles and Applications*. Kamoun and Graham together taught *Plant–Microbe Interactions*. Wang also organized an interdepartmental research forum called *Molecular Plant-Microbe Interactions at OSU* that met regularly to facilitate discussions among faculty and graduate students on aspects of plant molecular biology.

A significant advancement in the graduate curriculum, for students primarily interested in molecular biology, was the inception of the interdisciplinary Plant Molecular Biology and Biotechnology Program (PMBB) that began in the 1990s. Graham was a founding member of this campus-wide graduate program that involved several faculty from Plant Pathology and faculty from other departments in the College of FAES and the College of Biological Sciences. Graduate students in Plant Pathology have the option of pursuing the PMBB curriculum as a specialization within the departmental graduate program.

Plant Pathology Department

Sally Miller with students, 2012

Advances in understanding of molecular plant–microbe interactions led to many practical applications for the use of molecular-based tools, particularly in the areas of plant breeding and pathogen diagnostics. **Sally A. Miller**, who joined the department in 1991, previously had been employed by a commercial company developing molecular-based diagnostic kits for plant pathogens. Miller took responsibility for an existing course in field plant pathology and modified it into *Diagnostic Field Plant Pathology*, where she focuses on giving graduate students intensive hands-on instruction in both traditional and molecular diagnostic techniques for plant pathogens. Several other faculty have been involved in teaching parts of this course, making available to students the expertise of many people.

Margaret Redinbaugh teaching in plant disease diagnostics course, 2015

Master in Plant Health Management

A significant development in graduate education has been the establishment and growth of Professional Science Master's Degrees. Part of a national trend, a hallmark of the professional degree is the incorporation of business, communications, and professional training with in-depth science education. The Master in Plant Health Management (MPHM) program was launched in 2012 to meet growing employment demand for students with plant health expertise and workplace skills in business and communications. The MPHM program was spearheaded by **Anne E. Dorrance**, who joined the faculty in 1997, and an online option was added in 2014 through the efforts of Sarah Williams and Terry Niblack. The program was jointly established by the Departments of Plant Pathology and Entomology. Dorrance and Luis Cañas, OSU Department of Entomology, serve as Graduate Studies Co-Chairs for the MPHM program.

In 2013, the MPHM program became the first graduate program at Ohio State to achieve Professional Science Master's (PSM) affiliation. A key feature of PSM programs is the incorporation of a project or internship as part of the degree requirement, which can be done in industry or in an academic department, depending on the student's interest. MPHM students can select from courses in seven academic units, covering topics in plant disease management, integrated pest management, statistics, soil science, weed science, Extension education and leadership, agribusiness and more. The program uses classroom and distance education options to appeal to working professionals who wish to pursue a Professional Science Master's Degree for career advancement or a career change. Enrollment in this program has continued to grow each year. The addition of the online option has opened the program to students outside of Ohio.

Ohio State's Nationally Recognized Top-Tier Graduate Program of Today

In 2010, the National Research Council conducted a nation-wide study of doctoral programs and concluded that Ohio State was ranked among the top 3–5 plant pathology Ph.D. programs in the U.S. Current enrollment in department graduate programs, in 2016, was 9 M.S., 31 Ph.D., and 16 MPHM students.

Major changes to the graduate curriculum were made during the university's conversion from quarters to semesters that was finalized in 2012. Core requirements were changed and increased flexibility was built into the curriculum, allowing for customized individual student needs. Because students have insufficient time in a semester system to take as many courses as they did under quarters, three of the four pathogen-specific courses (nematology, virology, and bacteriology) were changed to half-semester courses, and *Molecular Bases of Plant Host–Microbe Interactions* was made into a capstone course for graduate students only. An online version of *General Plant Pathology* was developed for entering graduate students lacking that background, and more hands-on, practical coursework was added to existing courses. Key graduate-level courses were retained, including: *Quantitative Methods for Agricultural Scientists, Plant Disease Management, Plant Disease Diagnosis, Advanced Plant Pathology, Plant Disease Epidemiology*, and *Agricultural Genomics: Principles and Applications*.

The Department of Plant Pathology now boasts that it offers three graduate degrees: Ph.D, M.S. (plan A), and the Professional Science Master's Degree through the MPHM program. As with undergraduate programs in the discipline, plant pathology graduate programs nationwide have shown a trend of shrinking numbers of students and faculty, so much so that many universities cannot offer a full complement of courses dedicated to each of the four core pathogen groups. In contrast, over the past decade, the Department of Plant Pathology at Ohio State has hired eight new faculty members and now enrolls 40 graduate students, plus an additional 16 in the MPHM program. These numbers, and the NRC top-tier ranking, place it as one of the strongest plant pathology graduate programs in the United States. This phenomenal success is due to the diligent work of the current faculty, staff, and students and is built upon the foundations established by earlier faculty, staff, and students following the department's founding in 1967, and even back to its origins with William A. Kellerman in the late 1800s.

Appendix 1

Leadership in Professional Service by Plant Pathology Faculty

OSU DEPARTMENT OF BOTANY
(and previous name)
Department Chairperson
William A. Kellerman 1891–1908
John H. Schaffner 1908–1918
Edgar N. Transeau. 1918–1946
Bernard S. Meyer. 1946–1948

OAES DEPARTMENT OF BOTANY
(and previous names)
Chief
Augustine D. Selby 1902–1923
Harry C. Young. 1923–1924

OAES DEPARTMENT OF BOTANY and PLANT PATHOLOGY
Chief
Harry C. Young. 1924–1948

OSU DEPARTMENT OF BOTANY and PLANT PATHOLOGY
Department Chairperson
Bernard S. Meyer 1948–1967
Associate Department Chairperson
Harry C. Young 1948–1958
Curt Leben 1959–1967

OSU DEPARTMENT OF PLANT PATHOLOGY
Department Chairperson
Ira W. Deep. 1968–1984
Charles R. Curtis 1984–1996
Randall C. Rowe 1996–2006
Michael J. Boehm 2007–2010
Terry L. Niblack 2011–present

OSU DEPARTMENT OF PLANT PATHOLOGY
Acting or Interim Department Chairperson
Curt Leben 1967
Laurence V. Madden 2006–2007
Laurence V. Madden 2010–2011
Laurence V. Madden 2015–2017
Associate Department Chairperson
Lansing E. Williams 1968–1989
Randall C. Rowe 1989–1996
Terry Graham 1996–2000
Stephen G. P. Nameth. 2000–2004
Michael J. Boehm 2004–2007
Laurence V. Madden 2007–present

OHIO AGRICULTURAL RESEARCH and DEVELOPMENT CENTER
Director
Steven A. Slack 1999–2015
Associate Director
Lowell R. (Skip) Nault 1995–2002
Interim Director
Lowell R. (Skip) Nault 1999

OSU AGRICULTURAL TECHNICAL INSTITUTE
Director
Stephen G. P. Nameth. 2004–2012

THE OHIO STATE UNIVERSITY
Vice Provost for Academic and Strategic Planning
Michael J. Boehm 2010–2016

AMERICAN PHYTOPATHOLOGICAL SOCIETY

President

Augustine D. Selby 1911–1912
Randall C. Rowe 1992–1993
Laurence V. Madden 1996–1997
Stephen A. Slack 2000–2001
Michael J. Boehm 2012–2013
Sally A. Miller 2015–2016

Treasurer

Randall C. Rowe 2006–2012
Steven A. Slack 2012–2018

Councilor-at-Large

Augustine D. Selby 1909–1910
Randall C. Rowe 1987–1990
Michael A. Ellis 2002–2005
Michael J. Boehm 2007–2010
Anne E. Dorrance 2009–2012

Editor-in-Chief, *Phytopathology*

Laurence V. Madden 1991–1993

Editor-in-Chief, *APS Press*

Steven A. Slack 1992–1994

PRESIDENTS OF OTHER PROFESSIONAL SOCIETIES

American Society of Plant Physiologists

Bernard S. Meyer 1943

Entomological Society of America

Lowell R. "Skip" Nault 1991

Ohio Academy of Science

William A. Kellerman 1897
Augustine D. Selby 1901
C. Wayne Ellett 1976

Potato Association of America

Steven A. Slack 1988

Society of Nematologists

Terry L. Niblack 2004

Appendix 2

Students Who Have Received the Master's Degree from The Ohio State University with a Focus on Plant Pathology or Related Areas in the Department of Botany (1891–1947), the Department of Botany and Plant Pathology (1948–1966), and the Department of Plant Pathology (1967–2016)

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
1891	Frederica Detmers	The Ohio State University	W. A. Kellerman
1906	Opal I. Tillman		W. A. Kellerman
1913	Leo E. Melchers	The Ohio State University	John H. Schaffner
1915	Webster S. Krout	The Ohio State University	J. H. Schaffner & W. G. Stover
	Gustav A. Meckstroth	The Ohio State University	J. H. Schaffner & W. G. Stover
1916	William Nelson Ankeney	Heidelberg College (now Heidelberg University)	W. G. Stover
1918	Maud Dawson	University of Michigan	W. G. Stover
	Harry W. Lutz	The Ohio State University	W. G. Stover
	Ghulam Mohammed Malik		J. B. Park
1919	Sylvia Celicia Fuson	Miami University	B. Fink & W. G. Stover
1921	Edwin Warren Gordon		W. Paddock
	Charles White Waters	Berea College	B. Fink
1922	Raymond Anson Dobbins	The Ohio State University	W. G. Stover
1923	Sylvester Sherman Humphrey	The Ohio State University	W. G. Stover
1924	John W. Baringer	Wabash College	W. G. Stover
	Howard W. Johnson	The Ohio State University	W. G. Stover
	Donald Philips Limber	The Ohio State University	W. G. Stover
	Curtis May	The Ohio State University	W. G. Stover
	Ivan E. Massar	Ohio University	W. G. Stover
	Floyd F. Smith		D. M. DeLong
1925	Harmon A. Runnels	The Ohio State University	W. G. Stover
1926	Robert J. Campbell	The Ohio State University	W. G. Stover
	Minnie May Johnson	Ohio University	W. G. Stover
	Paul E. Tilford	Michigan Agricultural College (now Michigan State University)	W. G. Stover
1928	Isaac Peters Lewis		W. Paddock
1929	Allen Henry Bauer	Otterbein College	W. G. Stover
	Ora Neal Liming	Wilmington College	W. G. Stover
	Everett T. Miller	Miami University	W. G. Stover

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
1931	Monroe Thomas Vermillion	Ohio University	W. G. Stover
	Edmund D. Walter		R. C. Burrell
1933	Howard N. Lamb	The Ohio State University	W. G. Stover
	Paul Ellsworth Zimpfer	Capital University	W. G. Stover
1934	Jose Balonquita Acebo	The Ohio State University	W. G. Stover
	John Nicholas Wolfe	The Ohio State University	L. H. Tiffany
1938	Willis Edmund Chase	Cornell University	W. G. Stover
	Harold Lawrence Porter	The Ohio State University	W. G. Stover
	Russell C. Slutz	Kent State University	W. G. Stover
1940	Clayton Wayne Ellett	Kent State University	W. G. Stover
	Darrell Marshall McLean	Oklahoma A&M College	A. L. Pierstorff
1941	Mah Sing Pon	The Ohio State University	A. L. Pierstorff
1942	Richard Shoots Davidson	The Ohio State University	A. L. Pierstorff
1946	Warren C. Jacobs	Ohio Northern University	W. G. Stover
	Theverthundyil Abraham Koshy	University of Allahabad (India)	W. G. Stover
1947	Blair F. Janson	The Ohio State University	W. G. Stover
	John Rush Warren	Marietta College	C. C. Allison
	David William Rosberg	St. Olaf College	C. C. Allison
1948	Hugh Chapman Palmer	The Ohio State University	C. C. Allison
	George Swank Jr.	Bluffton College	C. C. Allison
	Patricia L. Van Burgh	University of Houston	C. C. Allison
1949	Thomas H. Campbell	The Ohio State University	C. C. Allison
	Don C. Norton	University of Toledo	C. C. Allison
	John Palchefsky Allen	Miami University	C. C. Allison
	George James Bart	The Ohio State University	W. G. Stover
1950	Robert S. Zerkel	Miami University	C. C. Allison
1951	Ralph Elwood Althaus	Bluffton College	J. D. Wilson
	Robert C. Bossley	The Ohio State University	C. C. Allison
	Daniel J. Higgins	The Ohio State University	C. C. Allison
	Harold E. Kazmaier	The Ohio State University	H. C. Young
	A. Frederick Schmitthenner	Gettysburg College	C. C. Allison
	Oren W. Spilker	The Ohio State University	C. C. Allison
	Leon S. Wood	Kent State University	R. S. Davidson
	Robert Eugene Deems	Marietta College	C. C. Allison
1952	Lansing E. Williams	Morris Harvey College (now University of Charleston)	C. C. Allison
1953	Donald F. Schoeneweiss	The Ohio State University	C. C. Allison
	James D. Panzer	Miami University	L. J. Alexander
	Leonard J. Herr	The Ohio State University	C. C. Allison & H. C. Young
1954	Erwin S. H. Wollman	The Ohio State University	C. C. Allison
	Asa Cline Sims, Jr.	Hampton Institute	C. C. Allison
	Glenn E. Smith	Morris Harvey College (now University of Charleston)	C. C. Allison
	Kenneth C. Snyder	Miami University	C. C. Allison & C. W. Ellet
	Robert Eugene Stall	The Ohio State University	L. J. Alexander

