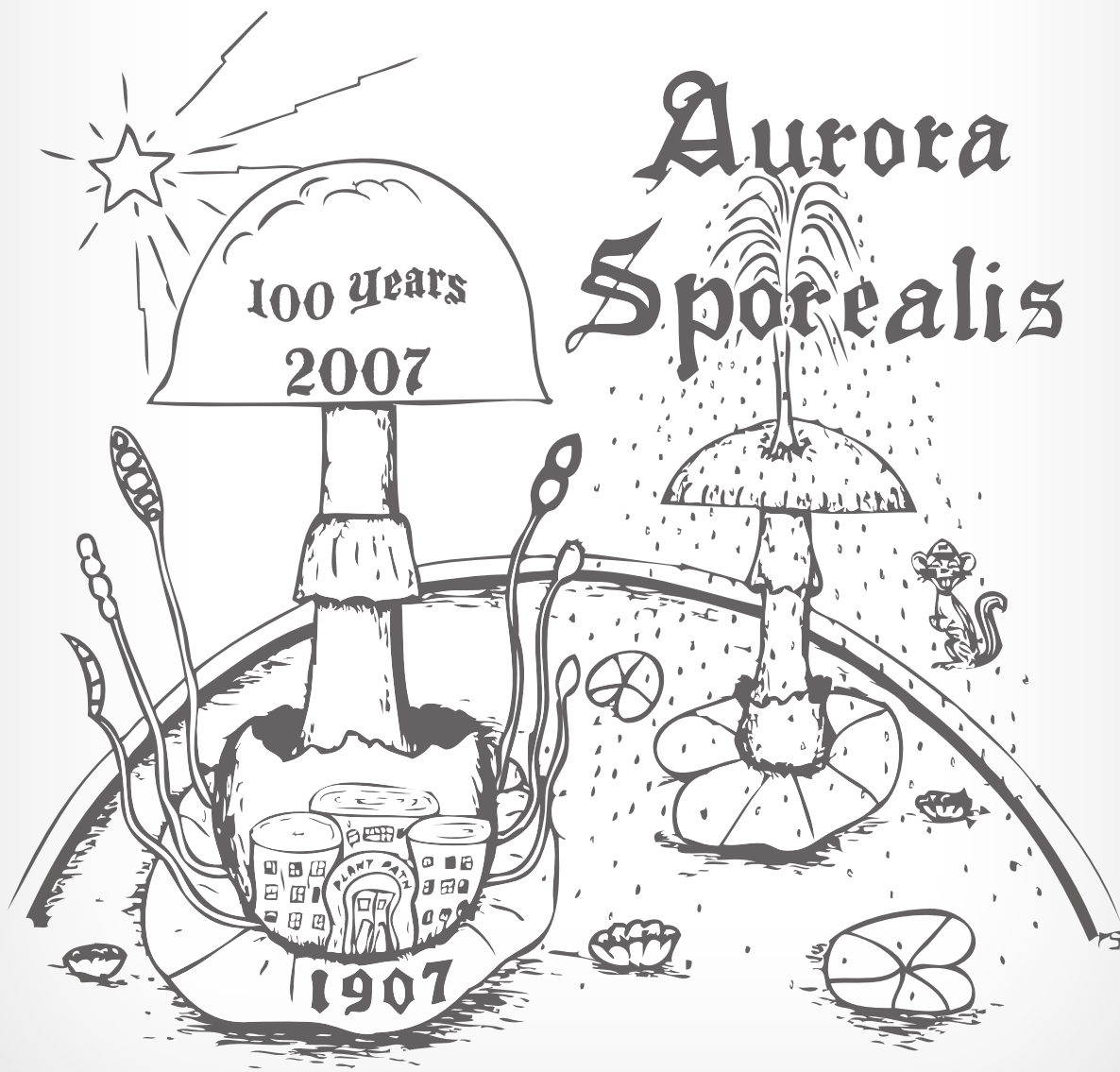


Aurora Sporealis

2007 Centennial Edition
Celebrating 100 Years of Excellence



The Alumni News Magazine of the Department of Plant Pathology at the University of Minnesota - 2007.
Continuously published since 1924.

The Aurora Sporealis is the alumni news magazine of the Department of Plant Pathology at the University of Minnesota. First published in 1924, it is the oldest, consecutive alumni News magazine in the history of the University of Minnesota. All volumes are bound and available in the Plant Pathology Library in Borlaug Hall, St. Paul Campus, University of Minnesota. All Aurora Sporealis volumes are also accessible on-line from the University of Minnesota's Digital Conservancy (<http://conservancy.umn.edu/>).

Editor-in-Chief

Richard J. Zeyen - Chair
Public, Alumni and Institutional
Relations Committee 2007

Graphic Design

Dustin Fields

Production Associates

Laura Wiegand
Carol Anderson

Contributors

Dann Adair
Ben Alsop
Ann Arendt
Carol Anderson
Matt Bakker

Howard Bissonette

Robert Blanchette

Norman Borlaug

James Bradeen

Ed Carley

Debora Baden-Drange

Ruth Dill-Mackey

Art Elliot

James Groth

Eugene Hayden

Robert Herdt

Ann Impullitti

Carol Ishimaru

Bill Kennedy

Thor Kommedahl

Philip Larsen

Al Linck

Chester Mirocha

Maria Ordonez

Tim Pawlenty

Astrid Skovmand

Eugenia Skovmand

Brian Steffenson

Tim Walz

Laura Wiegand

Richard Zeyen

Photography & Digital Images

Paul Meyer

Tamas Szinyei

Richard Zeyen

Business Manager

Nancy Hamilton

Home Page: www.plpa.cfans.umn.edu

The University of Minnesota is an equal opportunity educator and employer.

The Aurora Sporealis is produced annually and sent to alumni, former faculty members, staff and old timers who have spent significant time in the Department. Items for consideration in the Aurora can be sent to aurorasp@umn.edu or to:

The Department of Plant Pathology
c/o The Chairperson
Development, Alumni and External Relations Committee
University of Minnesota
495 Borlaug Hall
1991 Upper Buford Circle
Saint Paul, Minnesota 55108-6030



College of Food, Agricultural
and Natural Resource Sciences

UNIVERSITY OF MINNESOTA

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Editor-in-Chief's Commentary

Richard Zeyen



The Aurora Sporealis is the alumni news magazine of the Department of Plant Pathology at the University of Minnesota. It has been published continuously since 1924. This special edition is devoted to the Department's Centennial Celebration of September 18-20, 2007. We dedicate it to all alumni, friends, faculty, staff and students both past and present. We trust it also has some historical significance as a document.

Major presentations during the Centennial were recorded for posterity in digital format and DVD copies will be deposited in the Plant Pathology Library and in the University of Minnesota's Anderson Library Archives. Only a brief day-by-day synopsis of events is presented here.

We did not produce a 100-year history of the Department. An excellent history of the first 40 years of the Department is found in the 1947 Volume 23 (Supplement), another 75 year history is in the 1983 Volume 54 "Special Issue" of the Aurora, and a more contemporary history is found in the 2003 Aurora. They can be read either in bound volumes in the Plant Pathology Library or alternatively read or downloaded from the University of Minnesota's Digital Conservancy (<http://conservancy.umn.edu/>).

In this edition we included Gene Hayden's "Dr. Stakman and Mr. Donald Fletcher: A Special Relationship," because Donald Fletcher played a large role in the early successes of the Department but he was largely undocumented, either in the Aurora or elsewhere. The late Al Linck contributed a brief history of plant physiology as it existed inside the Department, and we included this since it would be otherwise lost.

I thank all who contributed to and participated in the Department's Centennial Celebration; it was truly a once in a lifetime experience.

On a personal note I am retiring from the Department. This issue is my final as Editor-in-Chief. Publication of the Aurora is a group effort. I thank all those who contributed throughout the years to this unique recording of 83 consecutive years of departmental history. Special thanks go to all past Editors-in-Chiefs from Helen Hart through Carl Eide. My personal thanks to Professor Deborah Samac who alternated with me for the better part of 16 years in the Editor-in-Chief role.

Richard J. Zeyen



Professor Deborah Samac

DEPARTMENT OF PLANT PATHOLOGY

Centennial Celebration

100 Years of Research and Education

Promoting Plant Health in Minnesota and Around the World

Carol Ishimaru

Dear Alumni and Friends,



This edition of the Aurora Special is coming to you later than usual. I know some of you have been waiting anxiously for its arrival, wondering whether it got lost in the mail or worse- that it simply wasn't coming. Several factors melded together last year into what I've referred to as the "perfect storm." Fortunately, the outcome was not as it was in the movie; the ship did not go down in the storm! In fact, from what we can tell, it and all of its passengers survived and are now sailing in calmer seas.

"Okay," you say, "Enough with the metaphors. Tell us why the Aurora is late!" Well, it has something to do with an anniversary, a report card, and a visit. "Hmm," you say, "I knew you administrators could make mountains out of mole hills, but this takes the cake. Anniversaries come every year, report cards every semester, and visits, well, that's just everyday stuff. What the heck are they paying you for anyway?" Oh yes, I know what you're thinking!

Okay, here's the deal. The anniversary wasn't just any anniversary. It was THE anniversary of the century, the big one... the 100th anniversary of the U of M Department of Plant Pathology. The report card was the first external USDA-CSREES review of the Department in 12 years. And, the visit was a weeklong site visit with the CSREES review team. Topping it all off, the site visit took place the week before Christmas! That's about the time when the last bits for the Aurora are usually being put into place. But this year, folks were still recuperating from the "storm." So please, accept my sincere apologies for the delay of the Aurora- it's taken us a while to get our bearings straight. I hope you'll find this memorable edition well worth the wait.

The Anniversary

This issue is filled with photos and stories from the Centennial Celebration. It was a fabulous three-day event, filled with history, glimpses of current programs, food, music, and many memorable moments. Even the river of rain that led to cancellation of the Annual Stakman Baseball Game didn't dampen our spirits. I especially enjoyed the opportunity to meet several alumni and friends of the department. I think some of the special sentiments of the days came through in the photos. Enjoy.

Our Next 100 Years: Continuing the Legacy

The CSREES review required an enormous outpouring of energy on many peoples' parts, but the net result has been overwhelmingly positive. The review team's report validated what many of us secretly thought, but few had the confidence to say: The Department of Plant Pathology at the University of Minnesota remains one of the top plant pathology departments in the world today.

If you've kept track, you know the College of Food, Agricultural, and Natural Resource Sciences (CFANS) is now more than a year old. Dean Allen Levine has done an admirable job of moving forward with several new college initiatives, some of which should have positive impacts on the department in the coming years. I want to assure everyone that plant pathology remains a priority within the college. I state this because some have expressed concerns about the future of plant pathology at the University. I can also say with confidence that the strong marks received from the CSREES review team removed any doubt about the relevancy or vitality of the Department. The review team's report emphasized that the Department has not simply floated by on its past laurels. In contrast, it is a very productive unit, well positioned for continued success. This is an excellent time to celebrate a few of our accomplishments:

We have successfully served local and statewide stakeholders in agricultural, horticultural and forestry sectors for more than 100 years.

Our research, education, and extension programs continue to positively affect regional and national plant disease issues.

Our faculty remains at the forefront of research in disease resistance, biology of plant-associated microbes, and disease management.

The department's international research footprint, which spans all 7 continents, addresses plant health needs in developed and underdeveloped regions of the world.

The Plant Pathology Graduate Program has granted 426 Ph.D. and 424 M.S. degrees in its history and continues to attract a diverse and high-performing student body.

Our dedicated teachers, like Matt Moore and David MacDonald, have influenced the career goals of thousands of undergraduate and graduate students.

Our faculty hires have brought new energy and vigor to our teaching, research and extension programs.

As a whole, our faculty members have continued their success in obtaining extramural funding, remaining at the top of our college in sponsored funds expenditures since 2004.

Our faculty have been recognized widely for their excellence; at present our faculty boasts two APS Fellows, one APS International Fellow, a Distinguished McKnight Land Grant Professorship, an American Association for the Advancement of Science Fellow, multiple UM STAR Faculty, one Fellow of the International Academy of Wood Science, and one Fellow of the International Air and Waste Management Association.

Many of our alumni have gone on to establish distinguished careers that directly shaped agriculture and forestry in the 20th and 21st centuries. Some, including a Nobel Peace Prize Laureate, were instrumental in securing the world's food supply against some of the most devastating plant diseases of our time.

It wouldn't be Minnesotan of me not to point out are that there are still several challenges ahead and room for improvement. Nevertheless, we can feel proud that our efforts have made and will continue to make a difference in the world.

New Facility for Exotic & Emerging Plant Pathogen Research

Amid all the other activities of the year, construction of the maximum containment plant pathogen greenhouse and laboratory facility was completed at the end of 2007. Some of you had the opportunity to tour the facility during the Centennial Celebration, and I'm sure you'd agree this facility is really something special. Faculty are anxious for the facility to become officially approved by the USDA-Animal and Plant Health Inspection Service (APHIS) so that research on exotic and emerging plant pathogens can begin. The APHIS inspection has been scheduled for mid-May 2008. If all goes well, research could begin as soon as researchers receive USDA permits for their particular projects.

A Few Acknowledgements

Making it through all the challenges imposed by last year's exciting but hectic schedule was possible only because of the amazing talents and resourcefulness of many dedicated people. My personal thanks to everyone who helped in the success of the Centennial Celebration and the CSREES review. In particular, I'd like to acknowledge our incredible support staff (Carol Anderson, Ann Arendt, Rachel Kissner, Robb Miller and Laura Wiegand) for always being there to meet our administrative, web, graphic, IT, and food requests; Maggi Adamek for her professional facilitation of the strategic plan and site visit preparations; Linda Kinkel for co-editing the CSREES self-study document; Brian Steffenson for his leadership as Director of Graduate Studies and tireless promoter of the plant pathology graduate program, and Richard Zeyen for his leadership and historical perspectives that underpinned the Centennial Celebration's success.

A Call for Continued Partnership

The Department has recently completed a comprehensive strategic planning process that provides a roadmap for its future. Through this process, we identified our priorities in research, teaching, and extension/outreach, and developed a planning process for accomplishing our goals in each of these areas. We stand poised for the future, and look forward to our next 100 years. And, we need your assistance.

Gifts from alumni and friends to Plant Pathology Endowments are needed more than ever to continue to provide fellowships and assistantships in support of graduate education in plant pathology. Your gift to the **E. C. Stakman Graduate Student Fellowship Endowment** or an endowment of your choice will directly influence the future of plant pathology at the University. Please consider becoming our partner (see Endowment Insert).

2007 was a great year for plant pathology at the University of Minnesota. I'd like to believe the legendary faculty of the past would be proud to be a part of today's department. It is my good fortune to serve this fine group of faculty, staff and students. As always, I will continue to do my best to carry on the legacy that has made this a world-class department.

I look forward to making new and renewing acquaintances with you during the 2008 APS Centennial Meeting, which will be held here, in Minneapolis, this July 26-30. The Department will be hosting a special "Legacy Tour" Saturday, July 26, on the St. Paul Campus. This will be an opportune time to check out the latest facilities and chat with old friends. I hope to see you there!

With thanks and best wishes,

Carol Ishimaru



STATE of MINNESOTA

Proclamation

- WHEREAS: The year 2007 is the Centennial of the Department of Plant Pathology at the University of Minnesota; and
WHEREAS: The Department of Plant Pathology's faculty, students, and staff excel in the application of science to control and manage plant diseases. These efforts contribute greatly to sustainable growth, as well as the prosperity and health of Minnesotans; and
WHEREAS: The Department of Plant Pathology is a national and international leader in the education and training of plant pathologists whose broad understanding of science, crop improvement, and human needs helps people throughout the world; and
WHEREAS: The Department's dedicated and determined alumni were driving forces in the "Green Revolution" that produced disease resistant and high yielding cereal crops that prevented wide-spread famine and suffering for many developing nations during the mid-twentieth century; and
WHEREAS: The citizens of Minnesota honor the Department of Plant Pathology's scientists and alumni who have, for 100 years, served humanity through numerous contributions that have helped ensure and enhance the health of food and fiber crops.

NOW, THEREFORE, I, TIM PAWLENTY, Governor of Minnesota, do hereby proclaim Wednesday, September 19, 2007, as:

PLANT PATHOLOGY DAY

in the State of Minnesota.



IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Minnesota to be affixed at the State Capitol this 13th day of September in the year of our Lord two thousand and seven, and of the State the one hundred forty-ninth.

[Handwritten signature of Tim Pawlenty]

GOVERNOR

[Handwritten signature of Mark Ritchie]

SECRETARY OF STATE

The Department of Plant Pathology's 2007 Centennial Celebration

Richard Zeyen

The Department of Plant Pathology's 100th Birthday was celebrated in a very well attended, four-day series of events held on the Saint Paul Campus from September 18-20, 2007. Friends and alumni from many parts of the world attended.

Registration and Tour Day -Tuesday, September 18

Welcome Day – Seminar Room Stakman Hall
Coffee and conversation with Emeritus Faculty, 403 Stakman
Campus Facility Tours
Picnic and Softball Game

Celebrations began at 10:30 am, with a welcome and registration for alumni and visitors in the old Stakman Hall Seminar Room. A concurrent "Coffee and Conversation" open house was hosted by the Department's emeriti faculty and spouses (Neil and Barbara Anderson, Ernest and Marlene Banttari, Ann and Bill Bushnell, Philip and Sandra Larsen, Donna and Chester Mirocha, Frank Pflieger, and Darroll and Marie Skilling). Mary Kay Ferguson, from the pesticide applicator program, and Rachel Kissner from the main office registered alumni and guests.



Philip Larsen, emeritus Department Head, getting registration materials from Mary Kay Ferguson (seated) and Rachel Kissner on the morning of Tuesday the 18th of September.

Tours of Plant Pathology and related facilities began at 1:00 pm. One tour was of the the Microbial and Plant Genomics facility in the Cargill Building (across the street from Christensen Laboratories and Stakman Hall). Dr. James Bradeen led the tour which was narrated by Susan Livingston



"Coffee and Conversation" in the old Seminar Room of Stakman Hall.

The second tour was of the newly built \$4.8 million dollar Plant Pathology Bio-Safety Level (BL3) laboratory in the recently completed glass house facilities on Saint Paul Campus. The Bio-Safety Laboratory enables work on plant pathogens that our researchers would normally be prohibited from working with in Minnesota. This is especially true for new and emerging microbial disease agents in the US or worldwide. For old timers who haven't been to the campus recently the site of this high containment laboratory is directly east of the old wooden machine shed that was across Gortner Avenue from Stakman Hall. The laboratory is a joint effort of the Minnesota Agricultural Experiment Station and the Minnesota Department of Agriculture.

Tour members begin assembling in front of the glasshouse complex containing the BL3 Bio-Safety laboratory on Tuesday afternoon.



Some tour participants gather inside the Cargill Building. Left to right are Dirk Hoffmeister, Bill Anderson, Mahesh Pandey, Carol VanWhy, Lois Johnson, Francisco Skovmand, Kirstin Wilson/Skovmand, Bill and Betty Kennedy, Astrid Skovmand and John Dueck.

Later Tuesday afternoon a picnic and the annual student vs. faculty and staff E.C. Stakman Softball Game was scheduled for the old North Hall playing field located on campus just south of the Gymnasium. A huge tent was erected in far right field for those attending the 3:00 pm picnic. Those participating in the softball game donned their special Centennial tee shirts and were ready to play. The game was not to be, as the skies opened and a torrential, persistent downpour began. However the very large tent and the catered picnic supplies were ready. Undaunted by mere rain alumni, students, friends, faculty and staff enjoyed themselves in the safe confines of the right field tent, with furtive glances toward the playing field. Only darkness finally curtailed their enjoyment.



Undaunted, Stephanie Dahl and Carol Anderson lead other picnickers in ignoring the weather and enjoying the fare.



Lois Johnson along with Tom and Ann Arendt are among the first picnickers to get settled.



A flooded North Hall playing field caused cancellation of the annual E.C. Stakman student vs. faculty/staff softball game.

Legacy Day - Wednesday, September 19

Legacy Day: Departments' Past, Present, & Future

135 Continuing Education and Conference Center, University of Minnesota, St. Paul, MN

MORNING SESSION

Welcome – Dean, Allen Levine; Carol Ishimaru, Department Head;

The Genesis of Plant Pathology at Minnesota - Professor Richard Zeyen

Dr. Stakman and Mr. Fletcher, a special relationship – Dr. Eugene Hayden

The International Impact of Dr. J. George (Dutch) Harrar – Dr. Guy Baird (retired Rockefeller Foundation - Colombia and India Programs)

Audience Participation, Question and Answer Session – Drs. Norman Borlaug, Leon Hesser, Eugene Hayden, Guy Baird, Thor Kommedahl and moderator Richard Zeyen

AFTERNOON SESSION

Plant Pathology in the 21st Century – Professor Brian Steffenson presiding

Continuing the Legacy – Professor and Head, Carol Ishimaru

New Tools to Battle Ancient Enemies of Cereal Crops – Brian Steffenson, Mr. Pablo Olivera and Professor Ruth Dill-Macky

Microbial Ecology: What Lies Beneath the Prairie? – Professor Linda Kinkel

Global Impact of Research and Education – Professor Deborah Samac presiding

Addressing Today's Plant Disease Challenges – Asst. Professor Dean Malvick

Advances in Understanding and Using Plant Disease Resistance - Professor Nevin Young and Asst. Professor James Bradeen

The Indiana Jones's Guide to Wood-Rotting Fungi: Extreme Environments and Fantastic Adventures – Professor Robert Blanchette

Music and Social

Dinner and program: A Tribute to Norman Borlaug – Future Challenges – Dr. Robert Herdt (retired Rockefeller Foundation Economist, Cornell University adjunct Professor)

Centennial Celebration (cont.)

Legacy Day was devoted to the past, present and future of Plant Pathology at the University of Minnesota. It was held in the Continuing Education and Conference Center (CECC) on the Saint Paul Campus (the former Earle Brown Center).

The importance of the Department to education and to the health and welfare of agriculture and forestry in Minnesota and worldwide was noted by Governor Tim Pawlenty. He declared, in a written proclamation of September 19th “Plant Pathology Day in Minnesota” (see page 06). Congressional representative Tim Walz of Mankato and Minnesota’s 1st congressional district also honored the Department. Representative Walz entered into the September 14th Congressional Record a speech entitled “Tribute to the 100th Anniversary of the University of Minnesota’s Department of Plant Pathology” (see page 23). Representatives of the Governor’s office and of Mr. Walz’s office were on hand to present the proclamations and tributes during Centennial Celebration ceremonies on Sept. 19th. In addition, United States Senator Amy Klobachar sent her best wishes to the Department.

Governor Pawlenty also issued a second proclamation, proclaiming September 20th as “Dr. Norman Borlaug Day in Minnesota,” thus honoring one of the Department’s most famous alums. Two months previously, on July 18th, Norman Borlaug received the nation’s highest distinction – the Congressional Gold Medal for saving hundreds of millions of people from death by starvation. With receipt of the Congressional Gold Medal, this alumnus of the Department of Plant Pathology, Norman Borlaug, became one of only five people to be awarded the Nobel Peace Prize (for the Green Revolution), the Presidential Medal of Freedom and the Congressional Gold Medal (see page 29).

In the registration area of the CECC, the American Phytopathological Society’s APS Press made available Dr. Clyde Christensen’s 1984 biography of EC Stakman, “E.C. Stakman, Statesman of Science.” E.C. Stakman’s influence and his capacities as an epidemiological researcher, teacher, mentor and his many friendships established a culture that fueled the successes of the Department’s first 60 years.

Dr. Leon Hesser, author of “The Man Who Fed The World,” the 2006 authorized and award winning biography of Dr. Norman Borlaug, was also in attendance. A third book by the author Susan Dworkin, detailing the career of another alum, Sir Bent Skovmand (B.S. 1970, M.S. 1973, Ph.D. 1976) was not yet in print at the time of the Centennial Celebration.



On September 14th Dr. Norman Borlaug is presented the Congressional Gold Medal by Speaker of the House Nancy Pelosi, President George W. Bush and Senate Majority Leader Harry Reid.



Copies of Governor Pawlenty’s proclamation concerning Norman Borlaug Day, Representative Tim Walz’s Congressional Record tribute to the Department on its 100th anniversary, and a replica of Dr. Norman Borlaug’s Congressional Gold Medal. All were on display in the registration area of the CECC during the Centennial Celebration



Florence and Leon Hesser and Leon’s award winning biography of Norman Borlaug.

The morning session, termed “The Legacy” was devoted to the historical development of the Department and the influence of alumni on world agricultural development. In total there were three morning presentations interspersed with breaks and an audience participation Question and Answer period

The afternoon session was termed “Continuing the Legacy.” It was a mixture of present efforts by faculty, staff and students and futuristic projections. The evening session was a tribute to Norman Borlaug, perhaps the Department’s most celebrated alumnus.

The morning session began with welcoming remarks by Allen Levine, Dean of the College of Food, Agricultural and Natural Resource Sciences, and Carol Ishimaru, Head, Department of Plant Pathology. It was well attended with an audience of approximately 180.

Opening remarks were followed by professor Richard Zeyen’s presentation entitled “The Genesis of Plant Pathology at Minnesota.” Richard traced the forces resulting in the Department’s origin to the stem rust epidemic of 1904. That event drastically impacted the value-added economy of Minnesota and the upper midwest region. It brought farmers, railroad and Minneapolis milling interests together and generated the necessary political and financial resources, whose influence resulted in the 1907 establishment of the Department within the University of Minnesota. He reviewed highlights of the first 60 years, including elements of the national and international impact of the Department’s faculty and alumni. Both basic (H.H. Flor’s Gene-for-Gene Theory) and applied (the Green Revolution) disease control successes were highlighted, thus setting the stage for the other two morning speakers.

Dr. Eugene Hayden (Ph.D. alum 1956), former Secretary of the Minnesota Crop Quality Council, explained the influence of Elvin C. Stakman’s student Donald Fletcher in a presentation entitled “Dr. Stakman and Mr. Fletcher, a special relationship”.

Donald Fletcher left the Department in 1922 to become the Secretary of the Conference for the Prevention of Grain Rust. He was actively involved in many aspects of cereal crop stem rust control. In that, and in other professional capacities he brought together various agribusiness and railroad interests. His life-long friendship with E.C. Stakman and superb personal skills resulted in advanced professional contacts with agribusiness, the USDA, legislatures and the US Congress along with mid-western region Land Grant Universities. Among many of Mr. Fletcher’s achievements was adding continuity to the Barberry Eradication Campaign and bringing resources into the Department and to regional agricultural colleges. Mr. Fletcher’s efforts are undocumented in Departmental history or in the history of the University of Minnesota. Therefore to establish an historical record a synopsis of Dr. Hayden’s presentation is published in this Centennial Issue.

The final morning speaker was Dr. Guy Baird (Rockefeller Foundation – Colombia and India programs, retired). He spoke about the influence of Minnesota alumni, and in particular Dr. George Harrar (Ph.D. 1936 under E.C. Stakman) in the establishment and ultimate success of international crop research centers. His talk was entitled “The International Impact of Dr. J. George (Dutch) Harrar.” George Harrar (sometimes called the godfather of the Green Revolution), in addition to proven scientific and administrative skills, was bilingual in Spanish and English. He was hired in 1943 by the Rockefeller Foundation, at the suggestion of E.C. Stakman (himself a Rockefeller Foundation consultant), to head up the Foundation’s agricultural effort in Mexico. The Foundation’s objective was to cooperate with the Mexican government to help Mexico become self-sufficient in maize and wheat. Among Harrar’s early hires was Norman Borlaug (Ph.D 1942 under J.J. Christensen). Under J. George Harrar the Mexican program succeeded and he was placed in charge of all Rockefeller Foundation’s agricultural efforts. He then went on to become President of the Rockefeller Foundation. At his urging, the



Professor Richard Zeyen “The Genesis of Plant Pathology at Minnesota.”



Donald Fletcher (photo from mid 1950’s) annually evaluated cereal crop production on the Great Plains from Texas through Manitoba. He often logged 3000 miles annually in this endeavor.

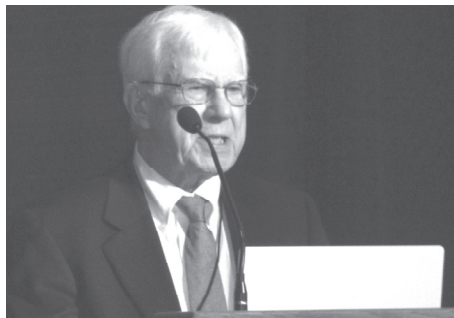


Legacy Day audience listening to Eugene Hayden’s presentation of the contributions of Mr. Donald Fletcher.

Centennial Celebration (cont.)



Dr. George (Dutch) Harrar and his friend and mentor Professor Elvin Stakman, Mexico 1956



Dr. Guy Baird delivers "The International Impact of Dr. J. George (Dutch) Harrar."



Professor Carol Ishimaru waits for the audience to settle in for her afternoon presentation entitled the "Department of Plant Pathology in the 21st Century."



Mr. Pablo Olivera presents research on locating and mapping cereal disease resistance from wild progenitors of modern cereal crops.

Ford Foundation joined with the Rockefeller Foundation in establishing an international center for rice research in the Philippines. The Mexican center model (now CYMMIT) was applied to rice (now IRRI) and ultimately to the creation of many more international centers (bean in Columbia, potatoes in Peru, etc.). These centers continue to supply base genetic materials for major crops that supply the carbohydrate base for most of the world.

Following the morning presentations was an audience participation "Question and Answer" session. A panel composed of Drs. Norman Borlaug, Leon Hesser, Eugene Hayden, Guy Baird, Richard Zeyen, and Thor Kommedahl responded to questions from the audience.

The afternoon session on Legacy Day began with an initial session moderated by professor Brian Steffensen entitled "The Department of Plant Pathology in the 21st Century." The first speaker was Dr. Carol Ishimaru, the current Department Head.

Many old friends of the Department and some alumni were unfamiliar with the modern Department's structure, its faculty and research programs. Therefore, Dr. Ishimaru encapsulated its current status and highlighted the many strengths of our modern Department. She stressed the quality of the faculty, staff and students, and Departmental facilities. She stated that the ability to attract outside funding is a good measure of the quality of the research and outreach programs in the modern Department.

The second speaker was Professor Brian Steffenson, holder of the Department's Lieberman-Okinow Endowed Chair of Cereal Disease Resistance.