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
1955	Paul L. Thayer	Marietta College	C. L. Wilson & C. C. Allison
	Paul M. Alexander	California St. Polytechnic College	C. C. Allison
	Gary Jay Farabee	The Ohio State University	J. L. Lockwood & C. C. Allison
	Robert W. Metz	Morris Harvey College (now University of Charleston)	C. C. Allison
	H. Paul Carter	Eastern Illinois State University	C. C. Allison & J. L. Lockwood
	Evamarie Sander	University of Bonn	C. C. Allison
	John P. Jones	The Ohio State University	L. J. Alexander
1956	H. Harvey Klein	The Ohio State University	C. C. Allison
	John James McRitchie	DePauw University	L. J. Alexander
1957	Jeanne W. Anderegg	Oberlin College	C. C. Allison
	Doyle E. Anderegg	The Ohio State University	C. C. Allison
	Carl Richard Sova	Pennsylvania State University	W. D. Gray
	Robert D. Shealy	Capital University	C. C. Allison
	Jerry T. Walker	Miami University	C. C. Allison & C. W. Ellett
1958	Floyd J. Williams	The Ohio State University	C. W. Ellett
	George M. Willis	Prairie View College	C. W. Ellett
1959	R. Kenneth Horst	Ohio University	L. J. Herr & C. C. Allison
	Clarence George McQuade	Ohio University	L. E. Williams & C. C. Allison
1960	James W. Hilty	The Ohio State University	A. F. Schmitthenner & C. W. Ellett
1961	John A. Chisler	The Ohio State University	C. C. Allison
	Gilbert C. Daft	Marietta College	C. W. Ellett
	Ramachandra Kuppayya Hegde	College of Agriculture (Dharwa, India)	C. C. Allison
	Malayattil Ramanathn Menon	Maharajas College (India)	C. C. Allison
1962	John Earl Rodebaugh	The Ohio State University	C. W. Ellett & C. C. Allison
1963	Daniel V. Phillips	The Ohio State University	C. C. Allison
	Stanley Bernard King	Goshen College	L. J. Alexander
1964	Nelson P. Mwanza	University College of Rhodesia and Nyasaland	C. C. Allison
	Manjoola Siddharth Patel	M.S. University Baroda (India)	C. C. Allison
	Howard W. Boyd	The College of Wooster	C. C. Allison
	Nualchantra H. Deema	Kasetsart University (Thailand)	C. C. Allison & A. W. Troxel
	David W. Long	The Ohio State University	C. C. Allison
	Floyd Richard Poruban	The Ohio State University	C. C. Allison & A. W. Troxel
1965	Raymond Eugene Hite	The Ohio State University	L. J. Alexander
	Paul Francis Brinkpeter	The Ohio State University	C. C. Allison & G. E. Smith
	Choy Lan (Kuan) Kok	Nanyang University (Singapore)	G. E. Smith
1966	Ronald David Allowitz	The Ohio State University	L. J. Alexander
	James E. Leonard	The Ohio State University	C. W. Ellett
	Richard M. Riedel	The Ohio State University	G. E. Smith
1968	Phillip F. Colbaugh	Oklahoma State University	C. W. Ellett
	Gordon J. Muller	The Ohio State University	L. J. Herr
1969	Paul R. Theaker	The Ohio State University	D. T. Gordon
1970	Liu-Gei Chou	National Taiwan University	M. O. Garraway

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
1972	Paul H. Kauffman	Eastern Mennonite College	C. Leben & P. O. Larsen
	James L. Starr	The Ohio State University	M. O. Garraway
1973	Richard W. Carter	The Ohio State University	P. O. Larsen
	David E. Daugherty	Denison University	C. C. Powell & P. O. Larsen
	Gene A. Jumper	The Ohio State University	C. L. Wilson
	Konrad T. Kmetz	Ohio University	C. W. Ellett & A. F. Schmitthenner
1974	Raul G. Cuero	Heidelberg College	J. D. Farley
	Rosalie D. Hoffman	Morris Harvey College (now University of Charleston)	C. W. Ellett & A. F. Schmitthenner
	Dwight Q. Peirson	Urbana College	R. M. Riedel
1975	John A. Harri	The Ohio State University	P. O. Larsen
	Saleh Mustofa Nuesry	University of Libya	I. W. Deep
	Joann Safford	South Dakota State University	R. M. Riedel
	Stephen J. Vesper	Xavier University	C. Randles
	Robert L. Schlub	The Ohio State University	I. W. Deep
1976	John A. Francis	Kent State University	R. M. Riedel
	Ahmed Ali Rokaibah	University of Riyadh	M. O. Garraway
	Christine T. Stephens	Smith College	C. C. Powell
1977	Stephen Carver	The Ohio State University	C. C. Powell
	Dennis G. Chef	Michigan State University	H. A. J. Hoitink & J. D. Farley
	David L. Roberts	The Ohio State University	L. J. Herr
	Douglas A. Spilker	Miami University	A. F. Schmitthenner & C. W. Ellett
1978	Marsha J. Brown	Miami University	R. M. Riedel
	Rochelle Franks	The College of Wooster	A. F. Schmitthenner
	Stuart L. Greenberger	The Ohio State University	T. C. Weidensaul
	Austin K. Hagan	Indiana University of Pennsylvania	P. O. Larsen
	Thomas J. Hall	SUNY College of Environmental Science and Forestry	P. O. Larsen
	Debra Longworth	Miami University	C. L. Wilson
	Charles R. Semer	The University of Akron	C. L. Wilson
	Grace Wang	National Chung Hsing University (Taiwan)	R. M. Riedel
1979	Craig H. Canaday	Miami University	A. F. Schmitthenner
	James A. Chatfield	Ohio University	C. C. Powell & L. H. Rhodes
	David E. Spring	Ohio University	A. F. Schmitthenner & H.A.J. Hoitink
1980	Marinez Muraro Alves de Lima	Escola Superios de Agro Piracicaba (Brazil)	P. O. Larsen
	Freda Machelle Ashbaugh	Northland College	D. L. Coplin
	Linda M. Basham	Kent State University	H. A. J. Hoitink
	Earl E. Conaway	Bowling Green State University	L. R. Schreiber & C. C. Powell
	Thomas J. Harrison	The Ohio State University	M. O. Garraway
	Thomas W. Hobbs	University of Miami (Florida)	C. W. Ellett & F. Schmitthenner
	Eric B. Nelson	Indiana University	H. A. J. Hoitink & R. M. Riedel
	Steven R. Shafer	The Ohio State University	L. H. Rhodes
1981	Jayne S. Anderson	University of Illinois	C. C. Powell
	Neil W. Higgins	The Ohio State University	L. H. Rhodes

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
	Marjorie Adams Hobe	Wittenberg University	A. F. Schmitthenner & C. W. Ellett
	Jennifer B. McHugh	Mount Union College (now University of Mount Union)	L. R. Schreiber & M. O. Garraway
1982	Timothy William Bischoff	The Ohio State University	M. O. Garraway
	Margot J. Bridgen	Pennsylvania State University	P. O. Larsen
	Mark A. Heinlein	The Ohio State University	R. M. Riedel & C. C. Powell
	Joseph W. Rimelspach	The Ohio State University	P. O. Larsen
	Prawat Tanboon-ek	Kasetsart University (Thailand)	M. A. Ellis
	R. Danise Thames	Auburn University	R. M. Riedel
	Barbara A. Thuma	Goshen College	R. C. Rowe
1983	John J. Abt	Kent State University	R. Louie & I. W. Deep
	Tamara Abernathy	The Ohio State University	P. O. Larsen
	James A. Dunkerley	Miami University	unknown
	Liju Fan	National Taiwan University	M. O. Garraway
	Reid David Frederick	Pennsylvania State University	D. L. Coplin & M. O. Garraway
	Kevin K. Jeffrey	The Ohio State University	L. J. Herr & P. E. Lipps
	Carolyn J. McQuattie	Ohio Wesleyan University	L. H. Rhodes
	Victoria Lynn Smith	Ohio Northern University	R. C. Rowe
1984	Weidong Chen	Huazhong Agricultural College (China)	H. A. J. Hoitink
	Donald O. Koch	The Ohio State University	M. O. Garraway
	Laura J. Mihuta	The College of Wooster	R. C. Rowe
	Barbara Lee Norris	University of Rhode Island	L. J. Herr & P. E. Lipps
1985	Ronda D. Conner-Koski	Purdue University	C. C. Powell
	Maria I. Trillas-Gay	University of Barcelona	H. A. J. Hoitink
1986	Murray A. Bulger	University of Guelph	M. A. Ellis & L. V. Madden
	Tony R. Joaquim	Rutgers University	R. C. Rowe
1987	David P. Miller	Colorado State University	I. W. Deep
	Young-Shil Shin	Yonsei University	M. O. Garraway
1988	Philip D. Brune	Wittenberg University	L. H. Rhodes
	Patricia Ngwira	University of Malawi	D. T. Gordon
	David S. Spink	Oregon State University	R. C. Rowe
	Leslie Lee Wilson	The Ohio State University	M. A. Ellis & L. V. Madden
1989	Marie June Anderson	University of Wisconsin	S. G. P. Nameth
	Russel E. De Long	University of Wisconsin	C. C. Powell
	Clarissa Josefa M. Maroon	University of Philippines	D. T. Gordon
1990	Verra A. Atmatjidou	University of Thessaloniki (Greece)	H. A. J. Hoitink
	Michael Jon Boehm	Heidelberg College (now Heidelberg University)	H. A. J. Hoitink
	Leena Chakravarty	Ranchi University	R. C. Garber
	Sergio L. Lenardon	National University of Cordoba	D. T. Gordon
	James T. Mayer	Hofstra University	L. R. Schreiber
	Sharon J. Wainshilbaum	University of Massachusetts	P. E. Lipps
1991	Scott T. Adkins	The Ohio State University	S. G. P. Nameth
	Shu-Ling Cheng	National Chung Hsing University (Taiwan)	S. G. P. Nameth
	John Clinton Stier	The Ohio State University	W. W. Shane