Brian presented a talk entitled "New Tools to Battle Ancient Enemies of Cereal Crops." After establishing a historical perspective, he explained how modern research tools including molecular genetics are marshaled to provide better and more durable disease resistances in cereals. Mr. Pablo Olivera, a Ph.D. student of Brian's, explained his research in disease resistance of barley. He outlined how international collaboration with Tel Aviv University is helping in the identification and transfer of disease resistances from wild ancestors of modern cereal crops.

Professor Ruth Dill-Mackey's presentation on current research efforts involving Head Blight of wheat and barley encompassed a wide array of applied research useful in the control of this devastating disease. Head Blight caused primarily by *Fusarium graminearum* was a multi-billion dollar problem beginning in the early 1990's when soil conservation techniques resulted in winter carry over of residue harboring the pathogen. High levels of inoculum in concert with wet growing seasons caused massive

damage. A national research effort in which Dr. Dill-Mackey and others at Minnesota and in 22 other states was initiated in the 1990's and remains in force today.

Professor Linda Kinkel was the final speaker in the first afternoon session. Her talk was entitled "Microbial Ecology: What Lies Beneath the Prairie?" Dr. Kinkel discussed and illustrated the diversity of microorganisms in soils and in prairie soils in particular. She emphasized the fact that the vast majority of microbes in the soil matrix can not be cultured. They have only been identified by modern molecular genetic techniques. She then narrowed her presentation to *Streptomyces* spp. with an emphasis on cultural control and soil amendments for control of diseases like potato scab.

Adjunct Professor Deborah Samac (USDA/ARS Alfalfa Project) presided over the final afternoon session entitled the "Global Impact of the Department's Research and Education."

The first speaker of the afternoon session was Assistant Professor Dean Malvick whose talk was "Addressing Today's Plant Disease Challenges." Dr. Malvick documented several plant diseases of concern in Minnesota and well as diseases we anticipate seeing in Minnesota in the near future. His presentation included the impact of the warming trend of the past 10 years, modern disease epidemiology and control methods. He highlighted research into new control methodology, and preemptive steps that Department members are taking for diseases we anticipate seeing in Minnesota in the near future.

The second afternoon presentation involved two speakers. The first was the Department's McKnight Professor, Dr. Nevin Young, and the second Professor James Bradeen. Their topic was "Advances in Understanding and Using Plant Disease Resistance." Nevin Young introduced molecular genetic technologies used to identify, map and clone disease resistance genes. He documented advances in soybean disease resistance arising in part as a result of molecular genetic information originally obtained with the model legume species *Medicago truncatula*. James Bradeen addressed the challenge of durable resistance to late blight disease of potato. He described cloning of late blight resistance genes and the cloning of a particular R gene from a wild species of potato. This R gene when inserted into commercial potato lines with genetic engineering techniques provided durable and reliable resistance. This resistance held up even when in a location where the causal agent of late blight, *Phytophthora infestans* evolves many physiological races, in the Toluca Valley of Mexico.

The final afternoon speaker was Professor Robert Blanchette. His title was "The Indiana Jones's Guide to Wood-Rotting Fungi: Extreme Environments and Fantastic Adventures." He



Norman Borlaug and Professor Ruth Dill-Mackey share thoughts during a break on Legacy Day.



Professors Linda Kinkel and Carol Windels share a moment between sessions on Legacy Day.



Professor Deborah Samac talks with retired Professor Ward Stienstra during a session break. Left to right in the background are: Marlene Banntari, and Professors Ernest Banntari (retired), Robert Blanchette, Chester Mirocha (retired) and alum Robert Noyd (Professor - United States Air Force Academy).

described research into wood deterioration in archeologically important, but environmentally extreme sites. He described ancient sites in Turkey and sites in Native American civilizations of the southwestern United States. He ended inside huts built by Antarctic explorers of the 19th and early 20th century. Archeological research stems from expertise gained by his forest pathology and wood deterioration work. His was another example of unexpected strength and diversity in Minnesota.

The evening of Legacy Day September 19th

The evening began with a reception in the CECC atrium with music by Dann Adair's jazz group. Dann spent many years in the Department as its Glasshouse Supervisor and retains strong ties with the Department.

The Legacy Day Dinner's theme was "A Tribute to Norman Borlaug-Future Challenges." It was held in the CECC Dining Room and the guest speaker was Dr. Robert Herdt (retired Rockefeller Foundation Economist, now an adjunct professor at Cornell University). Dr. Herdt paid tribute to Norman Borlaug while outlining future challenges and the need for a second Green Revolution, especially in Africa. Dr. Herdt's tribute, in its entirety, is found on page 24.

With audience urging Norman Borlaug spoke. He passionately underscored the need to eliminate worldwide hunger and for basic education. He then outlined challenges to both food production and education, especially in undeveloped and impoverished areas of the world.

Norman Borlaug was gracious in allowing a film to be made of a conversation Professor with Richard Zeyen about Norman's recollections of Plant Pathology at Minnesota. Each dinner guest received a DVD copy of this historical record.

Dann Adair's "Mile from Mars" jazz group entertain on Legacy Day evening. Left to right - Dann Adair, Jane Aleckson, Rolf Bjornson and Charles Schrantz.



Guests enjoy a light moment during the after dinner talks.



Dr. Norman Borlaug addressing fellow plant pathologists and guests following Robert Herdt's presentation.



Open House and Awards Day September 20

Departmental Awards - Professor Carol Ishimaru

E.C. Stakman Award posthumously to Sir Bent Skovmand – Professor Richard Zeyen (Eugenia, Astrid, and Francisco Skovmand, and Kirsten Skovmand-Wilson accepting)

Audience Participation, Question and Answer Panel Discussion (The Legacy, The Current Department, and the Future) – Drs. Carol Ishimaru, Philip Larsen, Neil Anderson, Norman Borlaug, Leon Hesser, Guy Baird, Frank Pfleger and moderated by Richard Zeyen

Public Reception Honoring Sir Bent Skovmand and Norman Borlaug comments by Dr. Leon Hesser, author of Norman Borlaug's biography, "The Man Who Fed the World"

Campus Facility Tours

The annual Departmental Awards ceremonies were held at 11:00 am at CECC. See pages 14 & 15 for the award recipients.

In the early afternoon an audience participation, question and answer session with the theme "The Current Department, and the Future" was held at the CECC. The panel, to which comments and questions were put, was made up of former Department Heads, Drs. Neil Anderson, Philip Larsen and Frank Pfleger. They were joined by current Head, Dr. Carol Ishimaru and Professor Richard Zeyen.

Following the Question and Answer session a public reception honoring Sir Bent Skovmand and his mentor and friend Norman Borlaug was hosted by the College of Food, Agriculture and Natural Sciences. To begin the reception, Dr. Leon Hesser, author of "The Man Who Fed the World," gave a brief synopsis of Norman Borlaug's life and contributions to world agriculture and to fighting world hunger. Several hundred people attended this outstanding event.



Dr. Borlaug addresses the panel during the audience participation, "Question and Answer" session.

Department Awards

2007 ELWIN L. STEWART TRAVEL AWARD

Paul Meyer

2007 WARD C. STIENSTRA AND RICHARD A. MERONUCK TRAVEL AWARD

Christie Almeyda

Pravin Gautman



**2007 Milton F. Kernkamp Scholarship
Ben Alsop**



**2007 Distinguished Mentor Award
Professor Benham Lockhart**



**2007 Civil Service Award of Excellence
Carol Anderson**



**2007 Fred Frosheiser Scholarship
Ann Impulliti**



**2007 Distinguished Alumnus Award
Professor Barbara Christ**

Dr. Barbara Christ is Professor and Head of the Plant Pathology Department at Pennsylvania State University.

E.C. Stakman Award

2007 E.C. STAKMAN AWARD Sir Bent Skovmand Leader in Plant Genetic Resource Preservation Alumnus - Plant Pathology Department University of Minnesota

The Department of Plant Pathology at the University of Minnesota presented its 2007 E.C. Stakman Award to an alumnus (B.S., M.S., & Ph.D.; 1971-1976), Sir Bent Skovmand. Dr. Skovmand, an internationally acclaimed and award-winning plant scientist and genetic conservationist began his career in science as a Minnesota Agricultural Student Trainee (MAST) at the University of Minnesota.

He began his professional career in 1977 at the International Maize and Wheat Improvement Center (CIMMYT) in Mexico under Norman Borlaug in CIMMYT's wheat program, and later headed its Triticale improvement program. From 1983-1989 he was on loan to a United Nations Development Project for wheat improvement in Turkey. From 1989 through 2003 he led CIMMYT's Wheat Genetic Resources Program.

In 2003 Queen Margrethe II of Denmark awarded him the Knight's Cross of the Order of Dannebrog for his work both in crop improvement and in the preservation of valuable plant genetic resources.

In 2003 he was appointed Director of the Nordic Gene Bank (NGB) in Sweden. Sir Skovmand's insight and pragmatic vision of the future led to instigation of several genetic resource

preservation efforts, the largest of which was a cooperative program with the Central Asian Republics for preserving their plant genetic resources.

As the Director of the NGB he was heavily involved in the design and construction of the Svalbard International Seed Vault (the so-called Doomsday Seed Vault) on the remote island of Spitsbergen. This vault holds 3-5 million plant accessions. It preserves living seed stocks for most of humankind's major food crops. See web site below.

(http://en.wikipedia.org/wiki/Svalbard_Global_Seed_Vault)

Sir Skovmand died unexpectedly, at age 61, on February 6, 2007 in Kävlinge, Sweden of medial complications related to a brain tumor. His wife Eugenia and children Astrid, Francisco and Kirsten Wilson/Skovmand accepted the E.C. Stakman Award on the 20th of September 2007 during the Department's Centennial Celebration. The Department of Plant Pathology joined the world in mourning the untimely passing of our gifted, visionary plant scientist.



Bent Skovmand as a MAST student in 1967 harvesting maize on a farm in southwestern Minnesota.



Sir Bent Skovmand in Copenhagen, Denmark in 2004 at a reception held by Queen Margrethe II.



Left to Right - Francisco Skovmand, Kirsten Wilson/Skovmand, Astrid and Eugenia Skovmand and Professor Richard Zeyen. The family received the EC Stakman Award on behalf of Sir Skovmand. September 20th in Saint Paul, 2007.

E.C. Stakman Award Call for Nominations

The Department requests nominations for the E.C. Stakman Award. The award goes to individuals of any country or nationality for outstanding achievements in plant pathology. The award is given for documented achievements in research, teaching, outreach, international development, or for any combination of these areas. Preference is given to candidates actively engaged in these areas; only occasionally will lifetime achievement awards be considered.

Complete nominations must include a brief biographical sketch of the nominee, a current vitae and three letters from persons who can address the contributions of the candidate. Nominations must be received by February 14, 2009.

Please send nominations or direct inquiries to: to Dr. Carol Ishimaru, Department Head, Plant Pathology Department, University of Minnesota, 495 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6030 USA., office telephone 612-625-8200 for inquiries, or fax nominations to 612-625-9728,

STAKMAN AWARD RECIPIENTS 1956-2007

Dr. W.L. Waterhouse, Professor, University of Sydney, Australia, 1956
Dr. H.A. Rodenhizer, USDA, Washington, DC, (formerly Deputy Administrator for Farm Research), 1957
Dr. T. Johnson, Head, Canadian Rust Research Laboratory, Winnipeg, 1958
Dr. J.J. Christensen, Head, Department of Plant Pathology, University of Minnesota, 1959
Mr. Jose Vallega, Argentina Department of Agriculture, FAO in Rome, 1960
Dr. Norman E. Borlaug, renown wheat breeder and plant pathologist with the Rockefeller Foundation's agricultural improvement program in Mexico (now in charge of their international wheat improvement program), 1961
Dr. Helen Hart, Professor, Department of Plant Pathology, University of Minnesota, 1963
Dr. J.H. Craigie, former Head, Canadian Rust Research Laboratory, Winnipeg, 1964
Dr. J.A. Rupert, in charge of the Rockefeller Foundation's agricultural improvement program in Chile, 1965
Dr. I.A. Watson, Dean, College of Agriculture, Sydney University, Australia, 1966
Dr. H.H. Flor, Research Plant Pathologist, USDA, Fargo, North Dakota, 1967
Sir Frederick C. Bawden, Director, Rothamsted Experimental Station, Harpenden, Herts, England, 1968
Dr. Donald G. Fletcher, former Executive Vice-President, Crop Quality Council, Minneapolis, Minnesota, 1968
Dr. George J. Harrar, President, Rockefeller Foundation, 1969
Dr. H. Asuyama, Department of Plant Pathology, University of Tokyo, 1971
Dr. C.S. Holton, Department of Plant Pathology, Washington State University, Pullman, 1971
Dr. J.C. Walker, Professor Emeritus, Department of Plant Pathology, University of Wisconsin, Madison, 1972
Dr. D.L. Bailey, Professor Emeritus, Department of Botany, University of Toronto, Canada, 1972
Dr. C.M. Christensen, Regents Professor Emeritus, Department of Plant Pathology, University of Minnesota, 1981
Dr. J.F. Fulkerson, Plant Pathologist and Microbiologist, USDA, Washington, DC, 1982
Dr. E.J. Wellhausen, Special Staff Member, The Rockefeller Foundation, Mexico, 1982
Dr. J.E. VanderPlank, Plant Protection Research Institute, Pretoria, South Africa, 1985
Dr. J.M. Daly, Department of Agricultural Biochemistry, University of Nebraska, Lincoln, 1986
Dr. Arthur Kelman, Department of Plant Pathology, University of Wisconsin, 1987
Dr. Theodor O. Diener, USDA, Plant Virology Lab, Agricultural Research Center, Beltsville, Maryland, 1988
Dr. R. James Cook, USDA, Regional Cereal Disease Research Lab, Washington State University, Pullman, 1989
Dr. Thor Kommedahl, Department of Plant Pathology, University of Minnesota, 1990
Dr. Allen Kerr, Department of Crop Protection, The University of Adelaide, South Australia, 1991
Dr. Luis Sequeira, Departments of Bacteriology and Plant Pathology, University of Wisconsin, 1992
Dr. Sanjaya Rajaram, Germplasm Improvement Subprogram International Maize and Wheat Improvement Center, CIMMYT, Mexico, 1993
Dr. Malcolm C. Shurtleff, Professor Emeritus, University of Illinois, and Adjunct Professor, Texas A&M University, 1999
Dr. William Bushnell, Department of Plant Pathology, Cereal Disease Lab, University of Minnesota, St. Paul, MN 2000
Dr. James DeVay, Department of Plant Pathology, University of California, Davis, California 2001
Dr. Robert A. McIntosh, Plant Breeding Institute Cobbitty, Australia, 2002
Dr. Jeremy J. Burdon, CSIRO, Canberra, Australia, 2003
Dr. Jan E. Leach, Department of Plant Pathology, Kansas State University, Manhattan, Kansas, 2004
Dr. Laurence V. Madden, Department of Plant Pathology, Ohio State University, Wooster, Ohio, 2005.
Dr. John W. Gibler, 2006, Leader in Latin American Crop Development, Alumnus - Plant Pathology and Plant Breeding, University of Minnesota
Sir Bent Skovmand, 2007, Director of the Nordic Gene Bank, Alnarp, Sweden (design and oversight of the Svalbard International Seed Bank, Spitsbergen).

Centennial Celebration (cont.)

Mycological Foray - Friday, September 21

A mycological foray, hosted by Drs. Robert Blanchette and Neil Anderson was held on the last day of the Centennial celebrations at Nerstrand Woods State Park. Although the preceding weeks were very dry and few fungi were fruiting at most locations this remnant of the great Minnesota woods produced many fungi. The final total was over 100 different taxa for the trip!



Participants in the mycological foray pose in Nerstrand Woods State Park, which is located in south central Minnesota.

Centennial Celebration Attendees and Donors List *

Plant Pathology Centennial Celebration September 19-21 2007, Saint Paul Campus

Dann Adair	Vernon Cardwell	Greg Grahek	Thor Kommedahl	Jeri Ooka	Elwin Stewart
Gib Ahlstrand	Mary Carlstrom	Craig Grau	Kathy Kromroy	Mary Ooka	Myrna Stienstra
Christie Almeyda	Terry Carlstrom	Lesley Grau	Steve Kronmiller	Maria Ordonez	Ward Stienstra
Ben Alsop	Martin Carson	Lisa Guyott	James Kurlle	Elizabeth Ozmon	Sam Stoxen
Alyssa Anderson	Claudia Castell-Miller	Nancy Hamilton	Philip Larsen	Mahesh Pandey	Manhong Sun
Barbra Anderson	Senyu Chen	Rob Hanks	Sandra Larsen	Tara Pandey	Barbara Swadburg
Carol Anderson	Ming Cheng	Eugene Hayden	Kurt Leonard	Ji-Hyun Park	Ryan Syverson
Dorothy Anderson	Barbara Christ	Ben Held	Al Levine	Frank Pflieger	Tamas Szinyei
Grace Anderson	Meg Clemens	Robert Herdt	Sharon Lewandowski	Jill Pokorny	Timea Takacs
Jim Anderson	Florence Crow	Joan Herrett	Dan Lieberman	Abel Ponce de Leon	Kayellen Taylor
Linda (Rivers) Anderson	Robert Crow	Richard Herrett	Steve Lieberman	Penphit Prakhongchit	Michael Tello
Neil Anderson	Karen Cummings	Dean Herzfeld	Susan Lieberman	Donald Rasmussen	Kathleen Terry
William Anderson	Stephanie Dahl	Florence Hesser	Albert Linck	Lois Reiling	Susan Tertell
Hedwing Andres	Delight Darley	Leon Hesser	Vandora Linck	Theodore Reiling	Anna Testen
Markus Andres	Elis Darley	Jason Hilburn	Benham Lockhart	Bobby Renfro	Toi Tsilo
Ann Arendt	Michael Davis	Karen Hilburn	David Long	Howard Rines	Carol Van Why
Tom Arendt	Roxanne Denny	John Hill	Patricia Long	Maria Rojas Barros	Dimitri Von Ruckert
Brett Arent	Ruth Dill-Macky	Charla Hollingsworth	Dean Malvick	Robert Romig	Tim Walz
Mauricio Assuncao	Yanhong Dong	Delores Huebner	Enrico Marsili	Noah Rosenzweig	Bing Bing Wang
Guy Baird	Kevin Dorn	Ann Impullitti	Pat Martinez	Matthew Rouse	Shelly (Xiaohong) Wang
Erica Bakker	Melinda Dornbusch	Carol Ishimaru	Georgina May	Alice Rowell	Gloria Warner
Matt Bakker	Chris Dowsell	Dan Ishimaru	Matt McBride	John Rowell	Karen Wennberg
Ernest Banttari	Deb Drange	James Jacobs	Denis McGee	Deborah Samac	Laura Wiegand
Marlene Banttari	John Dueck	Haiyan Jia	Judy McGee	Jonathan Schilling	Lorna Wiems
Maria del Pilar Rojas	Mary Dueck	Yue Jin	Jon Menke	Dan Schlatter	Melvin Wiems
Barros	Mazen El Zarka	Lois Johnson	Paul Meyer	Michael Schmitt	Karina Wilson
Charles Barnes	Lori Engstrom	Sharon Jons	James Miller	Patrick Schneider	Miles Wimer
John Bienapfl	Bruce Fletcher	Virgil Jons	Norma Miller	Jason Scott	Carol Windels
Robert Blanchette	Craig Flor	Scott Joseph	Ben Millett	Tina Seeland	Matthew Wohlman
Dallas Bohnsack	Jennifer Flor	Jennifer Juzwik	Katie Millett	Darroll Skilling	John Vreysen
Norman Borlaug	Crystal Floyd	Jennifer Kang	Chester Mirocha	Marie Skilling	Kun Xiao
James Bradeen	Warren Formo	Elizabeth Kaplan	Donna Mirocha	Astrid Skovmand	Lei Xu
Laurie Brand	Phyllis Frederiksen	Betty Kennedy	Martin Moen	Eugenia Skovmand	Harry Young
Grace Bucher	Richard Frederiksen	Bill Kennedy	Dimitre Mollov	Francisco Skovmand	Nevin Young
Patricia Burnes	Liane Gale	Gregory King	Jacki Morrison	Kirsten Skovmand-Wilson	Beheshteh Zargaran
Todd Burnes	Sam Gale	Linda Kinkel	Robert Morrison	Robert Slattery	Richard Zeyen
Ann Bursch	Liangliang Gao	Rachel Kissner	Richard Morrison	Bonnie Slattery	Lingyan Zhang
Mary Buschette	Atenea Garza	Corby Kistler	Robert Noyd	Ran Song	Hao Zhou
Ann Bushnell	Pavin Gautam	Tonya Kjerland	Susan Noyd	Mary Sortland Moberg	Jie Zhou
William Bushnell	Irene Goodfellow	Tammy Kolander	Diana Oleskow	Brian Steffenson	
John Byrnes	Sandra Gould	James Kolmer	Pablo Olivera	Mark Stennes	

Organizations and Industry Support

American Malting Barley Association, Minnesota Agricultural Experiment Station, Minnesota Soybean Growers Association, Minnesota Wild Rice Council, College of Food, Agriculture and Natural Resource Sciences, University of Minnesota Foundation

* Attendees who did not pre-register but came to various functions of the Centennial Celebration may be missing from this list.

Heads of the Department of Plant Pathology



EM Freeman
1907-1940



EC Stakman
1940-1953



JJ Christensen
1953-1961



MF Kernkamp
1961-1972



FA Wood
1972-1977



DW French
1977-1984



PO Larsen
1984 -1993



NA Anderson
1993-1996

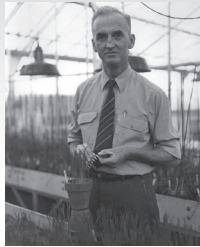


FL Pflieger
1996-2004



CA Ishimaru
2004 -

Faculty Legends



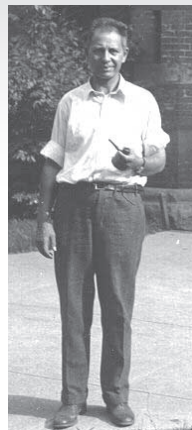
Matt Moore



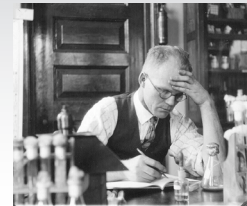
Louise Dossall



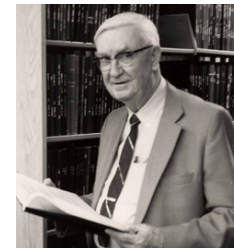
Clyde Christensen



Elvin Stakman



Jonas Christensen



Carl Eide



Helen Hart

Legacy Faculty

Neil Anderson
Ernest Banttari
Howard Bissonette
David French
James Groth
Bill Kennedy
Thor Kommedahl
Al Linck
Chester Mirocha
Roy Wilcoxson

E.C. Stakman & Don Fletcher - A Special Relationship

Eugene B. Hayden (M. S. 1954; Ph.D. 1956)
Head – Crop Quality Council 1965-1968



E.C. Stakman

The rust epidemic of 1916 at the end of World War I caused heavy losses to Upper Midwest wheat crops and resulted in a lifelong professional and personal relationship between E. C. Stakman and Don Fletcher.

Concerns about rust losses brought agricultural scientists, business and political leaders together. Twin City business leaders including Franklin M. Crosby, head of Washburn Crosby Co. (predecessor to General Mills), Ralph Budd, president of the Great Northern Railway and C. C. Webber of Deere & Webber (head of the Minneapolis division of John Deere) were among business leaders to financially support a historic effort to control wheat rust.

The Conference for the Prevention of Grain Rust was established and funded in 1922 by the agribusiness community. Stakman played a key role in founding the organization when he was 37 years old. It supported rust control efforts for 60 years – from 1922 until 1983.

The Conference was initially headed by a newspaper man whose interest waned and Don Fletcher joined the organization.

Don, who headed the organization for more than 40 years, stated in his modest way, “They tipped a waste basket upside down as a chair for me when I joined the

A Professional Bond A Personal Relationship

It benefited agriculture and the agribusiness community for decades.

organization.” He provided continuing leadership from 1922 until his retirement in 1965.

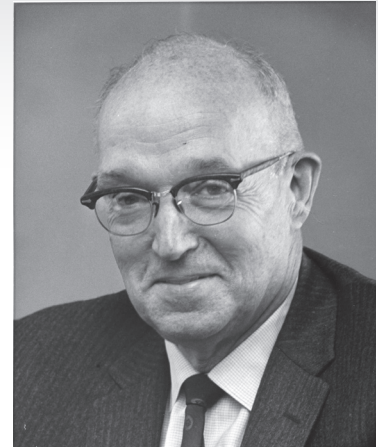
The Conference for the Prevention of Grain Rust was later named the Rust Prevention Association and still later Crop Quality Council in 1960.

Fletcher was born on a farm in Brooklyn Center, Minnesota in 1898, and received a BS Degree in agricultural education and farm management at the University of Minnesota in 1922.

He had worked in the field in the barberry eradication program two summers during college and had started work toward a Master’s Degree with Dr. Stakman in 1922.

He passed the German examination before joining the Conference staff, but must have been moved by the immediate challenge to control rust – perhaps by Stakman’s enthusiasm – and never finished the MS.

Research by Stakman and his associates had shown that there were individual races within the stem rust organism and that the pathogen had an alternate host, the common barberry. It was widely distributed in grain growing areas and provided an early source of infection for nearby grain fields.



Don Fletcher

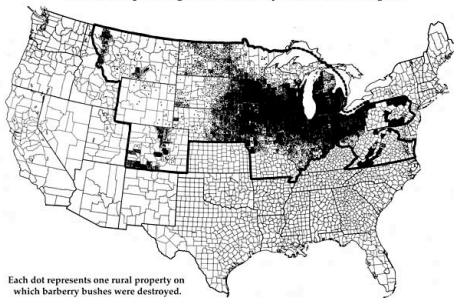
Although much had been learned about the relationship of the barberry to wheat stem rust, there were gaps in knowledge. Stakman made a courageous decision to encourage the U. S. Dept. of Agriculture to eradicate barberry bushes from grain growing areas. His willingness to encourage this effort, despite some misgivings, is related in his oral history and quoted in *E. C. Stakman, Statesman of Science*, by C. M. Christensen.



E.C. Stakman circ 1920

Stakman had studied the spread of rust to wheat from barberries as early as 1910, when he began his own graduate studies at 25 years of age. He was put in charge of the federal barberry eradication effort when it started in 1918 and became intimately involved in the educational effort that supported the eradication program – all before 1922.

States Cooperating in the Barberry Eradication Program



Barberry eradication was begun in 13 states, and was later expanded to 16 states in principal grain growing regions. More than 500 million bushes were eradicated between 1922 and 1979 when the eradication effort was considered complete and the program ended.

Stakman has said, "Federal funds for barberry eradication were saved by Fletcher's efforts on at least two occasions."

Personal Characteristics of Fletcher and Stakman

Dedication, dogged determination, the highest level of integrity and "that famous smile" were Don Fletcher's keys to success. One of Don's daughters characterized his dedication to work saying, "Dad was always gone."

Stak, and his wife Louise, often took vacations with Don and his family on the north shore of Lake Superior. Barbara Fletcher Reiss recalls that Don wanted to buy a piece of land on a high cliff overlooking the lake. Since Stak had mentally appropriated Don's three children, when the proposed purchase was mentioned Stak said, "I don't want my kids falling over that cliff!" Barbara was disappointed the land was never bought, but she describes with enthusiasm the fact that Stak taught her to tap dance – and he was good at it!



Louise & Dr. Stakman, Early 1950s



CEREAL DISEASE LABORATORY on the St. Paul Campus

Vance Goodfellow, head of the Crop Quality Council (1969-1983), obtained federal construction funds.

It was built in 1972 and expanded twice.

It plays a vital national role in rust race identification.

Although many were aware Stak used the nickname Juno or The Viking for Louise, only a few intimates knew he often said, "I'll have to check that with the Princess."

The Stakman home provided the best meal of the week for graduate students in the 1920's when times were tough. Frank Greaney (Ph. D. 1931), a young student from Canada, related how he and other students looked forward to those Saturday night seminars.

They may have thought it was a seminar, but Stak knew what he was doing – feeding hungry graduate students!

Many students came from Canada to Minnesota for advanced study in plant pathology and plant breeding. Among them were Margaret Sloan Newton (Ph.D. 1922), J. H. Craigie (M.S. 1925), Thorvaldur Johnson (Ph.D. 1930), who later headed the Dominion Rust Laboratory at Winnipeg, W. F. Hanna, Rudy Peterson, A. Barrie Campbell and others. They gave an early international feel to the department and several contributed importantly to rust control efforts in the 1950's.

The 15B Era

Rust resistant wheat varieties held stem rust in check until 1950 when race 15B first became prevalent and attacked wheat crops in the Upper Midwest and Canada. All widely grown varieties were susceptible. Serious losses occurred for several years during the 1950's. In 1954 alone more than 300,000,000 bushels of spring bread wheat were destroyed in the Up-

per Midwest, and 80% of the durum crop was lost. In Canada, 120,000,000 million bushels of wheat were destroyed.

The virulent race 15B had been detected for 11 years – usually near barberries.

It became widespread in 1950 when Upper Midwest and Canadian wheat crops were late maturing. This provided opportunity for large quantities of 15B spores to develop, move south to over-winter and move north in the spring to threaten the wheat crop.

Don Fletcher then broadened Rust Prevention Association activities and led efforts to obtain increased financial support for USDA rust research and wheat breeding. He worked to get support from state legislatures for increased research budgets and facilities. New greenhouses at Minnesota, North and South Dakota were built. In 1956, winter research plantings were begun in Mexico to speed development of new varieties.

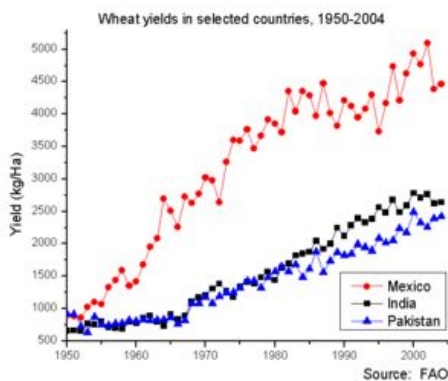
Later, funds were obtained for a Cereal Technology Building at North Dakota State University and a National Seed Storage facility at Fort Collins Colorado, where genetic materials of important crops could be preserved for future research.

Communication among North American scientists was aided by the 1953 International Wheat Stem Rust Conference in Winnipeg, Canada and the 1956 International Wheat Rust Conference in Mexico City. Winter research plantings in Mexico also fostered cooperation among scientists from the Upper Midwest and

Stakman & Fletcher (cont.)