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
	Craig Tappan	Vanderbilt University	C. C. Powell & C. R. Krause
1992	Julia Bonga	University of Zimbabwe	D. T. Gordon
	Despina D. Botseas	Athens University of Agriculture (Greece)	R. C. Rowe
	Marcella E. Grebus	The Ohio State University	H. A. J. Hoitink
	Ngindu Kasongo	National University of Zaire	D. T. Gordon
	Magally J. Luque-Marin	Central University of Venezuela	S. G. P. Nameth
	Carlos Rodriquez	University of Costa Rica	L. V. Madden & L. R. Nault
1993	Tianyun Wu	Shandong University (China)	H. A. J. Hoitink
1994	Fikrettin Sahin	Ataturk University (Turkey)	S. A. Miller
	Rajishwar R. Persaud	University of Guyana	P. E. Lipps
	Musharaf Ahmad	NWFP Agricultural University (Pakistan)	D. L. Coplin
	Mildred Sosa-Alvarez	University of Puerto Rico	M. A. Ellis & L. V. Madden
	Pervaiz Akbar Abbasi	University of Agriculture-Faisalabad (Pakistan)	T. L. Graham
	Dae-Sup Park	Nyung Pook National University (South Korea)	M. O. Garraway
	Yusuf Yanar	Ataturk University (Turkey)	S. A. Miller
1995	John R. Fisher	The Ohio State University	S. G. P. Nameth
	Bryan Keith Blankenship	The Ohio State University	H. A. J. Hoitink
	William T. King Jr.	Shaw University	L. V. Madden
1997	Javier Dario Beltran-Herrera	Universidad del Valle (Colombia)	M. O. Garraway
	Sibel Demirci	University of Cukuroya (Turkey)	P. E. Lipps
	Maria Claudia Sanchez-Cuevas	Universidad de Oriente (Venezuela)	S. G. P. Nameth
	Jaber H. B. Al-Dahmani	United Arab Emirates University (U.A.E.)	H. A. J. Hoitink
	Omer Erincik	University of Ege (Turkey)	M. A. Ellis & L. V. Madden
	Leona Esther Horst	The University of Akron	C. R. Krause
	Matthew S. Krause	The Ohio State University	H. A. J. Hoitink
1998	Mohamed N. Al-Daoud	Mosul University	S. G. P. Nameth
	Yasar Alptekin	Cukurova University (Turkey)	R. M. Riedel
	Scott Gregory Rowe	Pfeiffer College	R. C. Rowe
	Troy Donovan Markham	The Ohio State University	M. J. Boehm
	Hideka Kobayashi	The Ohio State University	R. M. Riedel
1999	Christian Andrew Wyenandt	Cornell University	R. M. Riedel
	Enid Fisher	The Ohio State University	S. G. P. Nameth
	Glenn Curtis Colburn	The Ohio State University	S. A. Miller
	Marcy Roczacka	Indiana University	P. E. Lipps
	Samantha Lynn Thomas	Cumberland College	M. J. Boehm
2000	Daniel Craig Garling	The Ohio State University	M. J. Boehm
	Cerinda Loschinkohl	University of Maryland	M. J. Boehm
2001	Nathan Thomas Tuttle	The Ohio State University	A. E. Dorrance
	Simeon Wright	Iowa State University	S. A. Miller
	Jennifer Joy Cox	Oakland University	L. H. Rhodes
2002	Massimo Merighi	University of Bologna	D. L. Coplin
	Jessica Sue Engle	The Ohio State University	P. E. Lipps
	Mizuho Nita	Southern Illinois University at Carbondale	L. V. Madden

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
2003	Hongtao Jia	Beijing Forestry University	A. E. Dorrance
	Clayton Tyler Larue	The Ohio State University	T. L. Graham
	Laura Ann Wutz	The Ohio State University	R. M. Riedel
	Miguel E. Vega- Sánchez	Licenciatura-Pontificia Universidad Catolica del Ecuador	G-L. Wang
	Zhenyu Liu	Northeastern University (China)	S. Kamoun
2004	Amanda Brickner Core	Miami University	M. J. Boehm
	Joseph Henry LaForest	The Ohio State University	P. Bonello & D. A. Herms
	Laura Jean Gutierrez	Allegheny College	B. B. McSpadden Gardener
2005	Katherine Renee Whitten	The Ohio State University	L. H. Rhodes
	Raghavendra Joshi	University of Agricultural Sciences (Bangalore, India)	B. B. McSpadden Gardener
2006	Santiago Xavier Mideros Mora	Escuela Politecnica del Ejercito (Ecuador)	A. E. Dorrance
	Emilia Gabriela Briceno-Montero	University of Costa Rica	S. A. Miller
2007	Amy Lee Niver	The Ohio State University	M. J. Boehm
	Maria Soledad Benitez	Licenciatura La Pontificia Universidad Catolica (Ecuador)	B. B. McSpadden Gardener
2008	Nathan Michael Kleczewski	Oshkosh State College	P. Bonello
	Rosa Emilia Raudales Banegas	Escuela Agricola Panamericana Zamorano (Honduras)	B. B. McSpadden Gardener
	Christian Dagoberto Cruz	Escuela Agricola Panamericana Zamorano (Honduras)	A. E. Dorrance
2009	Sarah Dee Ellis	The Ohio State University	M. J. Boehm
	Nagendra Subedi	Tribhuvan University (Nepal)	S. A. Miller
	Cunyu Li	Beijing Normal University (China)	P. A. Paul
	John Louis Koenig	The Ohio State University	M. J. Boehm
	Annemarie Margaret Nagle	University of North Carolina-Chapel Hill	P. Bonello
	Kylea Joy Odenbach	University of New Mexico	P. A. Paul
	Maria Andrea Ortega	Ingeniero, Francisco de Paula (Colombia)	A. E. Dorrance
	Barry Lee Weber	The Ohio State University	L. H. Rhodes
2010	Carola Maria De La Torre Cuba	Agraria la Molina (Peru)	D. J. Lewandowski
	Aaron Lee Fown	The Ohio State University	D. L. Coplin
	Zhifen Zhang	South China Agricultural University	A. E. Dorrance
	Daniel Joseph Anco	Lewis University	M. A. Ellis & L. V. Madden
	Christine Diann Woltjen	The Ohio State University	D. J. Lewandowski
	Alissa Brynn Kriss	Indiana State University	L. V. Madden & P. A. Paul
2011	Oscar Alberto Burbano Figueroa	Universidad de Narino (Colombia)	T. K. Mitchell
	Kate Marie Gearhart	The Ohio State University	A. E. Dorrance
2012	Chenxi Chen	Tsinghua University (China)	T. K. Mitchell
	Jinnan Hu	Nanjing University (China)	T. K. Mitchell
	Matthew W. Wallhead	The Ohio State University	P. A. Paul
	Bridget Lee Meiring	The Ohio State University	T. K. Mitchell
	Racheal Anne Pack	The Ohio State University	T. L. Graham
	Xiaoqing Rong	China Agricultural University	B. B. McSpadden Gardener
	Jasleen Singh	Punjab Agricultural University (India)	F. Qu
	Fiorella Melina Cisneros	Universidad San Marcos (Peru)	M. G. Redinbaugh & F. Qu
	Spencer James Debenport	Saint Olaf College	B. B. McSpadden Gardener
	Patrick William Sherwood	The Ohio State University	P. Bonello

Year	Name	Origin of Bachelor's Degree	Faculty Advisor
	Chunxue Cao	China Agricultural University	B. B. McSpadden Gardener
	Maria Veronica Cepeda Miranda	Escuela Politecnica del Ejercito (Equador)	B. B. McSpadden Gardener
	Andika Gunadi	The Ohio State University	A. E. Dorrance
2013	Godwill Mih Chewachong	University of Yaounde 1 (Cameroon)	F. Qu
	Jorge David Salgado	Escuela Agricola Panamericana Zamorano (Honduras)	P. A. Paul
	Ellie Kathleen Walsh	Cornell University	C. G. Taylor
	Anna Oliva Conrad	SUNY College of Environmental Science and Forestry	P. Bonello
	Diane Elizabeth Plewa	University of Illinois	A. E. Dorrance
	Kelsey Faith Andersen	Lafayette College	P. A. Paul
	Ashlina Chin	Virginia Polytechnic Institute & State University	F. Qu
	Daisy L. D'Angelo	Capital University	P. A. Paul
2014	Xing Ma	China Agricultural University	S. A. Miller
	Bhupendra Acharya	Tribhuvan University (Nepal)	A. E. Dorrance
	Christine Susan Balk	Saint Lawrence University	A. E. Dorrance
	DeeMarie Marty	The University of Akron	C. G. Taylor
	Brittany Jaye Nauth	The College of Wooster	C. G. Taylor
	David Neil Showalter	Eastern Mennonite College	P. Bonello
2015	Horacio Daniel Lopez Nicora	University Nacional de Asuncion Paraguay	T. L. Niblack
	Abasola Comptom Maurice Simon	University of Guyana	P. A. Paul & T. L. Niblack
2016	Rachel Danielle	Capouya University of Georgia	T. K. Mitchell
	Meredith Milo Eyre	The College of Wooster	A. E. Dorrance
	Donald P. Gillis	Morehouse College	C. G. Taylor
	Karasi B. Mills	University of Washington	L. V. Madden & P. A. Paul
	Krystel Acevedo	University of Puerto Rico, Mayaguez	C. G. Taylor
	Jaqueline Huzar Novakowiski	Universidade Estadual do Centro-Oeste (Brazil)	A. E. Dorrance
	Anna Kathryn Stasko	Concordia College	A. E. Dorrance
	Pavinee Suttiviriya	Kasetsart University (Thailand)	G-L. Wang

Appendix 3

Students Who Have Received the Master in Plant Health Management Degree from The Ohio State University in the Departments of Plant Pathology and Entomology (2014–2016)

Year	Name	Origin of Bachelor's Degree	Independent Study & Faculty Advisor
2014	Mary F. Griffith	The Ohio State University	M. Gardiner
	Anastasia Nicole Tonti	The Ohio State University	F. Peduto Hand
	Jason Michael Hartschuh	The Ohio State University	A. Michel & P. Paul
	Rong Sun	South China Agricultural University	C. Welty
2015	Ethan John Smrtnik	The Ohio State University	A. E. Dorrance & P. Paul
	Elizabeth Honor Roche	The Ohio State University	F. Peduto Hand
	Brian Michael Kleinke	The Ohio State University	M. Gardiner
	Scott Carl Erick	The Ohio State University	D. Shetlar
2016	John Mark Schoenhals	The Ohio State University	A. E. Dorrance
	Nicole V. Wright	Oberlin College	M. Gardiner

Appendix 4

Students Who Have Received the Ph.D. Degree from The Ohio State University with a Focus on Plant Pathology or Related Areas in the Department of Botany (1929–1947), the Department of Botany and Plant Pathology (1948–1966), and the Department of Plant Pathology (1967–2016)

Year	Name	Faculty Advisor
1929	Minnie May Johnson	W. G. Stover
	Dissertation: The gastromycetes of Ohio.	
1930	Ora Neal Liming	W. G. Stover
	Dissertation: The relation of pentathionic acid and its component constituents to the toxicity of sulphur fungicides, and its toxic action on fungi.	
1935	Curtis May	W. G. Stover
	Dissertation: A study of the life history of *Cerastostomella ulmi* in relation to the development and spread of the Dutch Elm Disease.	
1937	Theodore Walter Bretz	W. G. Stover
	Dissertation: *Botrytis cinerea* Pers. in relation to tomatoes grown under glass.	
1938	James Arthur Herrick	W. G. Stover
	Dissertation: A contribution to the biology of *Stereum gausapatum* Fries.	
1943	Darrell Marshall McLean	W. G. Stover & G. W. Blaydes
	Dissertation: An experimental and histological study of phloem necrosis, a virus disease of American Elm.	
1948	Theverthundyil Abraham Koshy	C. C. Allison
	Dissertation: Morphology and genetics of *Ascorolus striisporus*.	
1949	Frank Heaton Bell	C. C. Allison
	Dissertation: Anthracnose of cereals and other grasses.	
	David William Rosberg	C. C. Allison
	Dissertation: Blossom and leaf mottle of orchids.	
1950	Blair Ferdinand Janson	W. G. Stover
	Dissertation: Fusarium root rot and wilt of dill.	
	Don Carlos Norton	C. C. Allison
	Dissertation: The relation of various fungus isolates to strawberry root rot development.	
	George Swank, Jr.	C. C. Allison
	Dissertation: Variation of monosporous isolates of *Colletotrichum phomoides*.	
	John Rush Warren	C. C. Allison
	Dissertation: A study of Stewart's disease of corn with special reference to factors related to resistance and susceptibility.	