Canada. They came to Mexico each spring for 27 years to make selections from their breeding materials.

Mexico became self sufficient in wheat production in 1956. The semi-dwarf, rust resistant Mexican varieties, responsive to high levels of fertilization, were introduced into Pakistan and India in large quantities. Pakistan became self sufficient in wheat production in 1969 and India achieved the same result several years later. The world wide impact of these varieties is described in *The Man Who Fed the World*, a biography of Norman Borlaug by Leon Hesser published in 2006.



Impact on World Wheat Production

Fletcher made several long trips each year for decades to evaluate rust and crop development from Texas northward into the Canadian Prairie provinces.

These were grueling ten day, three thousand mile trips inspecting fields. They were down to dark affairs long before good motels were built after World War II.

Don stayed in many old wooden hotels with a knotted rope tied to the base of the radiator – it was the fire escape!



Don Fletcher

Winter Plantings Speed Response to Rust Attacks

From 1956 on, about 10,000 individual rows of experimental materials were grown each winter on the Mexico Department of Agriculture Experiment station at Ciudad Obregon, where Borlaug did much of his work. The Association arranged to plant the seed in October and scientists came from the Upper Midwest and Canada in April to select promising material for harvest and return north.

This international effort encouraged strong bonds of friendship among the participants. The Rust Prevention Association sponsored this effort for 27 years under contract with the U. S. and Canada Departments of Agriculture. Unfortunately, this productive program had to be terminated when dwarf bunt became prevalent in Mexico in 1982.

The release of several 15B resistant varieties of spring bread wheat and durum, halted rust losses as the acreage of these varieties increased. Among the varieties were Wells and Lakota durum wheats and Justin and Crim bread wheats, together with the Canadian variety Selkirk.

Louis Reitz, former leader of USDA wheat research programs stated “without Borlaug and Don Fletcher the winter increase program in Mexico would not have happened.”

The Impact of the International Spring Wheat Yield Nursery

The search for resistance to 15B was aided by H. A. Rodenhiser’s offer in 1953 of materials from the USDA World Wheat Collection for inclusion in an International Spring Wheat Rust nursery. Rodenhiser was a Stakman student who received his Ph.D. degree in 1928 and the Stakman Award in 1957.

Borlaug recognized the potential value and a series of Inter-American Spring Wheat Yield Nurseries were begun, under sponsorship of the Rockefeller Foundation. The International Spring Wheat Yield Nursery, initiated in 1958, had world-wide impact. Borlaug states “this nursery was the vehicle through which the broadly-adapted Mexican stem rust resistant wheat varieties spread around



The USDA, Rust Prevention Assn., Canada Dept. of Agriculture and the Wisconsin Agricultural Experiment station were represented at this harvest in Mexico.

the world ... it was instrumental in establishing the so-called Green Revolution in the Asian countries.”

Fletcher’s Contributions Recognized

In 1959, North Dakota State University recognized Fletcher’s contributions by honoring him with a Doctor of Science Degree.

Also, he was elected to the prestigious Cosmos Club in Washington, D. C. in 1962. He received the University of Minnesota Outstanding Achievement Award in 1966.

In 1968, he received the Elvin Charles Stakman award from the Plant Pathology Department at the University of Minnesota.

Retirement– 1965

Don’s retirement party was attended, by crop scientists from the US, Canada and Mexico It was summarized in a headline in The Farmers Union Herald: “Three Nations Thank Don Fletcher.”

Don Fletcher continued working for agriculture as a Rockefeller Foundation Consultant after retirement. He arranged to purchase and ship several sets of seeding and harvesting equipment for demonstration plots in India and Pakistan when the Mexican wheat varieties were being introduced.



“Total Happiness” – In retirement a gentleman freed of responsibilities after 40 years

Don Fletcher

He and Dr. Stakman joined Norman Borlaug in observing the impact of the “Green Revolution wheats” while visiting both Asian nations in 1968.

Don Fletcher, Stakman and George Harrar – president of the Rockefeller Foundation – made a trip to Scandinavia in July 1968.

Stakman, himself, was later honored by presenting the first Cosmos Club Award speech in 1964. On the commemorative copy of his speech, Stak wrote:

“This copy justly goes to Don Fletcher Who Always helped the cause By Talking and Listening And Doing good deeds”

Don Fletcher had a unique ability to work with the business community, scientists, leaders in agriculture and legislators. His integrity, that famous smile, his knowledge and dedication to the cause, earned him great respect wherever he went.



Left to Right: H. A. Rodenhiser, Eugenio Martinez (Obregon, Mexico), Donald G. Fletcher, Eugene B. Hayden and Totton P. Heffelfinger, Chairman of the board, Crop Quality Council. *Note: Eugene B. Hayden succeeded Don Fletcher and served as head of the Crop Quality Council from 1965 – 1968. He was succeeded by Vance V. Goodfellow who led the organization until his retirement in 1983.



The nature of the Stakman – Fletcher relationship is apparent from Stak’s note on the back of this picture.

Don:
“I’d like to give you this picture; I’d be proud to think that you wanted it.”
“Stak”



Stakman and Fletcher, Cosmos Club Award



Trip to Scandinavia

Stakman, Fletcher, & Borlaug

Each made special contributions

Don Fletcher was Stakman’s long-time ambassador to the business community and agricultural policy makers. Borlaug used Stakman’s research discoveries to develop rust resistant varieties. He extended plant breeding principles that caused a revolution in world wheat production.



E.C. Stakman



Don Fletcher



Norman Borlaug



Congressional Record

PROCEEDINGS AND DEBATES OF THE 110th CONGRESS, FIRST SESSION

House of Representatives

TRIBUTE TO THE 100TH ANNIVERSARY OF THE UNIVERSITY OF MINNESOTA'S DEPARTMENT OF PLANT PATHOLOGY

HON. TIMOTHY J. WALZ
OF MINNESOTA
IN THE HOUSE OF REPRESENTATIVES
Friday, September 14, 2007

Mr. WALZ of Minnesota. Madam Speaker, today I rise to commemorate the 100th anniversary of the Department of Plant Pathology at the University of Minnesota.

I would like to applaud the University of Minnesota's Department of Plant Pathology for its dedication to furthering knowledge of plant pathology and its work in developing genetic and biological controls that have helped increase crop production in Minnesota and across the world. The contributions of this Department to ecological plant genetics, and the work done by the Department's researchers to improve plant resistance to diseases and weather conditions, have been profoundly important to world's ability to raise higher quality crops and feed a growing population.

For well over a century, multi-national food companies have originated in Minnesota. Because of the importance of the grain milling industry to the economy of our then-young state, the threat of disease to the wheat, barley or oat crop was cause for great concern. Early members of this Department helped ensure that these key crops remained healthy, with research that stabilized crop production and prevented

losses from disease.

Today, the Department is recognized as a national and global leader in Plant Pathology and its research continues to improve the production capabilities and practices of farmers across the nation and around the world. The Department's work on cereal rusts and head blight diseases have saved growers millions of dollars in reduced input costs and prevented crop losses.

The impact of this Department is also measured through the success of its alumni. Dr. Norman Borlaug earned his bachelor's degree from this Department in 1937, his master's degree in 1939 and his doctorate in 1942. But that was only the start of the recognition that this remarkable alumni would receive. In 1970, he won the Nobel Peace Prize, and in July, he received the Congressional Gold Medal.

A plant pathologist by training, he has spent the better part of six decades fighting hunger in Africa, Asia and Mexico. With his tireless work in breeding high-yielding, disease-resistant varieties of wheat, he has saved--by some estimates--as many as one billion lives from malnutrition and starvation.

For their 100 years of service to the farmers, businesses and citizens of Minnesota and the world, I commend the faculty, staff, students and alumni of the University of Minnesota's Department of Plant Pathology and I look forward to many more years of their continued success.

Norman Borlaug: Passion, Persistence, and Persuasion

Robert W. Herdt

Robert Herdt is an International Professor of Applied Economics and Management, Adjunct, Department of Applied Economics and Management, Cornell University; former Director of Agricultural Sciences and Vice President, The Rockefeller Foundation.

Evening Speech Department of Plant Pathology Centennial Celebration University of Minnesota Legacy Day, September 18, 2007



Dr. Robert Herdt (formerly of the Rockefeller Foundation) delivering an after dinner "Tribute to Norman Borlaug."

It is a privilege to contribute information about the life and work of Norman Borlaug, one of the truly great Minnesota Plant Pathology Alumni and outstanding figures of our day.

Norman Borlaug received the Nobel Prize in 1970, thirty-seven years ago, about 25 years after he began working to increase food production in Mexico. So he received the Prize at the mid-point of his career. Before then and since then he has endured much and accomplished much, and he continues, working every day, traveling around the world, pursuing his mission, inspiring each of us by his very presence.

At 93 years of age, Norm is still going strong, working uncounted hours in Texas, in Mexico, and in Africa. His life is a story of hard work, determination, persuasion, persistence and passionate dedication to helping farmers produce more abundant food for others and better lives for themselves. As *Newsweek* recently reported (July 20, 2007), only five people have been awarded the Nobel Peace Prize, the Presidential Medal of Freedom and the Congressional Gold Medal - Mother Theresa, Nelson Mandela, Martin Luther King, Jr., Elie Wiesel and Norman Borlaug. Norm shares many characteristics with the other four: self-sacrifice, dedication, patience, vision, and compassion. And like the others, as anyone who has heard him speak knows, Norm is passionate about his convictions, persistent in going after his goals, and a master persuader articulating those goals.

Early Years

Born at the beginning of the First World War, Norman learned his early lessons at a one room school in Howard County, Iowa. Growing up on the family farm, he came to know the value of hard work and clear goals. More importantly, in his own words,

he came "to know right from wrong from his parents, grandparents and neighbors."

Norman was a teenager during the Great Depression, and one can only imagine the courage and determination it took for him to leave the farm during the depths of that depression and come here to the University of Minnesota where he would earn his Bachelor's, Master's and Doctoral degrees.

It must have been during his formative years at the University that he came to recognize the power of science to address practical problems of farmers. After a brief time with the Forest Service, he decided to continue his education as a graduate student under one of the giants in plant pathology, Professor E.C. Stakman. The influence Stakman had on Norman Borlaug is hard to overstate. Especially memorable was a 1938 lecture where Stakman characterized wheat rust as "a shifty, changing, constantly evolving enemy." That view of wheat rust has stayed with Borlaug to this day.

A Lifetime of Service

After obtaining his doctoral degree with Professor Stakman, Norman took a job as a microbiologist with DuPont, but after a few years had the opportunity to join one of the first international agricultural development assistance programs, the Rockefeller Foundation program in Mexico.

With the encouragement of Vice-President Henry Wallace, in 1940 the Foundation entered discussions with the Mexican Government and sent three distinguished professionals to review their agricultural situation. Professor Stakman with Professors Richard Bradfield of Cornell and Paul Manglesdorf of Harvard spent more than two months roaming over thousands miles of highways and byways in sixteen of Mexico's thirty-three states, seeking to understand the situation and how the Foundation might help. The essence of their recommendation was that the Foundation should send a team of scientists to work with the Mexican agricultural ministry to breed better plant varieties, improve soil and crop management and increase livestock productivity. J. George Harrar, another University of Minnesota

Norman Borlaug (cont.)

plant pathologist, who was later to become the Foundation's President, was selected to head the team, and Norman Borlaug was invited to join him. Thus Norman Borlaug began the first phase of his life's work.

1944 through 1960 were dedicated to helping Mexico increase its food production. The first years were learning by doing. Borlaug was the team's pathologist and so had responsibility for all the diseases attacking all the crops – with emphasis on dry beans and corn. But in reality Norm did whatever needed doing -- insect control, plot layout, planting, and recruiting helpers.

Looking back on it, Borlaug recalls that Harrar “came up with the ideal intellectual platform for launching an attack on hunger. He gave us the freedom to make our own decisions and to exercise our fullest capacities without interference. He managed the program based on four principles:

- To hire the best people for the tasks;
- To provide them a lifetime commitment;
- To shield them from distractions; and
- To share all research results freely with whomever could use them.”

Borlaug recalls, “We were to help Mexico solve its own food problems. In other words, alongside our own work we were to train local scientists and ease them into our jobs. Moreover, we were to be neither consultants nor advisors, but working scientists getting our hands and boots dirty, and demonstrating by our own field results what could be done.”

Those principles and a determination to work our way out of the job and make way for those with the continuing responsibility for it characterized the Rockefeller Foundation's agricultural program for many decades.

But in the process Borlaug had to fight some aspects of Mexican culture, in particular the conviction that scientists were above hand labor or getting dirty. He was told by one of his colleagues in the early days, “Dr. Borlaug, we don't do these things in Mexico. That's why we have peons. All you've got to do is draw up the plans and take them to the foreman and let them do it.”

Borlaug lost his temper (it wasn't the last time). He yelled back “That's why the farmers disrespect you. If you don't know how to do something yourself, how can you possibly advise them? If the peons give you false information, you wouldn't even know. No, this has to change. Until we master our own efforts, we will go nowhere in this project.”

In 1944 wheat was Mexico's second most important food crop,

and half of it was being imported, at an annual cost of \$21 million. Average yields were 11 bushels to the acre, about half the US level, but subject to enormous fluctuations caused by epidemics of wheat rust. It was an obvious target for the Harrar team, and George himself organized the first year's work on wheat.

In Borlaug's boyhood the Iowa home farm had never grown wheat, and Norman's doctoral thesis had been on flax. So when George Harrar asked Norm to take over the wheat program after the first year, he had little background to draw on. But that didn't stop him from taking up the challenge. And so he began his life-long, persistent attack on wheat rust, that shifty, ever-changing enemy fingered by Professor Stakman.

Norm and his small team began by making crosses among five established Mexican varieties and several imported ones. The resulting thirty-eight combinations, by some stroke of luck gave promising results from the beginning, and four selections were later released as varieties, resulting in notable increases in Mexico's wheat production by the late 1940s.

But the potential for disaster remained always in Borlaug's mind. That constantly changing enemy, wheat rust, was at bay but not defeated. In the years to come he was to make two innovations that had tremendous payoff. Most plant breeders made a few crosses or a few dozen crosses each season. The many individual plants that resulted each were observed throughout the growing season and seeds from the best individuals harvested and planted the next year, with more selections made, and so forth for eight to ten years.

Recognizing that each individual plant is potentially valuable, the general practice was to keep most and advance their progeny to the next generation. But the number of individuals rapidly increases and the work of observation can become overwhelming. As Borlaug says, “This hit-or-miss process is time consuming and mind-warpingly tedious. There's only one chance in thousands of ever finding what you want, and actually no guarantee of success at all.”

Success in breeding wheat means keeping ahead of the ever-evolving rust organism. Failure means disaster for farmers, nations, and even in an extreme case, the whole world. Borlaug became convinced that only by making thousands of crosses from wheat gathered from all around the world would he be able to raise the probability of finding the right combination to a high enough level. So he began to make many more crosses than any breeder had until that time. That meant a tremendous increase in the fieldwork of examining and scoring the progeny, imposing tougher criteria and discarding a higher fraction of plants.

This approach, high volume crossing, gave a much higher overall probability of success.

But it still required eight to ten years to get a variety and Norm looked for a way to grow two crops a year in order to cut down on that time. A possible place was the Yaqui Valley in Sonora, 1200 miles to the north, where irrigated wheat was normally planted in the fall. But the wheat program, like the other parts of the Foundation's effort, was focused in Toluca, not far from Mexico City, where most farmers were exceedingly poor and the climate was very different from Sonora. Borlaug proposed establishing an "off-season" facility in Sonora but that idea didn't sit well with Harrar and failed to gain his approval. Getting George to change his mind was to test Norm's passion, persistence, and powers of persuasion. Even so, it took the good offices of Professor Stakman, who happened to be in Mexico at the time, to get Borlaug and Harrar to the point where they could agree on the plan to extend the wheat work to Sonora for a second season each year. This was the birth of "shuttle breeding."

This met Borlaug's objective of faster generation advance, but growing conditions in Sonora were a dramatic contrast with those of in Toluca and the plan went against one of the dominant plant breeding dogmas of the day -- that plants had to be designed and tested in the environments for which they were intended. Much further North and in a near-desert, as harvest time approached in the Yaqui valley temperatures soared, humidity dropped and winds were strong. Most wheat lines that had performed well in Toluca just didn't hold up in Sonora and vice versa. But a few did well in both locations. The segregating populations were shuttled back and forth over ten degrees of latitude and from near sea level to over eight thousand feet of altitude. They were exposed to different diseases, different soils, different climates and the different day lengths of winter in Sonora and summer in Toluca. The result was much more than a faster breeding process. The plants that survived and performed well were well adapted to a wide range of conditions. And, not only in Mexico. Those same varieties were to prove exceedingly well-suited to the sub-tropical wheat growing areas of India and Pakistan. Hence serendipity stepped in -- shuttle breeding was designed to accelerate the breeding process and it did, but it had another, serendipitous effect -- the resulting varieties were well-adapted to a wide range of conditions.

Student and Teacher

Norman's student years may have begun in Iowa in the 1920s, and formally ended with the award of his PhD degree from the University of Minnesota in 1942, but he has never ceased being a student. In addition to Professors Stakman at Minnesota, he credits many colleagues, including George Harrar, Ed Wellhausen, John Neiderhauser and Louis Roberts, with providing

insights and challenges that led him to ever-greater efforts.

But perhaps his greatest teachers were the wheat plants to which he devoted uncounted hours. As he says, he learned "to tell the status of a wheat plant from its look, manner of growth, feel, movement, and level of growth. Wheat itself was becoming a person. Moreover wheat was the best teacher about wheat." He began to see that different wheats had different "personalities." He could tell them apart at a glance, or "even by the rustle of the wind through their ripening heads." Like many other pioneering plant scientists including Mendel and McClintock, Borlaug's advances were based on careful observations made during hours and hours of devoted work.

The untold story of Norman Borlaug's life is, however, his career as a teacher. In the very first days of his assignment to the Rockefeller Foundation's program in Mexico he encouraged young Mexican technicians to learn the secrets of plant breeding -- crossing and selection -- the critical steps that most plant breeders kept to themselves. Throughout the Mexico period he gave young people the opportunity and responsibilities to learn.

But learning from Borlaug wasn't easy, and didn't take place in an air-conditioned classroom. It involved preparing land, planting seeds, taking observations and making notes, making crosses, making more observations, harvesting, keeping records, and doing analyses. And, after the invention of shuttle breeding, the process was a year-round effort, unlike most plant breeding in the United States, where the winter season is used to analyze results and plan the next year's work.

If learning from Norm was not easy, neither was being his supervisor. In those days the Annual Report of the Rockefeller Foundation was compiled from the separate reports of its officers, including those in Mexico and elsewhere. With high-volume crossing, shuttle breeding and training young scientists, Norm had limited time for paperwork. His annual reports were not always produced by the deadline and apparently one year he was particularly late. After several reminders from the responsible Director and Vice President, George Harrar, then Foundation President, sent a telegram telling Norm to get his Report in. The responding telegram was short but to the point; Norm said: "Do you want paper or do you want wheat?"

Global Agricultural Diplomat

By the late 1950s the cooperative program had made such a contribution to Mexico's food production that the Foundation concluded Borlaug had succeeded in working himself out of a job. Leadership of the national Wheat Program was turned over to Mexican scientists.

PLANT PATHOLOGY ENDOWMENT FUNDS

"The true meaning of life is to plant trees under whose shade you do not expect to sit." Nelson Henderson

Public support of higher education has been steadily waning since the 1980's. For example, the University of Minnesota in the 1980's received more than 33% of its revenue from the State of Minnesota, now it is at 25% and dropping. The University of Minnesota and other land-grant universities are expected to operate more like privately funded universities. This new "business model for public universities" has changed our culture and operating premises.

For many years now, privately contributed tax-deductible donations invested as endowment funds have played a crucial role in the Department of Plant Pathology at Minnesota. We have maintained our excellence by the use of these endowments. Scholarships and fellowships for students and the Plant Pathology Library fund are emphasized. Alumni, faculty members, and friends have realized this need, and their support established the Plant Pathology Library Endowment Fund. Will you help us pass on learning opportunities to future generations of students?

Donations are currently needed for the following funds.

The E.C. Stakeman Graduate Fellowship Endowment (Fund #5646)

This fund supports graduate students in Plant Pathology. It was begun by Norman Borlaug to honor his teacher, mentor, and life-long friend.

The Dr. John Dueck Memorial (Fund # 1989)

In memory of our esteemed Canadian alum, this fund supports graduate students.

The Sir Bent Skovmand Memorial (Fund # 9901)

This fund supports graduate students from Mexico and Latin America.

The Norman E. Borlaug Fellowship for International Agriculture (Fund # 1445)

This fund supports international students and fellows who come to Minnesota to learn.

The Plant Pathology Library (Fund # 1847)

The Plant Pathology Library Fund makes it possible for the Department and the University to make available this learning center in Borlaug Hall to all students and the public.

BENEFITS FOR CONTRIBUTORS

There are many ways to contribute. See the insert for direct donations by check or money orders.

Planned donations of stocks, bonds, and real and deferred contributions of assets that can enhance your retirement income and/or facilitate financial and estate planning are ways to support the fund. Thus, you may be able to advance your own personal and financial goals in the process of supporting the Plant Pathology Library. For further information you may contact:

Ms. Cynthia J. Cashman
Chief Development Officer
College of Food, Agricultural and Natural Resource Sciences
The University of Minnesota
235 Skok Hall
2003 Upper Buford Circle, St. Paul, MN 55108
Office: 612-624-7489, Fax: 612-624-8701
Email: cashman@umn.edu

You can ensure a sustainable basis for educating future generations of plant pathologists and agricultural scientists. We welcome your suggestions, guidance, and assistance of alumni and friends and encourage everyone to visit us whenever possible.

Dr. Carol Ishimaru,
Professor and Head of Plant Pathology



College of Food, Agricultural
and Natural Resource Sciences

UNIVERSITY OF MINNESOTA

Norman Borlaug (cont.)

The Food and Agricultural Organization of the United Nations asked Norm to join a team of scientists to advise on its wheat work in the Middle East and North Africa, giving Norm his first trip outside the Americas. The team traveled through Algeria, Libya, Egypt, Jordan, Lebanon, Afghanistan, Pakistan and India, visiting agriculture ministries and experiment stations, observing wheat and barley research programs.

Returning to Rome, Norm reflected on the situation he had seen. Half of humanity was going to bed hungry. Many of the countries had virtually no agricultural scientists, but even those out there, in most cases weren't fired up about the food situation. They were government servants with secure jobs and little incentive to address farmer's problems.

Borlaug concluded they needed training and inspiration to address real problems. He believed that the same program of training that had helped so many young Mexican scientists to assume leadership of that country's agriculture could be used to train and motivate young scientists from the Middle East and South Asia. He took on the task of training the new candidates, not just in genetics but also in agronomy, soils, irrigation, weed control, plant pathology, entomology, cereal technology and more. After passing through a tough initial training they toiled in the fields twelve hours each day. They had to level and lay out sample plots, sow crops, apply water and fertilizer. They got a solid grounding in hunger fighting on the front lines.

As part of the training program they established the international wheat yield trials that Borlaug had recommended in his report to the FAO. The first year they sent out twenty-five lines of wheat. After that more and more people wanted to test more and more different types of wheat. In the second year fifty lines were sent out, then over one hundred. Eventually one hundred twenty five wheat lines were being sent to one hundred and fifty locations worldwide.

It seemed evident that the ideas that had been developed in Mexico could be useful throughout the developing world. In 1964, based on the model they had pioneered four years earlier at the International Rice Research Institute, the Ford and Rockefeller Foundations created the international maize and wheat research center, CIMMYT. Ed Wellhausen became its founding Director, and Borlaug became director of its wheat program.

Norman took dozens of scientists from South Asia under his wing. Some came to Mexico for formal training at CIMMYT, many more learned from his visits to Asia. With leadership from Canadian wheat breeder Glenn Anderson, the varieties created in Mexico were tested in India and Pakistan and performed as-

tonishingly well, attracting national attention in those countries struggling to meet the demand for food from rapidly growing populations.

In 1964 and 1965 India received over 5 million tons of food aid. Many despaired that India could ever meet its food needs, but Borlaug and the Rockefeller Foundation had a different view, after seeing how well the Mexican wheat varieties performed with high-input production methods in South Asia. In the crisis year of 1965 India and Pakistan each imported over 200 tons of Mexican wheat seed for wide-scale testing. Performance was spotty, with some unprecedented high yields when fertilized and irrigated but mediocre yields in other cases. Norm's powers of persuasion led to a brave political choice by India's Minister of Agriculture to import 18 thousand tons of seed and the needed fertilizer for the next year's planting.

The imports triggered the interest of India's Planning Commission and that led to another controversy. Borlaug and Anderson backed a plan to recommend high fertilizer rates to further demonstrate maximum yields. Foundation economist David Hopper, along with Planning Commission economists, argued for a more modest fertilizer recommendation so many more farmers could benefit from the limited fertilizer being imported. Borlaug wanted the high rate and consequent high yield to overcome the "skepticism and psychological barrier of the traditionalists, peasant farmers, bureaucrats and senior scientists." Once again, Norm's passion, persistence and persuasion paid off and the high rate was recommended. A bumper crop ensued and the Green Revolution was launched.

In February of 1968 Norman made a trip to India, where, as was his practice, he visited the experimental plots at various places around the country. A new University had been established in the state of Uttar Pradesh at Pantnagar, about 5 hours drive from Delhi, where scientists had planted trials with the wheat varieties from Mexico, other international breeding lines, and crosses made by Indian scientists. Norm's visit was the occasion for a gathering of local "aggis" from around North India, including some of us from the Rockefeller Foundation New Delhi Office.

Scores of wheat varieties had been planted in small observation plots. The morning was cool but bright, one of those perfect late winter days in North India when the spring heat is still weeks away. Norman arrived with the university Vice Chancellor, the head of India's wheat program, and dozens of scientists trailing along. The field was a checkerboard of short, intermediate, and tall wheat plots, some beginning to mature and others still fairly green. Most looked healthy and many promised copious yields.

Norm strode through the field barely glancing at one outstanding plot after another. He ignored the efforts of first one and then another proud scientist to explain the lineage of this or that line. Finally he found what he was looking for -- a sorry, disease-infested, disreputable plot. Pouncing on that plot he launched into a passionate warning of the potential dangers of pride and complacency. At any time, new races of wheat rust could descend on South Asia and devastate entire regions, just as that unfortunate plot had been devastated. It was the job of wheat scientist to be ever alert to that possibility, to anticipate it the “shifty, ever-changing” rust enemy and have breeding lines with alternative sources of resistance ready to be quickly multiplied and made available to farmers.

None of us in attendance could forget this lesson imparted by a gifted teacher with a burning mission.

Prize Winner and Philanthropist

The story of how, one morning in the fall of 1970 Norm heard he had won the Nobel Peace Prize is recounted by Leon Hesser in his biography, *The Man Who Fed the World*. Typically, Norm was in the field looking at wheat plants with a group of students, one of whom remembers it slightly differently than recounted by Leon. The Nobel Prize was entirely unexpected by anyone, least of all Norm, and when Margaret Borlaug tracked him down and shouted across an irrigation ditch separating the farm road from the wheat field that he had been awarded the Nobel Peace Prize, his reply was pretty much the same expression of disbelief that most any other Iowa farm boy would have had! When more vehicles filled with reporters appeared they all realized it was true and Norm's life changed forever. He would never again be simply a scientist.

But of course, as we have seen, he had long been more than a scientist, long been a persistent persuader with a passion to use all his talents to help feed people. Now he had a bigger platform and greater credibility and used it on every occasion to preach the need to bring together science, policy and hard work to defeat world hunger.

In 1979, at age 65, Norm completed 13 years as Director of the CIMMYT wheat program and became a Senior Consultant to CIMMYT. That sounds kind of like semi-retirement, but Norman Borlaug is not the “retiring kind.” He began to pursue an idea that had been germinating since that eventful day in Oslo. He petitioned the Nobel committee to establish a prize for work in agriculture but they turned the idea down. He continued to think about how to make it happen, and by 1986 he and his friend and colleague, Dr. Robert Havener, had found a sponsor and launched the World Food Prize. In 1990 the prize seemed in danger, when its original corporate sponsor was merged into another company and reneged on its sponsorship.

Borlaug and Havener began the search for a new sponsor and after many disappointments met John Ruan. Like Norm, Ruan had been born in a small town in Iowa in 1914. When his father died in 1932 Ruan had been forced to drop out of college to run the family trucking business. Now, anytime you are out on a highway in America you are likely to see one of over 20,000 trucks currently a part of the business. Borlaug and Ruan struck up a deep friendship and John Ruan became convinced of the value of the World Food Prize, and created an endowment to ensure its operation.

Today the World Food Prize is the foremost international award recognizing the achievements of people who have advanced human development by improving the quality, quantity or availability of food in the world. Typical of progressive mid-west values, the annual prize is given without regard to race, religion, nationality, or political beliefs. Norm is personally committed to the Prize and every year spends more than a week in Des Moines for the award ceremony, the accompanying seminar and the associated Youth Institute.

The World Food Prize Youth Institute is one commitment to educating young people, but Norman also has been active directly in the classroom. In 1984, he became Distinguished Professor of International Agriculture at Texas A&M University. He began to move from CIMMYT to College Station each fall to teach a regularly scheduled class. In between times he took up the lecture circuit, hammering away at the need for constant attention to the global population problem, the need to increase food production, and the short sightedness of misguided environmentalists who fail to see that fertilizer, pesticides and science stand between humanity and starvation, and actually preserve land for nature. Norm also served as Cornell University's Andrew Dixon White Distinguished Professor at Large. For several weeks each year from 1983 to 1985 he enlivened the Ithaca campus with his forthright views on agriculture, environment, and development.

He was settling into the role of senior statesman to the world food community. The crisis spots of the 60's were enjoying an abundance of food the pundits had never imagined. Indonesia, Pakistan, India, China and Bangladesh, were all producing food in abundance. They no longer could be held hostage to other countries more fortunately endowed.

Africa

But a new element had entered the world food scene. Africa. In the 1960s Africa was exporting food to the rest of the world and was seen as a potential granary by the former colonial powers. The leaders of the newly independent African nations believed they had no reason to fear problems on the food front. After all, Africa was a place of abundance.

Norman Borlaug (cont.)

But those leaders failed to understand the impact rapid population growth could have. Just as Latin America and later Asia had experienced a ballooning of population, by the 1970s population growth rates in Africa had reached explosive levels. By the 1980s country after country was experiencing episodes of shortages. Then came the much-publicized famines of Ethiopia and Sudan.