Year	Name	Faculty Advisor
	Patricia Lee Van Burgh	C. C. Allison
	Dissertation: Parasitism of *Colletotrichum phomoides*. II. The influence of some ontogenetic factors of tomato fruits.	
1952	**John Palchefsky Allen**	W. D. Gray
	Dissertation: Carbon train technique and its application to quantitative studies of Basidiomycete metabolism.	
1953	**Hugh Chapman Palmer**	C. C. Allison
	Dissertation: Mode of fungicidal action of sodium dialkyldithiocarbamates.	
	Howard Ernest Reed	C. C. Allison
	Dissertation: Studies on *Rhynchosporium secalis* (ond.) Davis, causing scald on barley.	
	August F. Schmitthenner	C. C. Allison
	Dissertation: The relationship of growth, pectolytic, and cellulytic activity of pathogenic variation among isolates of *Colletotrichum phomoides* and related fruit rotting fungi.	
1954	**William Henry Brandt**	W. D. Gray
	Dissertation: The effect of the oak wilt fungus upon oak wood.	
	Virginia Foster	W. D. Gray
	Dissertation: A study of an orchid root-rot fungus.	
	Lansing Earl Williams	C. C. Allison
	Dissertation: Factors affecting the pathogenicity of *Colletotrichum lagenarium* (Pass.) Ell. & Halst.	
1955	**Clayton Wayne Ellett**	W. G. Stover & C. C. Allison
	Dissertation: The parasitic fungi of Ohio plants.	
	George Donald Munger	C. C. Allison
	Dissertation: Sorption and fungitoxicity of potassium dimethyl- and di-n-propyl di-thiocarbamates.	
	James David Panzer	C. C. Allison
	Dissertation: Plant virus local lesions in relation to osmotic pressure.	
	Albert Joseph Suhovecky	C. C. Allison & H. C. Young
	Dissertation: A Phytophthora root rot of soybeans.	
1956	**George James Bart**	H. C. Young & C. C. Allison
	Dissertation: Host-parasite relationships of the oak wilt fungus.	
	Robert Eugene Deems	H. C. Young & C. C. Allison
	Dissertation: Black root of sugar beets as influenced by various cropping sequences and their associated microfloras.	
	Harold Clark Fritts	J. N. Wolfe
	Dissertation: Relations of radial growth of beech (*Fagus grandifolia* Ehrh.) to some environmental factors in a central Ohio forest during 1954–55.	
	Leonard Jay Herr	C. C. Allison & H. C. Young
	Dissertation: Investigations of a Phytophthora root rot of soybeans.	
	Sankara K. Menon	C. C. Allison & H. C. Young
	Dissertation: Some factors influencing soil mycofloras.	
	Asa Cline Sims, Jr.	C. C. Allison
	Dissertation: Virulence of single basidiospore isolates of *Pellicularia filamentosa* as affected by preculture substrate.	
1957	**Robert Eugene Stall**	L. J. Alexander
	Dissertation: Cytological, cultural and pathological studies of *Alternaria solani* (Ell. and Mart.) Jones and Grout in relation to heterocaryotic variation.	
1958	**Paul Marion Alexander**	C. C. Allison
	Dissertation: Movement of a fungicide, cyano (methylmercuri) guanidine, in sand and in soil.	

Year	Name	Faculty Advisor
	Henry William Crittenden	C. C. Allison
	Dissertation: Pathogen-suscept relationship of *Meloidogyne incognita acrita* and Glycine max.	
	John Paul Jones	L. J. Alexander
	Dissertation: The relation of certain environmental factors, tobacco mosaic virus strains, and sugar concentration to the blotchy ripening disease of tomato and the inheritance of the tendency to the disease.	
	Herbert Harvey Klein	C. C. Allison & H. C. Young
	Dissertation: Etiology of the Phytophthora disease of soybeans.	
	Donald Frederick Schoeneweiss	C. C. Allison & H. C. Young
	Dissertation: The use of systemic chemicals in oak wilt chemotherapy and their effect upon disease development.	
	Paul Loyd Thayer	L. E. Williams
	Dissertation: Some factors affecting Gibberella stalk- and root-rot of corn.	
1959	**Doyle Edward Anderegg**	C. C. Allison
	Dissertation: Physiological variation among selected isolates of the fungus (*Diaportia phaseolorum*) var (sojae) in relation to pathogenicity.	
	Daniel Joseph Higgins	W. D. Gray & C. C. Allison
	Dissertation: The utilization of glucose carbon by five isolates of the fungus *Ceratocystis ulmi*.	
	Robert Winfield Metz	C. C. Allison
	Dissertation: Differential disease development as a measure of entrance and movement of a fungicide within cucumber seedlings.	
	Jan Rutger Van Diepen	C. C. Allison
	Dissertation: Bioassay of the systemic activity of cycloheimide semicarbazone in cucumber plants.	
1960	**Harold Eugene Kazmaier**	C. C. Allison
	Dissertation: Some pathophysiological aspects of premature defoliation associated with rose blackspot.	
	John James McRitchie	L. J. Alexander
	Dissertation: Pathogenic, serological, and certain chemical characteristics of four strains of tobacco mosaic virus.	
	Glenn Edward Smith	C. C. Allison
	Dissertation: Effects of antecedent and immediate environment on a species of *Cephalosporium* producing an antibiotic.	
	Carl Richard Sova	W. D. Gray
	Dissertation: Metabolic pathways in ethyl acetate production by *Hansenula anomala* (Hansen) Sydow.	
	Edgar Wesley Toop	C. W. Ellett
	Dissertation: Verticillium and Fusarium wilts of chrysanthemum and the use of cycloheximide as a chemotherapeutant.	
	Jerry Tyler Walker	C. W. Ellett & J. D. Wilson
	Dissertation: Interrelationships of time, temperature, and chemicals in control of the root-knot nematode, *Meloidogyne hapala* Chitwood on propagating stock.	
1961	**Mohammad Myser Ali-Miah**	C. C. Allison
	Dissertation: Comparison of the physiology of certain isolates of *Colletotrichum graminicola* and their pathogenicity on wheat.	
	Carl Fleming Bell	C. C. Allison
	Dissertation: Cultural and pathogenic variability of *Verticillum albo-atrum*.	
	Floyd James Williams	C. C. Allison
	Dissertation: Nitrogen sources in relation to subsequent virulence of *Colletotrichum phomoides*.	
1962	**T. A. Abraham**	C. C. Allison
	Dissertation: Physiological characteristics of actinomycetes from the rhizosphere and non-rhizosphere soils of corn and soybean.	
	Peter Wales Bhelwa	C. C. Allison
	Dissertation: Seed decay, seedling blight, and root rot of *Cicer arietinum* caused by *Phytophthora cryptogea*.	
	John Adam Chisler	C. C. Allison
	Dissertation: Interruption of the syndrome of Fusarium wilt of tomato by a species of *Cephalosporium*.	

Year	Name	Faculty Advisor
	Ralph Kenneth Horst	C. W. Ellett & C. Leben
	Dissertation: Pathogenic and enzymatic variations in *Fusarium oxysporum* f. *callistephi*, causal agent of aster wilt.	
	Donald De Vere Kaufman	L. E. Williams
	Dissertation: Effect of mineral fertilization, soil reaction, and carbon:nitrogen ratio, on soil fungi.	
	George Mirron Willis	L. E. Williams & C. C. Allison
	Dissertation: Analysis and biological significance of soil fungistasis.	
1963	**Jaswant Singh Chohan**	C. C. Allison
	Dissertation: Development, inhibition and variability of tobacco ringspot virus-soybean blight strain.	
	Sadashiv Gopal Pathak	C. C. Allison
	Dissertation: Antagonistic properties of a *Streptomyces* species against the causal agent of Fusarium wilt of tomato.	
	Patrick Vincent Carmel Pinto	W. D. Gray
	Dissertation: The influence of substrate composition and environment on the amino acid content of the mycelia of some fungi imperfecti.	
1964	**James Willard Hilty**	A. F. Schmitthenner
	Dissertation: Development of electrophorectic methods and comparisons of proteins extracted from soybeans resistant and susceptible to *Phytophthora*.	
	John Earl Rodebaugh	C. W. Ellett
	Dissertation: Effect of *Cephalosporium* sp. on several biochemical aspects of Fusarium wilt in resistant and susceptible tomato plants.	
1965	**Edison Rudolph Fowlks**	C. Leben & J. F. Snell
	Dissertation: Sterols in relation to the inhibition of fungi by nystatin.	
	Daniel V. Philips	C. Leben
	Dissertation: Studies on the mechanism of Fusarium wilt symptom reduction by a species of *Cephalosporium*.	
	Ira Roy	C. W. Ellett
	Dissertation: Glutamic acid dehydrogenase activity associated with pathogenicity of Fusarium in tomato.	
1966	**Parduman Singh Bedi**	C. W. Ellett
	Dissertation: Studies on the biological control of Verticillium wilt in okra.	
	Howard Walter Boyd	C. C. Allison
	Dissertation: Storage and germination of cuttings and soil micro-organisms as they relate to the pineapple disease of sugar cane.	
	Stanley Bernard King	L. J. Alexander
	Dissertation: Studies of hyphal morphogenesis, pathogenicity, and toxin production of *Alternaria solani*.	
	Ahmed-Kilani Mohamed Mostafa	C. W. Ellett
	Dissertation: Studies of the control of vascular wilt diseases of cotton by fungi associated with the cotton plant.	
	Nelson Peter Mwanza	L. E. Williams
	Dissertation: Viruses as predisposing factors in the susceptibility of corn and wheat plants to other pathogens.	
1967	**Babu Singh Siradhana**	C. W. Ellett & A. J. Schmitthenner
	Dissertation: Pathogenic variability within *Phytophthora parasitica* as related to formation of post-infectional substances in peperomia.	
	Baldev Krishan Vig	E. F. Paddock
	Dissertation: Experimental alterations of leaf spot frequencies in *Glycine max* (L.) Merrill, with reference to the mechanism of spot formation.	
1970	**Gilbert Clayton Daft**	C. Leben & C. W. Ellett
	Dissertation: Studies of the epidemiology of bacterial blight of soybean.	
1971	**Caio O. N. Cardoso**	M. O. Garraway
	Dissertation: Accumulation of phenols and phytoalexins in hypocotyls of *Phaseolus vulgaris* L. infected by *Fusarium solani* f. sp. *phaseoli* (Burk) Synd & Hans.	
	Elke J. B. N. Cardoso	A. F. Schmitthenner
	Dissertation: Influence of light on the oospore germination of several species of *Pythium* and *Phytophthora*.	