The story of how the billionaire Ryoichi Sasakawa contacted Norm one day to ask why there was no Green Revolution in sub-Saharan Africa is worth re-telling. Norman replied that he didn't know anything about sub-Saharan Africa and anyway, he was too old. The next day Sasakawa's response came back, "I'm 13 years older than you are Dr. Borlaug. The central Africa initiative should have been done much sooner. No excuses, lets get to work." This was a challenge Norm could not resist, and he agreed to help organize a conference to address the Africa food problem.

He got former President Jimmy Carter and other luminaries like Father Theodore Hesburg to the meeting. Of course, no food gets produced by holding a conference, and a few months later, Global 2000, Inc. was established by Carter, Sasakawa and Borlaug to fight hunger in Africa. Ghana was one of the first countries to adopt the Global 2000 approach. Sudan was another and there civil war cut the program short, but maize production prospered in Ghana under the Global 2000 program. Currently the program is active in Ethiopia, Burkina Faso, Guinea, Malawi, Mali, Mozambique, Nigeria, and Uganda.

According to Dr. Gebisa Ejeta, a Purdue University Professor born in Ethiopia, the changes in Ethiopian agriculture are extraordinary. In his view, "the significance of the agricultural change in Ethiopia is that it was made possible through a conventional approach of extending modern agronomic practices... The success of the Norman Borlaug approach proves that there are niches in African agriculture that can be effectively addressed through conventional science and traditional approaches, pro-

vided that a concerted effort is planned in the development and extension of an appropriate technology -- to be implemented under the right policy environment."

The Borlaug approach that Ejeta finds has been so effective amounts to the tried and true elements Norman stressed in Mexico, India, Pakistan and elsewhere: high-yielding, well-adapted varieties created by plant breeding, appropriate fertilizer, and stable, remunerative prices to farmers. In one country after another, Norman Borlaug has helped governments to see that these elements are the keys to increasing food production.

The Next Horizon

It is no news to this audience that a new race of wheat stem rust, Ug99, has emerged and is threatening to spread from East Africa into the Middle East, Turkey, India, Pakistan and beyond. Norm sounded the alarm on Ug99 years ago and the world is slowly organizing to evaluate available wheat lines for their resistance. In addition to conventional approaches, he is also backing a different strategy, one that might uncover a more permanent source of resistance. All but one of all the world's major cereal crops is susceptible to the rust diseases. Only rice is not, but the reason why rice is immune is not at all well understood. Norman has put his influence behind a new research effort that is directed at understanding that question with the ultimate goal of transferring that resistance into wheat.

Ever the student and ever the teacher, with passion, persistence and persuasion, a clear focus on worthy goals, and science directed at solving problems, Norm has stressed the need to tackle problems rather than pursue fame, disciplinary knowledge or pre-conceived solutions. He has lit a spark in the minds of many young scholars in different parts of the world, in the conviction that this spark will develop into a flame that will motivate the efforts of these young people to improve the standard of living and make life a little more tolerable for the less-fortunate. That is the culmination of the life and work of Norman Borlaug.

Norman Borlaug's Congressional Gold Medal

by Richard Zeyen

The Congressional Gold Medal is the highest civilian award that can be bestowed by the United States Congress. The decoration is awarded to an individual who performs an outstanding deed or act of service to the security, prosperity, and national interest of the United States. The honoree need not be an American citizen. To receive a Congressional Gold Medal a recipient must be co-sponsored by two-thirds of the membership of both the House of Representatives and the Senate.

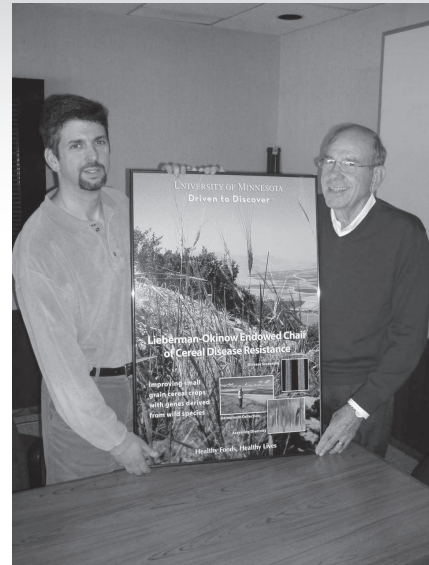
A Congressional Gold Medal is then created by the United States Mint to specifically commemorate the person and achievement for which the medal is awarded. Each medal is therefore different in appearance, and there is no standard design for a Congressional Gold Medal. Congressional Gold Medals are also considered "non-portable", meaning that they are not meant to be worn on a uniform or other clothing, but are meant for display.

Only five people in history have ever been awarded the Nobel Peace Prize, the Presidential Medal of Freedom and the Congressional Gold Medal. They are Martin Luther King Jr., Mother Teresa, Nelson Mandela, Elie Wiesel ... and Norman Borlaug.





Dr. Norman Borlaug, Professor Brian Steffenson, and distinguished friend of the department Steve Lieberman enjoy a light-hearted moment. Professor Steffenson currently holds the Lieberman/Okinow Endowed Chair of Cereal Disease Resistance in Plant Pathology at Minnesota.



Dan and Steve Lieberman receive a gift poster from the Department for the 100th anniversary of the family businesses. They founded the Lieberman-Okinow Endowed Chair of Cereal Disease Resistance in Plant Pathology at Minnesota.



Old friends – Dr. Jeri Ooka, Kay Terry, Mary Ooka, Dr. Gloria Warner



Professors emeriti Neil Anderson (foreground) and Bill Kennedy match names to faces on a 1959 Departmental photograph.



Tamas Szinyei (above) and Dr. Paul Meyer were the Aurora's official photographers!



Emeriti Professors William Bushnell and Frank Pflieger.



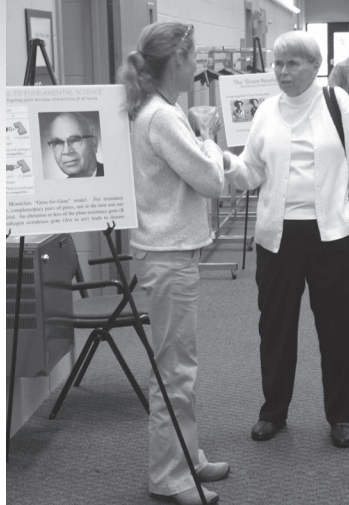
Audience participation "Question and Answer" session on 20 September. Panel members left to right – Drs. Phil Larsen, Guy Baird, Leon Hesser, Neil Anderson, Frank Pflieger, Carol Ishimaru and Richard Zeyen presiding.



Laboratory tour of genomics facilities in the Cargill – Microbial and Plant Genomics building. Left to right – Dr. Bill Anderson, Betty Kennedy, Kirsten Wilson/Skovmand, professors James Bradeen and Dean Malvick, Dr. Lois Johnson and Mary Dueck.



An impromptu advisees reunion of some of emeritus Professor James Groth's protégés. Left to right – Dr. Barbara Christ (Head of Plant Pathology at Penn State University and APS President Elect), Dr. James Kolmer (USDA/ARS Cereal Disease Laboratory, Minnesota) and Drs. Charles Barnes and Maria Ordonez (also of the Cereal Disease Laboratory)



Professor Linda Kinkel and Grace Bucher next to a poster of the Department's most cited alumns, Dr. H.H. Flor (Gene-for-Gene Theory).



Professors H.K. Hayes and E.C. Stakman 1940 at the Waseca, Minnesota Outreach Station. These iconic figures of the Agronomy and Plant Pathology Departments respectively worked closely and established Minnesota's reputation in cereal disease resistance breeding. They were both mentors to Norman Borlaug and the Rockefeller project in Mexico (the precursor to CYMMIT).



A 1920's photograph of the infamous "Tottering Tower" (campus Drill Hall) that housed the entire Department from 1914 through 1940. Elements of the Department like the USDA Cereal Disease Laboratory and many of the Department's plant physiologists were housed there until demolition in 1971. The site now has a classroom office-building complex.



The Department's first, first couple - Louise Jensen and Elvin Stakman. Louise (MS degree, Smith College in mycology) was hired as the Department's mycologist while Elvin (MS 1910, Ph.D. 1913) was the Division Chief for Vegetable Pathology. They were married in 1917. University nepotism rules forced Louise to resign from the faculty. She taught in local high schools, but during summers and in emergencies like World War I and II filled in, for short durations, in the Department.



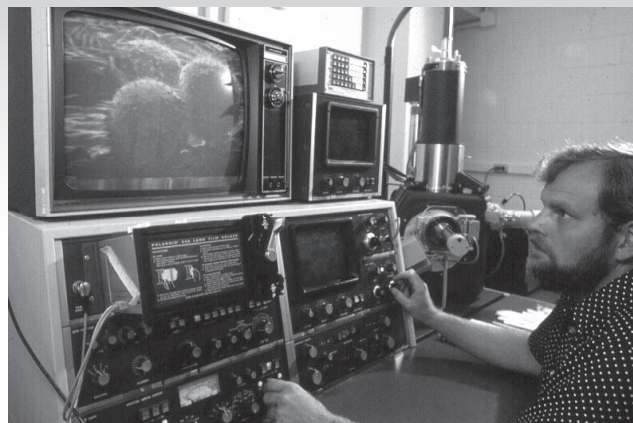
Professors emeritus Carl Edie and Elvin Stakman at Stakman's 90th birthday party in Stakman Hall - 1975. Both would occasionally "hold court" during morning coffee break held at 10:00 am in the Stakman Hall seminar room. Word would quickly spread that an enlivened conversation was underway and an audience of faculty, staff and students would almost magically appear.



A moment's conversation at Stakman's 90th birthday party, held in 1975, between Carol Windels (MS 1972, Ph.D. 1980), Dr. Fred Frosheiser USDA/ARS adjunct professor, and Lois Johnson (MS 1977, Ph.D. 1981)



1980 Plant Pathology Extension group. Secretary Deb Baden (Drange), Professors Howard Bissionette, Richard Meronuck, Ward Stienstra and Frank Pflieger.



Professor Richard Zeyen in 1977 examining rust spores with a scanning electron microscope. From 1971 to 2001 professor Zeyen, while tenured in Plant Pathology, directed the Minnesota Agricultural Experiment Station's Cooperative Electron Optics Facility. The 11-room facility on the ground floor of Christensen Laboratories eventually served all of the Saint Paul Campus's electron optics needs.



A 1991 farewell party in Stakman Hall seminar room for Dr. Beatriz Perez (M.S. 1988, Ph.D. 1990). Left to right Linda Treeful (Ph.D. 1988), Cheryl Engelkes (Ph.D. 1991), Grace Bucher, Beatriz Perez and Janell Stevens-Johnk (M.S. 1991, Ph.D. 1993).



George Hudler (M.S. 1973) on the move in as a graduate student in forest pathology. Little did he know, he would eventually move into the Headship of the Department of Plant Pathology at Cornell University.



Undergraduate psychology major Philip Berger looks over Oat Blue Dwarf Virus assay plants as part of his 1976 work-study employment. He completed an M.S. in plant pathology in 1980, but little did he know then that he would eventually become Head of Plant Pathology at the University of Idaho.



Barbra Swadburg and her husband Professor James Kurle enjoy a conversation with Ernest and Marlene Banttari at the evening reception on Legacy Day.

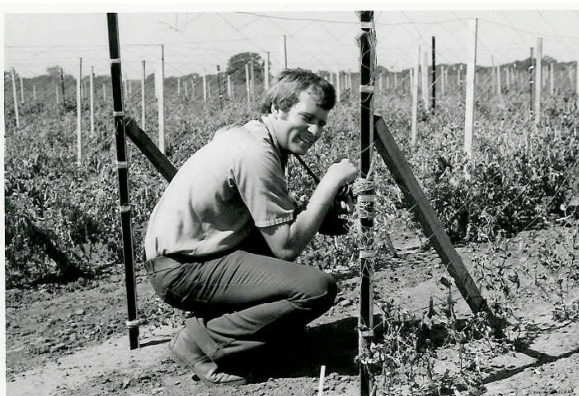


Stem rust researcher and old-timer, James Miller (Ph.D. 1971) approaches our cameraman on Legacy Day. Jim knew Dr. Stakman and spent his career combating cereal rusts.

Dr. Yanhong Dong, director of the Mass Spectroscopy Laboratory in Stakman Hall enjoys a short break in between Centennial Celebration events. Professor emeritus Ward Stienstra and Todd Burns (background).



Delores Huebner former Department Administrator pauses for a photograph with Professor Ruth Dill-Mackey and Karen Wennberg during Legacy Day.



Craig Grau (Ph.D. 1976) this unassuming graduate student photographed in 1973 at Dr. Ted Reiling's (Ph.D. 1957) Green Giant pea breeding plot near Le Sueur, Minnesota did not know he was destined for the Headship of Plant Pathology at the University of Wisconsin.



Robert V. Crow (Ph.D. 1975) photographed in 1974 in a Plant Pathology glasshouse. Bob specialized in nematology and spent his career in private industry. He and Florence now reside in Ames Iowa.

Debbie Baden Drange (Extension Secretary 1974-2003)



Left -Deb Baden/Drange (Extension Secretary) and Linda Rivers/Anderson (Department Administrator) 1975.

Well, it's been five years since I left the department and I can't believe how fast time flies. I have been in the Department of Plant Biology since June 5, 2003. I was hired to help with overflow work in the accounting area and when time permitted I assisted with computer support on equipment and software, I also assisted the other secretaries with managing the Department web site. I have thoroughly enjoyed the people that I have worked with and will miss them all very much when I leave the department to join the College of Biological Sciences Financial Cluster team in February. It is an honor to have been chosen for this position and I look forward to working with my new team.

In 2004, I was hired onto another part time job with the University of Minnesota Extension Finance and Planning, in addition to working in Plant Biology. My role is coordinating all of Extension's external sales and use agreements and working closely with the Office of General Counsel attorneys and paralegals. I am also so happy to be back in Extension as this has been part of my life for so very long. You know the saying "once Extension always Extension". It's just me.

On my off time from the University I help with computer support at 1666 Coffman Retired Faculty Condominium. This has been my FUN job. The people I deal with range from 65-85 years old and are so vibrant, full of life and so eager to learn new things. They keep me young!

I miss everyone in the department, present and past and think of you often. Take care and keep in touch. debbd@umn.edu

Dr. Howard Bissonette (retired Professor living in Florida – M.S. 1958; Ph.D. 1962)

I mailed two glass slides, old photos to you today with a note. One is a picture of an old airplane, and the other (shown) is of E.C. Stakman or Edward Freeman in a plane used to collect rust spore samples way back when. You might want to use these in your anniversary program. I have a lot of slides, but don't know what you want to see. We may get there for the Centennial, not sure yet.

How the "Puccinia Pathway" was verified. In the 1920's and 1930's the airplane's passenger would hold up vasoline-coated slides, to trap spores of the stem rust fungus *Puccinia graminis* while flying at various altitudes over the Great Plains of North America. These sampling experiments proved that spores were carried by air currents from southern to northern regions during the spring and early summer. In autumn, there was a backflow so that any southern volunteer wheat or winter wheat could be infected with blowback inoculum from the northern Great Plains. This inoculum erected an creating a over wintering "green bridge" for the stem rust fungus. Viable spores were eventually trapped, by more modern means, in excess of 20,000 ft.