Year	Name	Faculty Advisor
	James Calvin McFeeley	C. W. Ellett
	Dissertation: Studies on *Phyllosticta* diseases of corn in Ohio.	
	Hasime Tokeshi	C. C. Allison & I. W. Deep
	Dissertation: Cross-protection in tomato with Fusarium and Verticillium wilt pathogens.	
	Carroll Phillip Vance	M. O. Garraway
	Dissertation: The effect of ethanol and other low molecular weight alcohols on phenols and phenol oxidizing enzymes in *Armillaria mellea* (Vahl) Quel. in relation to growth and rhizomorph development.	
1972	**Kenneth Michael Foos**	R. Seymour
	Dissertation: Effects of temperature, photoperiod and light intensity on sporulation of *Camporsporium antennatum* Harkn.	
	Betty Friedman Klapper	J. A. Schmidt & R. M. Mayer
	Dissertation: Studies on the extracellular protease of *Aspergillus oryzae*: catalytic properties and biological appearance.	
	Pritam Singh Verma	C. W. Ellett
	Dissertation: Induced resistance to Fusarium wilt in susceptible tomato isolines by the non-pathogen, *Chaetomium*.	
1973	**Liu-Gei Chou**	A. F. Schmitthenner
	Dissertation: Factors affecting Pythium root rot of soybean and germination of oospores of *Pythium ultimum*.	
	Donald Glenn White	C. W. Ellett
	Dissertation: The preparation and use of a fluorescent antibody reagent for detection of *Pythium graminicola*.	
1974	**Wolfgang Wilhelm Gerlach**	H. A. J. Hoitink & C. W. Ellett
	Dissertation: Biology of shoot blight, dieback and crown rot on *Pieris japonica* in Ohio nurseries.	
	Richard Terry Jones	D. T. Gordon
	Dissertation: Purification, biological and physical properties and serology of bean yellow mosaic virus isolates from soybean, navy bean and clover.	
1975	**Konrad Thomas Kmetz**	C. W. Ellett & A. F. Schmitthenner
	Dissertation: Soybean seed decay: Studies on disease cycles, effects of cultural practices on disease severity and differentiation of the pathogens *Phomopsis* sp., *Diaporthe phaseolorum* var. *sojae* and *D. phaseolorum* var. *caulivora*.	
	John Paul Sleesman	C. Leben
	Dissertation: Microbial antagonists of *Bipolaris maydis* and the factors affecting survival of plant pathogenic and non-pathogenic bacteria.	
1976	**Charles Richard Krause**	T. C. Weidensaul
	Dissertation: Effect of ozone on geranium, *Botrytis cinerea*, pers. and the host-pathogen relationship.	
	Kenneth Louis Pohronezny	P. O. Larsen & C. Leben
	Dissertation: Angular leafspot of cucumber: Systemic invasion of the host by *Pseudomonas lachrymans* and field studies of yield losses due to epiphytotics of the disease.	
	Balakrishna Rao	A. F. Schmitthenner & C. W. Ellett
	Dissertation: Pythium root rot of corn; *Pythium graminicola* and other causal agents involved; detection of *P. graminicola* in soil; and effects of tillage, rotation, fungicides, moisture and temperature.	
	John Louis Saladini	P. O. Larsen & A. F. Schmitthenner
	Dissertation: A study of Pythium species associated with turfgrasses in Ohio; their prevalence and pathogenicity.	
1978	**Christine Taylor Stephens**	A. F. Schmitthenner & L. J. Herr
	Dissertation: Rhizoctonia damping off of bedding plants: pathogenicity, characterization, ecological, epidemiological and control studies.	
1980	**Austin Kent Hagan**	P. O. Larsen
	Dissertation: Epidemiological studies of melting-out of Kentucky bluegrass and development of a fungicide bioassay.	
	Paul Lawrence Pusey	C. L. Wilson
	Dissertation: Characteristics of *Ceratocystis ulmi* related to pathogenicity.	
	James Allen Quinn	C. C. Powell
	Dissertation: Powdery mildew of begonia.	

Year	Name	Faculty Advisor
1981	**Debra F. Edwards**	M. O. Garraway
	Dissertation: Polyphenoloxidase enhancement in *Armillaria mellea* by ethanol and guaiacol in relation to their stimulatory effects on growth and rhizomorph production.	
	Marsha Brown Martin	R. M. Riedel & R. C. Rowe
	Dissertation: Interrelationships between *Pratylenchus penetrans*, P. *crenatus*, and *Verticillium dahliae*, and their effects on *Solanum tuberosum* cv. 'superior' in field microplots.	
	Douglas Allan Spilker	P. O. Larsen
	Dissertation: Leaf blight and crown rot of 'Toronto' creeping bentgrass: etiology, host range, and effect of environmental factors on disease severity.	
1982	**Donald M. Gardner, Jr.**	A. F. Schmitthenner & M. O. Garraway
	Dissertation: Factors affecting expression of tolerance in soybean seedlings to Phytophthora rot incited by *Phytophthora megaspera* f. sp. *glycinea*.	
	Thomas Johnson Hall	C. Leben
	Dissertation: Decay of red oak: Effects of antagonistic microflora on wood discoloration and the effect of oxygen on *Polyporus compactus* in wood.	
	Marinez Muraro Alves de Lima	R. M. Riedel
	Dissertation: Physical and chemical factors affecting reproduction of *Pratylenchus* species in monoxenic culture.	
	Larry Lee McDaniel	D. T. Gordon
	Dissertation: Characterization of a strain of maize dwarf mosaic virus infecting oats.	
	Eric B. Nelson	H. A. J. Hoitink & R. M. Riedel
	Dissertation: Studies on the nature and mechanisms of suppression of *Rhizoctonia solani* in hardwood bark composts.	
1983	**Craig Holycross Canaday**	A. F. Schmitthenner & L. H. Rhodes
	Dissertation: Effects of fertilization and other factors on Phytophthora rot of soybeans and on natural inoculum of *Phytophthora megaspera* f. sp. *glycinea* in soil.	
1984	**Freda Machelle Ashbaugh**	P. O. Larsen
	Dissertation: Comparison of five fungicides used for control of Pythium blight of *Festuca rubra*.	
	Gary G. Grove	M. A. Ellis & L. V. Madden
	Dissertation: Epidemioloy of strawberry leather rot.	
	Indra Jeet Gupta	A. F. Schmitthenner & M. B. McDonald
	Dissertation: Effect of common seed, soil and storage pathogens on soybean seed quality testing.	
	Thomas W. Hobbs	A. F. Schmitthenner & M. B. McDonald
	Dissertation: Identification of *Phomopsis longicolla*, sp. nov., and its thermal biological control in soybean seed.	
1985	**Roy L. Patton**	M. O. Garraway
	Dissertation: Studies on the use of foliar peroxidase activity as a predictor of relative sensitivity to ozone among selected groups of *Populus* hybrids and other trees.	
1986	**Mohamed Yasser Abdalla**	L. H. Rhodes
	Dissertation: Isolation and characterization of species and races of *Colletotrichum* occurring on alfalfa.	
	Timothy William Bischoff	M. O. Garraway
	Dissertation: Ammonium production by *Bipolaris maydis* race T on L-asparagine and its relationship to the pH of the culture medium and growth and sporulation of the fungus.	
	Ekanem C. W. Wokoma	M. O. Garraway
	Dissertation: The effects of high temperature stress and nutrient release from maize (*Zea mays* L.) leaves on susceptibility to *Bipolaris maydis* (Nisikado) Shoemaker.	
1987	**Weidong Chen**	H. A. J. Hoitink
	Dissertation: The nature and mechanisms of suppression of damping-off caused by *Pythium ultimum* in container media.	

Year	Name	Faculty Advisor
	Rodolfo G. Gomez-Luengo	D. T. Gordon
	Dissertation: Proteins and serological relationships of maize mosaic virus isolates and replication of the virus in maize (*Zea mays* L.) protoplasts.	
1988	**Young R. Chung**	H. A. J. Hoitink
	Dissertation: Suppression of *Rhizoctonia solani* and its interaction with *Trichoderma hamatum* in bark compost container media.	
1989	**Keith M. Howard**	A. F. Schmitthenner
	Dissertation: Effect of soil-applied metalaxyl on tolerance in populations of *Phytophthora megasperma* f. sp. *glycinea*.	
	Tony R. Joaquim	R. C. Rowe
	Dissertation: Vegetative compatibility analysis and comparative pathogenicity to potato of soil and potato plant isolates of *Verticillium dahliae*.	
1990	**Xin Ge**	D. T. Gordon
	Dissertation: Characterization of the genome of maize chlorotic dwarf virus and an associated satellite RNA.	
1991	**Ravindra G. Bhat**	A. F. Schmitthenner
	Dissertation: Genetics of virulence in *Phytophthora megasperma* f.sp. *glycinea*.	
1992	**Michael Jon Boehm**	H. A. J. Hoitink
	Dissertation: Microbial ecology of Canadian sphagnum peat and compost-amended potting mixes varying in suppressiveness to Pythium root rot and damping-off.	
	Adipala Ekwamu	P. E. Lipps
	Dissertation: Variations in field populations, disease development, and yield losses associated with *Exserohilum turcicum* on maize in Uganda.	
	Amel Ghanay Gharbi	S. G. P. Nameth
	Dissertation: Use of monoclonal-based serodiagnostic assays for detection of *Clavibacter michiganensis* subsp. *michiganensis* in infected tomato seeds and seedlings.	
	Robert Andrew Hudson	W. W. Shane
	Dissertation: Comparative studies of wettable and non-wettable soils from *Agrostis palustris* sand greens.	
	Norbert Gilumbu Muyolo	P. E. Lipps
	Dissertation: Variability among *Rhizoctonia solani* isolates associated with soybeans and dry beans in Ohio and Zaire and evaluation of host resistance to Rhizoctonia root rot, hypocotyl rot, and web blight.	
	Nilceu R. X. De Nazareno	L. V. Madden & P. E. Lipps
	Dissertation: Influence of infected corn residue as a source of primary inoculum of *Cercospora zeae-maydis* (Tehon and Daniels), the cause of gray leaf spot of corn.	
1993	**Marie June Anderson**	S. G. P. Nameth & J. P. Kamalay
	Dissertation: Complementary DNA cloning, sequencing, and analysis of the Pelargonium flower-break virus genome.	
	Sergio L. Lenardon	D. T. Gordon
	Dissertation: Partial nucleotide sequences of the genomes of maize dwarf mosaic virus (MDMV) strains A, D, E. and F and their implication in classification of potyviruses.	
	Caiphas N. Mzira	D. T. Gordon
	Dissertation: Maize chlorotic dwarf virus strain M1, a distinct member of the Machlovirus group.	
1994	**Lydia I. Rivera-Vargas**	T. L. Graham
	Dissertation: Possible biochemical mechanisms of pathogenicity in *Phytophthora sojae*.	
1995	**Pervais Akbar Abbasi**	T. L. Graham
	Dissertation: Genetic and developmental control of soybean competency factors.	
	Marcella E. Grebus	H. A. J. Hoitink
	Dissertation: Development of plant disease suppressive compost-amended biocontrol agent-fortified potting mixes and turf topdressings and use of random amplified polymorphic DNA markers for identification of *Trichoderma hamatum* 382.	
	Deborah Redhead Hanmer	R. M. Riedel
	Dissertation: *Verticillium dahliae* and *Pratylenchus* penetrans interaction on processing tomatoes.	

Year	Name	Faculty Advisor
	Medani Ahmed Omer	T. L. Graham & A. F. Schmitthenner
	Dissertation: Biochemical defense responses to *Phytophthora sojae* along developmental zones of soybean roots.	
	Vidya Mohan Raj Schalk	S. G. P. Nameth
	Dissertation: Partial characterization of the genome and analysis of the 30K movement protein of a previously undescribed virus infecting *Epimedium* sp.	
1996	**Musharaf Ahmad**	D. L. Coplin
	Dissertation: Molecular characterization of the *hrpN* gene of *Erwinia stewartii*.	
	Jackson G. M. Njuguna	D. T. Gordon
	Dissertation: Epidemiology of maize streak disease in Kenya.	
1997	**Ming-Ching Hsieh**	T. L. Graham
	Dissertation: Purification and characteristics of a ß-glucosidase specific for isoflavone conjugates from soybean root.	
	Patricia Ngwira	D. T. Gordon
	Dissertation: Nucleotide sequence diversity in maize and grass-infecting streak geminiviruses: A basis for nucleotide sequence classification and identification.	
	Fikrettin Sahin	S. A. Miller
	Dissertation: Detection, identification and characterization of the strains of *Xanthomonas campestris* pv. *vesicatoria* by traditional and molecular methods, and resistance in *Capsicum* species to *Xanthomonas campestris* pv. *vesicatoria* pepper race 6.	
	Yusuf Yanar	S. A. Miller
	Dissertation: Pathogenesis of *Sclerotinia sclerotiorum* (Lib.) de Bary on pepper (*Capsicum annuum* L.).	
1998	**Charles Changa**	D. T. Gordon
	Dissertation: Evaluation of maize streak geminivirus resistance in maize germplasm by vascular puncture inoculation.	
	Dae-Sup Park	T. L. Graham
	Dissertation: Regulation of soybean disease resistance: proximal cell competency and distal cell potentiation.	
	Tianyun Wu	D. S. Verma
	Dissertation: Assimilation of symbiotically-reduced nitrogen in tropical legumes: regulation of peroxisome proliferation and ureide production.	
1999	**Javier Dario Beltran**	M. O. Garraway
	Dissertation: Study of the light reduction sensitivity of the maize (*Zea mays* L.) Texas male-sterile cytoplasm to the T-toxin produced by *Bipolaris maydis*/race T.	
	John Robert Fisher	S. G. P. Nameth
	Dissertation: Partial characterization of a cucumber mosaic virus isolate and its associated satellite RNA from *Ajuga reptans* 'Royalty'.	
	David Youngsun Han	H. A. J. Hoitink
	Dissertation: Identification and characterization of the systemic resistance inducing biological control agent *Pantoea agglomeraus* E278A from compost-amended potting mixes.	
	Maria Claudia Sanchez-Cuevas	S. G. P. Nameth
	Dissertation: Characterization of a new tobamovirus inducing severe mosaic in double petunia (Petunia x hybrida).	
	William Walter Turecheck	L. V. Madden
	Dissertation: Spatial characteristics of Phomopsis leaf blight and leaf spot of strawberry: pattern, association, and scale.	
2000	**Jaber H. B. Al-Dahmani**	H. A. J. Hoitink
	Dissertation: Biological control of Xanthomonas bacterial spot of tomato with compost amended mixes and compost water extracts.	
2001	**Yasar Alptekin**	R. M. Riedel
	Dissertation: Distribution and control of soybean cyst nematode, *Heterodera glycines* Ichinohe (Tylenchida:Heteroderidae), in Ohio.	
	Richard Edema	D. T. Gordon
	Dissertation: The genetics of virulence of the maize streak mastrevirus (MSV).	

Year	Name	Faculty Advisor
	Matthew Stephen Krause	H. A. J. Hoitink
	Dissertation: Specific suppression of plant diseases provided by compost-amended substrates.	
2002	**Omer Erincik**	M. A. Ellis & L. V. Madden
	Dissertation: Studies to determine time of grape berry and rachis susceptibility, and environmental parameters required for leaf and cane infection by *Phomopsis viticola*.	
	Felicita Varela-Ramirez	S. G. P. Nameth
	Dissertation: A new application method of the systemic fungicide metalaxyl to control poinsettia (*Euphorbia pulcherrima* Willd. Ex. Klotzsch) root rot caused by *Pythium ultimum* Trow.	
2003	**Massimo Merighi**	D. L. Coplin
	Dissertation: Molecular biology and biochemistry of the regulation of hrp/type III secretion genes in the corn pathogen *Pantoea stewartii* subsp. *stewartii*.	
	Gertrude Ayerchoo Torto	S. Kamoun
	Dissertation: Functional genomics of extracellular proteins of *Phytophthora infestans*.	
	Jianhua Zhang	S. A. Miller & S. Hogenhout
	Dissertation: Diversity of aster yellows phytoplasmas in lettuce.	
2004	**Samantha L. Thomas**	M. J. Boehm
	Dissertation: The development and utilization of assays to characterize populations of *Gaeumannomyces graminis*.	
	Christian Andrew Wyenandt	R. M. Riedel
	Dissertation: Fusarium fruit rot (*Fusarium* spp.) of pumpkin *(Cucurbita pepo)* and its control with cover crop mulches.	
2005	**Jennifer Joy Ariss**	L. H. Rhodes
	Dissertation: Pathological factors affecting persistence in alfalfa with emphasis on diseases incited by *Fusarium* species.	
	Xiaoyun Dong	D. S. Verma
	Dissertation: Functional investigation of *Arabidopsis* culture synthases and the signal transduction pathway.	
	Jessica Sue Engle	P. E. Lipps
	Dissertation: Pathogenic characterization, distribution in Ohio and wheat genotype reactions to *Stagonospora nodorum* and *Pyrenophora tritici-repentis*.	
	Edgar Huitema	S. Kamoun
	Dissertation: Determinants of nonhost resistance to *Phytophthora infestans*.	
	Young-Ki Jo	M. J. Boehm
	Dissertation: Management of dollar spot and gray leaf spot on turfgrass.	
	Mizuho Nita	L. V. Madden & M. A. Ellis
	Dissertation: Epidemiology and management of Phomopsis cane and leaf spot of grape.	
	Miaoying Tian	S. Kamoun
	Dissertation: Functional characterization of extracellular protease inhibitors of *Phytophthora infestans*.	
	Lirong Zeng	G-L. Wang
	Dissertation: A novel mechanism underlying programmed cell death in plant defense signaling.	
2006	**Angel Rebollar Alviter**	M. A. Ellis & L. V. Madden
	Dissertation: Efficacy and physical mode of action of fungicides against leather rot of strawberry and sensitivity of *Phytophthora cactorum* isolates to Azoxystrobin.	
	Cristian Nava Diaz	S. A. Miller
	Dissertation: Role of plant growth-promoting rhizobacteria in integrated disease management and productivity of tomato.	
	Chatchawan Jantasuriyarat	G-L. Wang
	Dissertation: Identification and characterization of genes involved in the interaction between rice and rice blast fungus.	
	Amr Tag El-Din Saeb	P. Grewal
	Dissertation: Phylogenetic and population genetic studies on some insect and plant associated nematodes.	

Year	Name	Faculty Advisor
2007	Shabeg Singh Briar	P. Grewal & S. A. Miller
	Dissertation: Nematodes as bioindicators of soil food web health in agroecosystems: a critical analysis.	
	Jorunn Indra Berit Bos	S. Kamoun
	Dissertation: Function, structure and evolution of the RXLR effector AVR3a of *Phytophthora infestans*.	
	Jing Song	S. Kamoun
	Dissertation: Functional characterization of extracellular protease inhibitors of *Phytophthora* spp. and their target tomato proteases.	
	Christopher Michael Wallis	P. Bonello
	Dissertation: Understanding the roles of phenolics and terpenoids in pine defense against fungal pathogens.	
2008	Maria Soledad Benitez	B. B. McSpadden Gardener
	Dissertation: Applied T-RFLP analyses for the identification and characterization of microbial populations associated with damping-off incidence in a transitional organic cropping system.	
	Kirk Dale Broders	A. E. Dorrance
	Dissertation: Seed and seedling disease of corn and soybean in Ohio: The role of *Fusarium graminearum*, *Pythium* species diversity, fungicide sensitivity, *Pythium* community composition, and soil properties in disease severity.	
	Nathan Michael Kleczewski	P. Bonello
	Dissertation: Nutrient and drought effects on biomass allocation, phytochemistry, and ectomycorrhizae of birch.	
	Rose Ellen Palumbo	G-L. Wang & C. R. Krause
	Dissertation: Target region amplification polymorphism (TRAP) analysis of pelargonium.	
	Miguel E. Vega-Sanchez	G-L. Wang
	Dissertation: The E3 ubiquitin ligase SPL11 regulates both programmed cell death and flowering time in rice.	
2010	Sawsan Youssef Elateek	S. A. Miller
	Dissertation: Molecular and biochemical genetic studies on some leafhopper transmitted plant pathogens.	
	Xiulan Xu	S. A. Miller
	Dissertation: Transmission of *Clavibacter michiganensis* subsp. *michiganensis* from seed to seedling and development strategies to control the pathogen in seed.	
2011	Daniel Joseph Anco	M. A. Ellis & L. V. Madden
	Dissertation: Epidemiological studies on the sporulation potential and environmental factors affecting sporulation of *Phomopsis viticola* on infected grapevines.	
	Jiye Cheng	T. L. Graham
	Dissertation: Development of metabolomics strategies for novel natural product discovery and its application to the study of soybean defense responses.	
	Margaret Lee Ellis	A. E. Dorrance & P. A. Paul
	Dissertation: Epidemiological studies on the sporulation potential and environmental factors affecting sporulation of *Phomopsis viticola* on infected grapevines.	
	Melanie L. Lewis Ivey	S. A. Miller
	Dissertation: Assessing microbial risks and management strategies in vegetables.	
	Alissa Brynn Kriss	L. V. Madden and P. A. Paul
	Dissertation: The role of environmental, temporal, and spatial scale on the heterogeneity of Fusarium head blight of wheat.	
	Chan Ho Park	G-L. Wang
	Dissertation: The role of ubiquitination in the interaction between rice and *Magnaporthe oryzae*.	
	Hehe Wang	A. E. Dorrance
	Dissertation: Identification and dissection of soybean QTL conferring resistance to *Phytophthora sojae*.	
	Justin Graham Alexander Whitehill	P. Bonello
	Dissertation: Investigations into mechanisms of ash resistance to the Emerald Ash Borer.	

Year	Name	Faculty Advisor
2013	Chenxi Chen	T. K. Mitchell
	Dissertation: Analysis of the molecular basis of virulence in pathogenic fungi.	
	Fiorella Melina Cisneros Delgadillo	M. G. Redinbaugh & F. Qu
	Dissertation: Maize fine streak virus (MFSV) gene expression and protein interaction.	
	Jinnan Hu	T. K. Mitchell
	Dissertation: Exploring genome structure and gene regulation related to virulence in fungal phytopathogens using next generation sequencing techniques.	
	Junyan Lin	F. Qu
	Dissertation: Nonhost resistance to bean pod mottle virus in *Nicotiana benthamiana*.	
	Chewachong Godwill Mih	F. Qu
	Dissertation: Engineering plant virus "vaccines" using pepino mosaic virus as a model.	
	Xiaoqing Rong	B. B. McSpadden Gardener
	Dissertation: Genomic analysis, population quantification and diversity characterization of *Cryptococcus flavescens*.	
	Gautam Shashikant Shirsekar	G-L. Wang
	Dissertation: Ubiquitination in innate immunity of rice *(Oryza sativa)*.	
	Pattavipha Songkumarn	G-L. Wang
	Dissertation: Identification and characterization of *in-planta* expressed secreted effector proteins from *Magnaporthe oryzae*.	
2014	Jorge David Salgado	P. A. Paul & L.V. Madden
	Dissertation: Modeling the effects of Fusarium head blight on wheat grain yield and quality and developing cost-effective strategies for minimizing losses.	
	Patrick William Sherwood	P. Bonello
	Dissertation: Biochemical mechanisms of resistance and susceptibility in the *Pinus nigra– Diplodia sapinea* pathosystem.	
2015	Anna Olivia Conrad	P. Bonello
	Dissertation: Metabolomics of *Quercus* spp. to understand and predict resistance to *Phytophthora ramorum*.	
	Spencer James Debenport	B. B. McSpadden Gardener
	Dissertation: Identification of fine scale responses in millet root-zone microbiomes to intercropping with woody shrubs in the Sahel.	
	Nagendra Subedi	S. A. Miller
	Dissertation: Characterization and management of *Ralstonia solanacearum* populations in South Asia.	
2016	Emmanuel Mohamed Mgonja	Guo-Liang Wang & Thomas K. Mitchell
	Dissertation: Molecular analysis of host resistance and pathogenicity of rice blast in East Africa.	
	Ellie Kathleen Walsh	Christopher G. Taylor
	Dissertation: Investigating root-knot and soybean cyst nematode parasitic interactions through transcriptomic analyses of the host and parasite.	
	Horacio Daniel Lopez Nicora	Terry L. Niblack
	Dissertation: Evaluation of *Heterodera glycines-Macrophomina phaseolina* interactions on soybean.	

Appendix 5

Postdoctoral Researchers and Visiting Scientists by Decades

Year	Name	Institution	Department Sponsor
1940s	Folke Johnson	Washington State University	W. G. Stover
1950s	Patricia Allison Van Burgh	The Ohio State University	C. C. Allison
	George L. Barnes	Oregon State University	C. C. Allison
	H. William Crittenden	University of Delaware	C. C. Allison
	Howard Reed	University of Tennessee	C. C. Allison
1960s	B. P. Chakravarti	Punjab University	C. Leben
	Mateo Cirulli	University of Bari	L. J. Alexander
	Anton DeLange	University of Utrecht	C. Leben & L. J. Alexander
	Nicholas Hubbeling	I.P.O. Wageningen University	L. J. Alexander
	Ramesh D. Parashar	Haryana Agricultural University	C. Leben
1970s	Helena Birecka	Union College (New York)	M. O. Garraway
	Gilbert C. Daft	The Ohio State University	H. A. J. Hoitink
	Robert C. Evans	Rutgers University	M. O. Garraway
	Joe Foster	Cornell University	D. T. Gordon
	G. A. Kuter	University of Wisconsin	H. A. J. Hoitink
	Abdul Moustafa	University of Missouri	H. A. J. Hoitink
	Dave Pritchard	Cornell University	C. Leben & T. Miller
	Susan Rabatin	University of Pittsburgh	R. M. Riedel
	Diane Robertson	University of California-Berkeley	O. E. Bradfute
	R. D. Singh	Rajasthan University	M. O. Garraway
1980s	M. Akhtar	Aligah Muslim University	M. O. Garraway
	DeSouky Ammar	Cairo University (Egypt)	L. R. Nault & D. T. Gordon
	Helena Birecka	Union College	M. O. Garraway
	T. W. Bischoff	The Ohio State University	M. O. Garraway
	Robert C. Evans	Rutgers University	M. O. Garraway
	P. C. Fahy	Biological and Chemical Research Institute (Australia)	H. A. J. Hoitink
	Stuart Falk	University of New York-Syracuse	R. C. Rowe & L. V. Madden
	Leonard Francl	University of Missouri	R. C. Rowe & L. V. Madden
	Lian-mei Graham	Purdue University	T. L. Graham
	Rodolfo G. Gomez	The Ohio State University	L. R. Nault & L. V. Madden
	Thomas Hall	The Ohio State University	C. Leben
	Jang E. Kim	Seoul University (Korea)	T. L. Graham
	Oliver Kwok	University of Hawaii	H. A. J. Hoitink

Year	Name	Institution	Department Sponsor
	Mindy Lambert	University of Maryland	T. L. Graham
	Norman Lalancette	Pennsylvania State University	M. A. Ellis & L. V. Madden
	G. Martinez-Lopez	ICA Tibaitata (Columbia)	O. E. Bradfute
	Larry L. McDaniel	The Ohio State University	D. T. Gordon
	Sally McCammon	University of Kentucky	D. L. Coplin
	Arthur Olah	University of Rhode Island	A. F. Schmitthenner
	Jack Paxton	University of Illinois	T. L. Graham
	Karl Poetter	The Ohio State University	D. L. Coplin
	Susan Rabatin	University of Pittsburgh	L. H. Rhodes
	Keith M. Reynolds	North Carolina State University	L. V. Madden
	Diane Robertson	Grinnel College	O. E. Bradfute
	Ronald Simpkins	Michigan State University	R. E. Gingery
	Yang Xiusheng	The Ohio State University	L. V. Madden & M. A. Ellis
1990s	Pervaiz Abbasi	The Ohio State University	S. A. Miller
	Ravindra Bhat	The Ohio State University	A. F. Schmitthenner
	Mark Boudreau	Oregon State University	L. V. Madden
	John Bowers	University of Florida	R. C. Rowe
	Rebecca Creamer	University of California-Berkeley	R. E. Gingery
	Janete A. DeBrito	(Brazil)	R. M. Riedel
	Erick De Wolf	North Dakota State University	P. E. Lipps & L. V. Madden
	Reid D. Frederick	University of California-Berkeley	D. L. Coplin
	David Y. Han	The Ohio State University	M. J. Boehm
	Georgina Hakiza	Kawanda Research Station (Uganda)	S. T. Nameth
	Donna Iannotti	The University of Akron	H. A. J. Hoitink
	Yoseph Inbar	University of Jerusalem (Israel)	H. A. J. Hoitink
	Naseem I. Khan	Oklahoma State University	M. J. Boehm
	N. Ntahimpera	Cornell University	L. V. Madden
	Medani A. Omer	The Ohio State University	T. L. Graham & A. F. Schmitthenner
	Paulette Pierson	The Ohio State University	R. M. Riedel
	Syed F. Rahman	Fort Valley State College (Florida)	S. T. Nameth
	Frits Rijkenberg	University of Natal (South Africa)	H. A. J. Hoitink
	Mary C. Stuart		R. M. Riedel
	Terry A. Wheeler	North Carolina State University	R. C. Rowe & R. M. Riedel & L. V. Madden
	Yang Xiusheng	The Ohio State University	L. V. Madden & M. A. Ellis
	Ye Jingsong	The Ohio State University	D. L. Coplin
2000s	Guleray Agar	Ataturk University (Turkey)	S. A. Miller
	Samia Al-Allaf	University of Cairo (Egypt)	P. E. Lipps
	Sharon Anderson	Texas A&M Univeristy	A. E. Dorrance
	Jo Ann Asselin	Cornell University (Horticulture & Crop Science)	D. L. Coplin
	Samidra Baishya	Assam Agricultural University (India)	G-L. Wang
	Isaac Barash	Tel Aviv University (Israel)	D. L. Coplin
	Fulya Baysal-Gurel	Cukurova University (Turkey)	S. A. Miller

Year	Name	Institution	Department Sponsor
	James T. Blodgett	University of Wisconsin-Madison	P. Bonello
	K. Burnham	Texas Women's University	A.E.Dorrance & S.K. St.Martin & D. Francis
	Liliana M. Cano	Sainsbury Laboratory, University of East Anglia (U.K.)	S. Kamoun
	Cao Mingxia	Shanghai Institute for Biological Sciences (China)	C. G. Taylor
	Cahid Cakir	University of Akdeniz (Antalya, Turkey)	S. Kamoun
	Chai Mao-Feng	China Agricultural University	G-L. Wang
	Charles Changa	The Ohio State University	H. A. J. Hoitink
	Chen Songbiao	Chinese Academy of Sciences	G-L. Wang
	Fiorella Cisneros	The Ohio State University	G-L.Wang
	Stefano Costanzo	Pennsylvania State University	A. E. Dorrance
	Dai Liangying	Hunan Agricultural University (China)	G-L. Wang
	Elizabeth DeNardo	University of Campinan (Brazil)	A. E. Dorrance
	Amal De Silva	Louisiana State University	A.E. Dorrance
	Ding Bo	Fudan University (China)	G-L. Wang
	Alieta Eyles	University of Tasmania	P. Bonello
	Carla Garzon	Pennsylvania State University	S. Kamoun
	Stewart Gordon	The Ohio State University	A. E. Dorrance
	Malali Gowda	Maharaja Sayajirao University of Baroda	G-L. Wang
	Sukhbir Grewal		B. B. McSpadden Gardener
	Rosemary Hage	The Ohio State University (Horticulture & Crop Science)	D. L. Coplin
	Ham Jong Hyun	Cornell University	D. L. Coplin
	Songhee Han	Chonnam National University (Korea)	B.B. McSpadden Gardener
	Walid Hamada	University of Paris VI (France)	S. Kamoun
	Hong Wai Foong	Monash University (Australia)	G-L. Wang
	Huang Zejun	Chinese Academy of Agricultural Sciences	G-L. Wang
	Thirumala Kanneganti	Osmania University (India)	S. Kamoun
	Jahangir Khan	North Dakota State University	H. A. J. Hoitink
	Naseem I. Khan	Oklahoma State University	M. J. Boehm
	Krissana Kowatanich	Thailand University	A. E. Dorrance
	La Honggui	China Agricultural University	G-L. Wang
	Youn Su Lee	Kangwon National University (Korea)	S. Kamoun
	Liu Xionglun	Hunan Agricultural University (China)	G-L. Wang
	Liu Zhenyu	Northeastern University (Shenyang, China)	S. Kamoun
	Lu Guo-Dong	Fujian Agricultural University (China)	G-L. Wang
	Sheshu Madhav Maganti	Indian Agricultural Research Institute	G-L. Wang
	N. McRoberts	Scottish Agricultural College (U.K.)	L. V. Madden
	Santiago Mideros Mora	Army Polytechnic School (Ecuador)	A. E. Dorrance
	J. Molineros	Pennsylvania State University	A. E. Dorrance & L. V. Madden
	William Morgan	The College of Wooster	S. Kamoun
	Baek Hie Nahm	Myongji University (Korea)	G-L. Wang
	Sang Keun Oh	Chungnam National University (Korea)	S. Kamoun
	Maria Andrea Ortega	Francisco de Paula Santander University (Colombia)	A. E. Dorrance
	Elvan Ozbek	Ataturk University (Turkey)	S. A. Miller & S. Hogenhout

Year	Name	Institution	Department Sponsor
	Kamal Pal	Indian Agricultural Research Institute	B. B. McSpadden Gardener
	Pierce Paul	Iowa State University	P. E. Lipps & L. V. Madden
	Pei Zhongyou	Shenyang Agriculture University (China)	G-L. Wang
	Wirat Pipatpongpinyo	Kasetsart University (Thailand)	A. E. Dorrance
	Kevin Pixley	CIMMYT (Mexico)	M. G. Redinbaugh
	Qu Shaohong	Chinese Academy of Sciences	G-L. Wang
	Mohan Babu Raghupathy	Tamil Nadu Agricultural University	G-L. Wang
	Venu Reddyvari Channarayappa	Maharaja Sayajirao University (Baroda, India)	G-L. Wang & M. J. Boehm
	Peerapat Roongsattham	Kasetsart University (Thailand)	A. E. Dorrance
	Dorith Rotenberg	University of Wisconsin	B.B. McSpadden Gardener
	Sebastien Saint-Jean	University of Paris (France)	L. V. Madden
	Sun Xinli	Huazhong Agricultural University	G-L. Wang
	Antonino Testa	University of Naples (Italy)	S. Kamoun
	Frank Van den Bosch	Rothamsted Research (U.K.)	L. V. Madden
	Olga Vashlya	University of Tomsk (Russia)	M. G. Redinbaugh
	Andreas Westphal	University of California-Riverside	B.B. McSpadden Gardener
	Wang Ping	Wuhan University (China)	H. A. J. Hoitink
	Wang Ying		B. B. McSpadden Gardener
	Joe Win	University of Auckland (New Zealand)	S. Kamoun
	Annette Wszelaki	University of California-Davis	S. A. Miller & M. Kleinhenz & D. Doohan
	Xu Xiangming	East Malling Research (U.K.)	L.V. Madden
	Yang Hongmei	China Agricultural University	G-L. Wang
	Carolyn Young	Massey University (New Zealand)	S. Kamoun
	Jose Zambrano Mendoza	Army Polytechnic School (Ecuador)	A. E. Dorrance
	Lily Xochilt Zelaya-Molina	Chapingo Autonomous University (Mexico)	A. E. Dorrance
	Zeng Lirong	The Ohio State University	G-L. Wang
	Zhang Haiwen	Hunan Agricultural University (China)	G-L. Wang
	Zhang Jianhua	The Ohio State University	S. Hogenhout & S. A. Miller
	Zhang Shouan	Auburn University	M. J. Boehm
	Zhou Bo	Chinese Academy of Sciences	G-L. Wang
2010s	Gauri Achari	University of Mumbai (India)	C. G. Taylor
	Il-Pyung Ahn	Seoul National University (Korea)	G-L. Wang
	Ahmed Al-Dulaimi	Al-Nahrain University (Iraq)	F. Qu
	Emran Ali md	Ehime University (Japan)	F. Qu
	Mahesh Basavarajegowda	University of Agricultural Sciences (India)	G-L. Wang
	Fulya Baysal-Gurel	Cukurova University (Turkey)	S. A. Miller
	Bi Dongling	National Institute of Biological Sciences (China)	G-L. Wang
	Marcelo Canteri	University Estadual de Londrina (Brazil)	L. V. Madden
	Cai Yuhui	China Agricultural University	G-L. Wang
	Bryan Cassone	Notre Dame University	M. G. Redinbaugh & A. E. Dorrance
	Chai Mao-Feng	China Agricultural University	G-L. Wang
	Sourav Chakraborty	University of New Orleans	P. Bonello
	Chen Ping	Hainan University (China)	F. Qu

Year	Name	Institution	Department Sponsor
	Godwill Chewachong	University of Dschang (Cameroon)	F. Qu
	Cui Jinlong	Shanxi University (China)	J. Slot
	Veena Devi Ganeshan Prabhakar	University of Cologne	T. K. Mitchell
	Di Dianping	Agricultural University of Hebei (China)	M. G. Redinbaugh
	Ding Bo	Fudan University (China)	G-L. Wang
	Sawsan Yousseff Elateek	The Ohio State University	C. G. Taylor
	Jessica S. Engle	The Ohio State University	P. A. Paul
	Fan Gaili	Fujian Agriculture & Forestry University	T. K. Mitchell
	Fan Jiangbo	Chinese Academy of Sciences	G-L. Wang
	Lilian Gichuru	Kenya Agricultrual & Livestock Research Organizaiton	G. Redinbaugh
	Guo Jiangbo	Chinese Academy of Sciences	F. Qu
	Ashraful Haque md	Tokyo University of Agriculture (Japan)	L. R. Stewart
	Sridhar Jarugula	Washington State University	L. R. Stewart
	Jiang Nan	Hunan Agricultural University (China)	G-L. Wang
	Jelena Jovic	Institute of Plant Protection & Environment (Serbia)	M. G. Redinbaugh
	M. Mostofa Kamal	Bangledesh Agricultural Research Institute	B. B. McSpadden Gardener
	Kang Houxiang	Chinese Agricultural Academy of Science	G-L. Wang
	James Karanja	Kenya Agricultural & Livestock Research Organization	M. G. Redinbaugh
	Anwar Khan	University of Punjab (Pakistan)	F. Qu
	Kwang-Ho Kim	Rural Development Administration of the Republic of Korea	L. R. Stewart
	Sudheer Kumar	Harayana Agricultural University (India)	S. A. Miller
	La Honggui	China Agricultural University	G-L. Wang
	Melanie Lewis Ivey	The Ohio State University	S. A. Miller
	Li Ya	Zhejiang University (China)	G-L. Wang
	Li Yuhong	University of Minnesota	C. G. Taylor
	Li Yunfeng	South China Agricultural University	G-L. Wang
	Lin Ruiming	China Agricultural University	G-L. Wang
	Liu Jinling	Hunan Agricultural University (China)	G-L. Wang
	Luo Jing	Beijing Forestry University (China)	G-L. Wang
	Horacio Daniel Lopez Nicora	The Ohio State University	T. L. Niblack
	Delphina Peter Mamiro	Pennsylvania State University	S. A. Miller
	Miao Hongqin	Hebei Institute of Agricultural & Forest Science (China)	M. G. Redinbaugh
	Mohamed Mpina	Tropical Pesticides Research Institute (Tanzania)	M. G. Redinbaugh
	Francis Mwatuni	Kenya Plant Health Inspectorate Service	M. G. Redinbaugh
	Ning Yuese	Hunan Agricultural University (China)	G-L. Wang
	Angela M. Orshinsky	University of Guelph (Canada)	M. J. Boehm
	Chan Ho Park	The Ohio State University	G-L. Wang
	Sunjeong Park	(Korea)	B. B. McSpadden Gardener
	Rafael Parreira Diniz	Universidad Federal de Lavras	M. G. Redinbaugh
	Gina Pengue	University of Naples (Italy)	C. G. Taylor
	Abdul Qadir	University of Agriculture (Peshawer, Pakistan)	L. R. Stewart
	Venu Reddyvari Channarayappa	Maharaja Sayajirao University (Baroda, India)	G-L. Wang & M. J. Boehm
	Hannah T. Reynolds	Duke University	J. C. Slot

Year	Name	Institution	Department Sponsor
	Francesca Rotondo	University of Bologna (Italy)	B. B. McSpadden Gardener & S. A. Miller
	Sara Rovaris	Agronomy Institute of Campinas (Brazil)	M. G. Redinbaugh
	Jorge David Salgado Moncada	The Ohio State University	P. A. Paul & L. V. Madden
	Denis Shah	Cornell University	P. A. Paul & L. V. Madden
	Patrick W. Sherwood	The Ohio State University	P. Bonello
	Sun Xinli	Huazhong Agricultural University (China)	G-L. Wang
	Venkata Phanikanth Turlapati	Washington State University	C. G. Taylor
	Michael J. Vaughan	University of Arizona	B. B. McSpadden Gardener
	Vinod Vijayakumar	University of Cologne (Germany)	J. C. Slot
	Caterina Villari	University of Padua (Italy)	P. Bonello & F. Hand
	Wang Mo	Chinese Academy of Sciences	G-L. Wang
	Wang Xuli	Northwest A&F University of Yangling (China)	G-L. Wang
	Anne Wangai	University of Reading (U.K.)	M. G. Redinbaugh
	Katelyn Willyerd	Pennsylvania State University	P. A. Paul
	Tao Xiao-Yuan	Shanghai Institue of Plant Physiology & Ecology (China)	C. G. Taylor
	Xie Wenshuang	Imperial College, University of London (U.K.)	C. G. Taylor
	Xin Cuihua	China Agricultural University	F. Qu
	Xu Xiulan	The Ohio State University	S. A. Miller
	Yao Xiaolong	Yangzhou University (China)	F. Qu
	Zhang Shaoyan	Hainan University (China)	F. Qu
	Zhang Xiaofeng	China Agricultural University	F. Qu
	Zhang Xiuchun	South China University of Tropical Agriculture	F. Qu
	Zhou Zhonghua	Hunan Agricultural University (China)	G-L. Wang

Appendix 6

Historical Group Photos

Plant Pathology Department

Columbus Faculty and Graduate Students, 1969

first row (kneeling), left-to-right: I. Deep, W. Ellett, two students, A. Troxel, student, C. Allison
second row, left-to-right: eight students, P. Larsen, R. Partyka, M. Garraway, B. Janson

Plant Pathology Department

Columbus Faculty and Graduate Students, 1973

front (kneeling): M. Garraway
second row, left-to-right: C. Powell, three students, A. Troxel, student
third row, left-to-right: R. Riedel, R. Partyka, seven students, W. Ellett

Plant Pathology Department

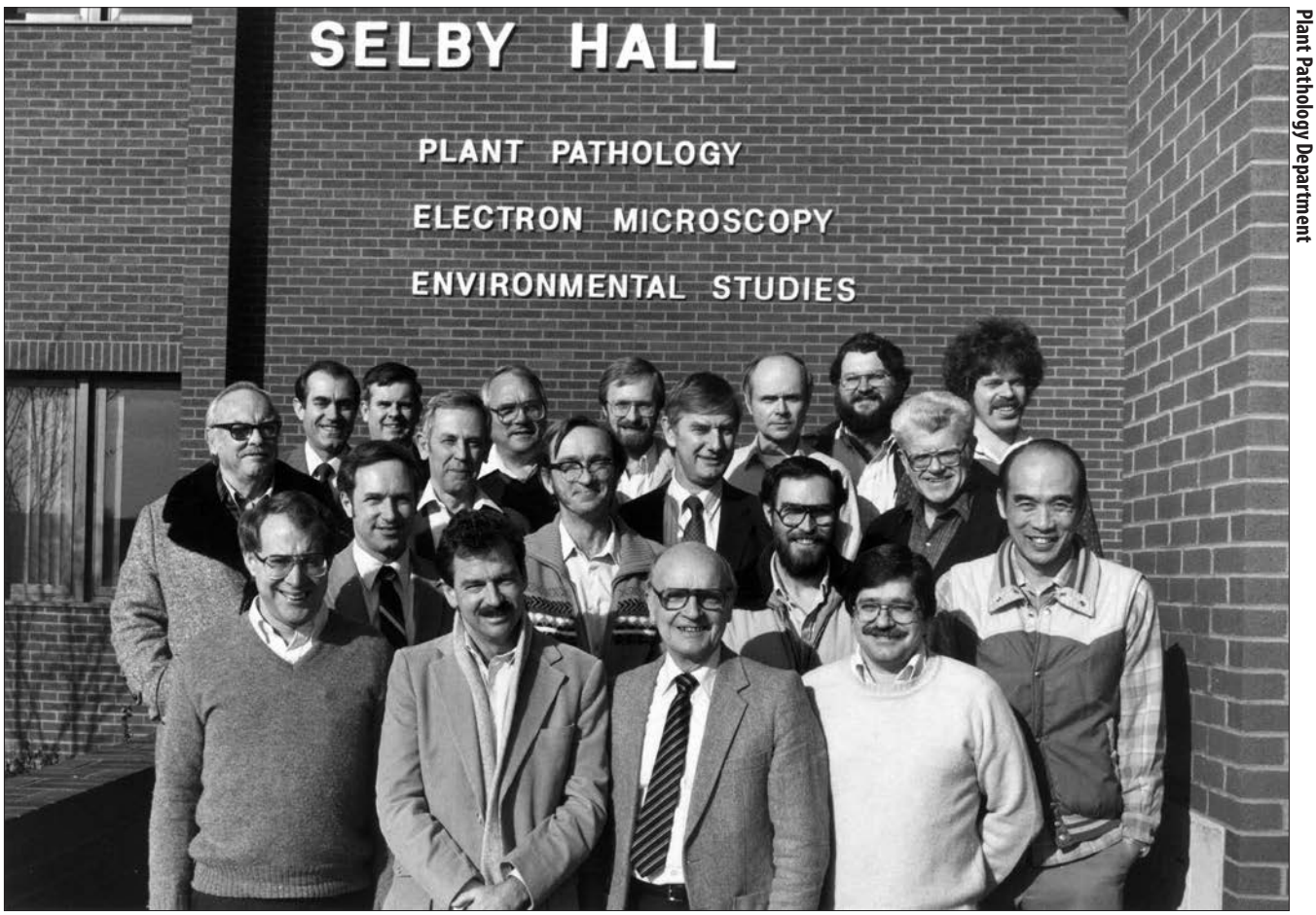
Plant Pathology Faculty (in bold type) **and Graduate Students at Wooster, 1975**

front row, left-to-right: **D. Coplin**, **L. Williams**, J. Sleesman, **R. Gingery**, **D. Gordon**, R. Schlub, **A. Schmitthenner**
second row, left-to-right: **R. Rowe**, **C. Leben**, **I. Deep**, **R. Louie**, J. Foster, **O. Bradfute**
third row, left-to-right: **C. Wilson**, **R. Caldwell**, **R. Spotts**, **L. Herr**, **H. Hoitink**

Plant Pathology Department

Plant Pathology Faculty (in bold type) **and Staff at Wooster, 1982**

front row, left-to-right: **R. Riedel**, **R. Gingery**, A. Olah, **D. Coplin**, **I. Deep**, **L. Williams**, **L. Rhodes**, **M. Ellis**
second row, left-to-right: R. Hite, G. Kuter, **L. Herr**, **R. Rowe**, **L. Madden**, **A. Schmitthenner**, **C. Powell**, **C. Leben**
third row, left-to-right: **H. Hoitink**, **M. Garraway**, **P. Lipps**, **P. Larsen**, **R. Louie**, **O. Bradfute**



Plant Pathology Department

Plant Pathology Faculty at Wooster, 1986

front row, left-to-right: R. Gingery, S. Nameth, L. Williams, D. Coplin
second row, left-to-right: C. Leben, R. Rowe, A. Schmitthenner, R. Whitmoyer, H. Hoitink, W. Bauer, O. Bradfute
third row, left-to-right: C. Curtis, T. Weidensaul, L. Herr, L. Madden, D. Gordon, P. Lipps, W. Shane

Plant Pathology Department

Plant Pathology Faculty (in bold type) **and Staff, 2008**

front row (seated), left-to-right: **G. Wang**, L. Wilson, **M. Redinbaugh**, **F. Qu**, **T. Graham**, M. Graham, G. Shirsekar
second row (standing), left-to-right: L. West, **A. Dorrance**, C. Powell, **T. Mitchell**, **M. Ellis**, **M. Boehm**, **L. Madden**, **P. Paul**, **D. Coplin**, D. Mills, J. Rimelspach, N. Taylor, D. Lewandowski

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Biography and photo of Robert F. Griggs

https://www.nps.gov/katm/blogs/Explorers-of-Katmai-Country-Robert-F-Griggs-1881-1962.htm
Photo and history of Robert F. Griggs explorations in Alaska

https://www.avo.alaska.edu/images/image.php?id=419
Photo and information on Mt. Griggs

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