Howard and Karwin

Dr. Ed Carley (Ph.D. 1969)

Unknown to us at the time, the 1960's were a period of political and technical transition and current stories of the 1960's are much more interesting than they were in reality. I was probably one of the last individuals in the department required to take two foreign languages. Subsequent students could substitute developing technologies, such as electron microscopy, for reading proficiency in a foreign language.

I always appreciated the broad range of learning experiences provided by the department. Looking back, even the Thursday night seminars were great learning experiences. The department provided me with the foundation for developing new knowledge and technologies, for which I am grateful. Perhaps my most meaningful experience was working in the Plant Disease Clinic for two summers. The diagnostic skills, which were developed, have served me well throughout my career and, in retirement, I now try to pass these skills on to individuals in the Colorado State University Extension Master Gardener program. Best Regards.

Editor's Comment



A 1960's and 70's New Year morning graduate student tradition. On New Years Eve students would camp out in Superior National Forest. The goal was to be the first humans to reach Eagle Mountain on New Year's morning and greet the New Year. Sub-zero weather and sometimes in near blizzard conditions didn't phase them, or so they said! Eagle Mountain is the highest point in Minnesota and is on the North Shore of Lake Superior. Howard Schwartz (MS 1975) shown in photo taken by Craig Grau (Ph.D. 1975)

Professor emeritus Thor Kommedahl (M.S. 1947: Ph.D. 1952)

Thor was awarded a Lifetime Honorary Membership in the Minnesota Native Plant Society April 5, 2008 at the society's annual symposium held at the Bell Museum of Natural History. It was "In recognition of his outstanding volunteer service to the society, dedication to the advancement of the society's mission and appreciation of Minnesota's native flora."

"What I learned, of course, I learned because of my education at the University of Minnesota and the knowledge of and strong interest in plants shown by faculty in the Department of Plant Pathology while I was a graduate student and as a faculty member here."



Thor Kommedahl in the old Stakman Hall Seminar room awaiting EC Stakman's 90th birthday party in 1975.

Recollections of Graduate School Days Arthur M. Elliot (Ph.D. 1961)

I began my Plant Pathology studies as a sophomore in 1950, and my on-the-job training during the summers under Dr's J.J. Christensen and Thor Kommedahl. Hoeing weeds was interspersed with planting spreader rows and test lines in the wheat stem rust nursery and later inoculating the spreader rows with urediospore suspensions until my thumb and fingers were numb; spraying the heads of wheat selections with *Fusarium* suspensions for scab development; tooth pick inoculating corn selections with *G. zeae*, *Diplodia zeae* or both, for stalk and/or ear shank rot development; ... etc. With the last procedure, even though we commonly used band-aids, the finger print ridges of my index finger and thumb never fully recovered. My Master's research was on the epidemiology of *Puccinia graminis tritici* and my doctoral research on *Leptosphaerulina briosiana* on alfalfa.

I found faculty extremely helpful in everyday activities as well as in their lecture and lab classes. Mathew Moore was a great help with field-work. Although not a professor, Mr. Eagle was a jewel, a fount of information. Do you remember bird abatement/control: Mr. Eagle with the shotgun to scare away the birds, the staked sheet aluminum fluttering in the wind, and Mathew Moore's mass trapping bird cage? Field work was sun tan time.

Seminars (formal and the Thursday evening) were when I learned about the faculty even though I would eventually have more than half for classes. The Seminars really kept us up-to-date on faculty and graduate student research and on important discoveries at other institutions. The Thursday evening seminar was not officially mandatory but a student would be "conspicuous by his absence." The 'Seminar Wives' met at someone's home during these evenings.

My first class seminar topic was on aerobiology of various fungi. Dr. Clyde Christensen was my seminar advisor and approved my abstract that would be supplied to all students and faculty. During my presentation, Dr. Clyde Christensen "shot me down." I did not know that *Hormodendron* had been synonymized with *Cladosporium*, what they and *Altenaria* and others looked like (morphology), how they were classified, whether they were sexual or asexual.... Though very embarrassing, it was an extremely important learning experience. I have attempted to make sure that this would never happen again. When I later did some mushroom collecting and put them out on the 'bridge' side counter, connecting the building with greenhouses, Dr C. Christensen made helpful suggestions.

It was both an educational and physical experience to spend 3 quarters learning about and identifying fungi with Dr. Louise Dosedall. She was not in good health but she was just tall enough to rest her elbow on the chalk rail and write and lecture and lecture. Physical? The metal stools had holes in the seats and at times I felt as if I were like a slime mold plasmodium draining down through. She was great! I really loved her.

Dr. Helen Hart became my Co-Advisor with Dr. J.J. Christensen since I was working on wheat stem rust. She was particularly helpful in my study of German. Dr's J.J. Christensen and Roy D. Wilcoxson were later advisors during my alfalfa disease work. It was during the 'rust days' that I started collecting information on the first appearance of various pathogens/diseases on an annual basis.

Great friendships developed with many of my contemporary graduate students that have lasted throughout the years. We helped one another even though we had our own specific research programs to attend to. It was good that the graduate students as well as the faculty had responsibilities in caring for and maintaining the Department facilities.

Under Extension Plant Pathologists R.C. Rose and then Dr. Herb Johnson, the graduate students worked in the Plant Disease Clinic each summer. It was a joint operation of the Dept. of Plant Pathology and MAES. I coordinated the Clinic during the summer of 1958. Coordinating identification and culture work of various graduate students and getting out responses to farmers and urbanites about the disease problems and their possible control was a great experience.

We worked hard but everything was not "all work and no play." The annual 'corn roast picnic' at the Plant Pathology Farm on the Rosemount Experiment Station was always a pleasure as was the festive dinner at Christmas in the basement lecture hall (later elsewhere). I was a dud at softball. A group of us used to make up lyrics to well known songs, about and for faculty members, to sing at these and other special occasions.

Anecdotes-Droll Stories-Peccadilloes

I used to take care of the Chinese Evergreen plants in the Seminar room and propagated them for the stairwell glass block window ledges. I also had several different kinds of plants on the south window sill of 410 Stakman Hall. One was an Impatiens which produced many stems, grew over 3 ft. tall, and became too large to continue on the window sill. I was going to get rid of it but Howard Bissonnette who was at the next desk said he would take it over. He got a stool and placed it and

In Their Own Words (cont.)

the plant at the end of his desk and near the office door. The plant continued to grow. Various graduate students used to tell Howard that he 'ought to get rid of that plant'. It grew so large that it was finally moved to the counter near the sink.

One day when I came into the office, one of the tall stems had fallen over so I removed it and told Howard. A day or so later another tall stem had fallen over. Howard looked at it and noted that the tissue at the base looked water soaked. So, he took it to the lab, cultured the tissue, and in a few days isolated *Pythium* (if I remember correctly). The *Pythium* ultimately eliminated the entire plant, stem by stem. We strongly suspected that one of our fellow graduate students had taken it upon himself to eliminate Howard's pet Plant. I don't believe he ever found out who did the dastardly act.

It was common for the Dept. Head, Dr. J.J. Christensen (affectionately known as J.J.), to make the rounds of the graduate offices and labs and ask the question "What new have you discovered?" I always assumed, that was one of the things that a Department Head did. Tried to learn of up-to-date findings. What I told him however may not have been new to him.

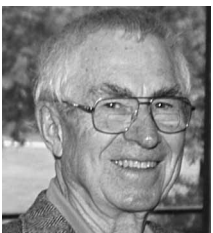
We always knew when J.J. was coming because he slid his foot on each stair step on his way to the fourth floor. One of my office mates (XYZ) was extremely nervous about these J.J.

visits and tried to avoid them. This antipathy was well known by other graduate students. One day when we heard J.J. coming, one of the graduate students, a large powerful man, grabbed XYZ, put him in a chair with wheels, and sent him down the hall where he arrived when J.J. reached the top of the stairs. Such expostulations from XYZ ensued and of course J.J. knew what had happened even if he didn't see anyone around. These are two of my favorite lighter moments while in Plant Path.

We had an elevator in *Phytobrickhaus erectus* (the old Drill Hall – e.g. Tottering Tower) but it was NOT for human use. To prevent this, there was a shelf across the entire space of the elevator at about half its height. One could place items on the floor or shelf, or wheel carts with low loads on the top shelf into the elevator, shut the door, walk to the appropriate floor and remove the cart or other materials. One day I loaded in a cart with glassware, some being tall graduated cylinders and decided to squat down and hold them from falling off. I asked a fellow grad. student to send it up from the 2nd to the 3rd floor. As you may guess, when the door opened, there was J.J. and another faculty member by the door. I tried to be "cool" about this but was far from "cool" while removing the material.

In Summary: Plant Pathology at the University of Minnesota was a wonderful place to be educated.

A Plant Pathology Heirloom A Tale About The Thursday Night Seminar Gavel Bill Kennedy (Professor Emeritus)



Bill Kennedy

A legendary seminar, that began around 1930 and continued through the mid 1980s, was mandatory for all plant pathology graduate students and faculty. The seminar lasted for a couple hours each Thursday evening throughout the year. A graduate student appointed by the department head began each session with a rap of the gavel. Topics were exceedingly broad. Presentations or announcements could include travel, thesis topics, employment experience or opportunities, practical or fundamental social or scientific history and current events relevant to folks claiming to be educated. However, one could speak up and embarrass oneself and be treated kindly at the same time. Guest speakers were frequent and always welcome. The seminar ended with a roast of the host, who furnished refreshments.

When I arrived in 1958, the seminar was vigorous. One

evening, the student chairman, Dick Fredricksen (Texas A & M), started a downward stroke of the gavel when the handle quivered and the head flew off into the audience.

The department head, J.J. Christensen, stormed to the podium, inspected the gavel, and began an emotional tirade, threatening whoever was responsible. "This gavel was presented to this seminar by a very famous plant pathologist. He made it from the first great elm to die of Dutch elm disease in the United States etc., etc." Christensen's face grew red with anger as he delivered a speech that was quite lengthy. We students later found out that someone had almost sawed off the gavel's handle near its head. The gavel was soon repaired and its handle was shortened.

I became chairman of the APS Archives in about 1980 and organized a display of memorabilia from departments everywhere for our annual meeting in Ames, Iowa, that year. To my embarrassment, I could not locate our gavel for this event. Judy Thies, then student chair of the seminar, told me she had



"The Gavel"

never seen such a gavel and Dr. French, current department head, had given the one she used to her.

About two years later, while walking down the third floor hallway of Stakman

Hall, I came across the original in an empty office. I stored it in my office until my retirement in 1993.

Before moving from Minnesota, I called Bob Blanchette, showed him the gavel, and related its history. We discussed, without resolution, what to do with it. Unless Bob Blanchette has some relevant information that occurred recently, this summarizes all the significant knowledge I have of the gavel from 1958-1993. The wood in the gavel was identified as elm confirmed by Bob's group.

Later when I wrote a letter-to-the-editor about history that was

published in *Phytopathology* I described this late 1950s incident. Dr. J.G. Horsfall of the Connecticut Agricultural Experiment Station sent me a small-penciled handwritten note offering to repair the gavel. I've always assumed, but without proof, that Horsfall was the person that J.J. Christensen referred to as the gavel's maker. In any case the gavel was indeed repaired and has now been returned to the Department where it will be mounted with its written story and hung in the old Seminar Room in 402 Stakman Hall.

I always wondered who sawed the handle off the gavel. About 1980, I asked my contemporary, George Bean, who was then an administrator at the University of Maryland. George said that he and several other students on the fourth floor of Stakman Hall had done it, each making a stroke or two with the saw. In this way, he said, in case of detection, several would have to take the blame.

Career Recollections **Dr. Chester J. Mirocha (Professor Emeritus)**



Chet Mirocha

I am pleased and most satisfied with my tenure in the Department of Plant Pathology as it gave me the opportunity to develop research and to teach in areas of science which I loved (i.e. pathology and chemistry). I joined the University of Minnesota on March 1, 1963, then with M.F. Kernkamp as the Head, and retired in 1997, after 34 years with Frank Pflieger as Head.

This is intended to be a more or less historical accounting of my association with Plant Pathology and many others will be mentioned. Over the years, I taught the "Physiology and Biochemistry of Fungi and Physiology of Host Parasite Relationship." Early in my career (1966), with the help of the Department and the National Science Foundation, I organized the U.S. Japan Cooperative Science Program which consisted of alternate meetings and seminars between Japanese and U.S. scholars working in physiology of parasitism. This allowed for reciprocal visits to Japanese laboratories and U.S. laboratories as well as to learn more of each others culture. Without our Plant Pathology assistance, this would not have happened. This seminar series is still held today with younger scientists in charge.

Perhaps the area of research that I treasure most is Mycotoxicology, the study of fungal toxins and their role

in animal and human health. Prof. C. M. Christensen was most influential in helping my career in this discipline as we cooperated in the study of fungal toxins for almost 30 years. Some of our students, Richard Meronuck, John Steele, Cesaria P. Eugenio, John Lieberman, Junping Chen, Winston Hagler, Yin Won Lee, Javier Plasencia, Steve Swanson, Linda Treeful, J.C. Wolf, Weiping Xie, Bob Pawlosky, Ursula Bosch, Hamed Abbas, Yu Hui and other staff: S.V. Pathre, Kajal Chatterjee, Jerry Behrens, Tom Robison, Dave Hewetson, George Davis, Beth Schauerhammer, and Syd Nystrom were closely allied with this study. It is important to note that our work along with others gave birth to the science of mycotoxicology. We cooperated with veterinarians and their students as well as some medical scientists in this multi-disciplinary venture that included mycotoxins such as zearalenone (estrogen), T-2 toxin (hemorrhagic agent), deoxynivalenol (vomition factor), wortmannin (hemorrhagic cardiac toxin) and fusarochromanone (anti-angiogenic agent: prevents capillary development) Most of our research funds came from the National Institutes of Health.

In 1979, our research in chemistry of toxins by fungi led to the acquisition of the first mass spectrometer (LKB 9000) on the St. Paul campus followed later by the Chemistry Department. We in Plant Pathology were ahead of most departments in this area using mass spectrometry in tandem with gas chromatography in identifying molecules. With the onset of

In Their Own Words (cont.)

studying trichothecenes, allegedly used in biological warfare in Laos (Yellow Rain), this allowed us to purchase a tandem mass spectrometer i.e. (MS/MS) which was on the cutting edge of research at the time. Grants from the Dept. of Defense allowed us access to this analytical equipment. Long standing grants from the Food and Drug Administration gave us the opportunity and means to develop an analytical foundation in the study of trichothecenes.

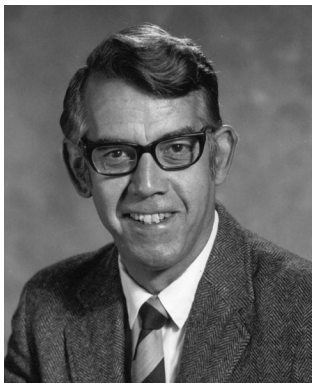
I would be remiss if I did not mention that mass spectrometry allowed us to analyze samples of wheat infected with *Fusarium* scab for deoxynivalenol (vomitoxin) which assisted the breeding program for selection of resistant wheat cultivars. Weiping Xie

analyzed 10,000 wheat and barley samples per year in this study. This method was so sensitive, that we could detect multiple toxins in single wheat seeds. Yu Hui and Jane Gacheri Muriuki studied genesis of toxins in single seeds.

These are only some of the areas of work that Plant Pathology and the University of Minnesota placed within my grasp, and to these institutions I am most grateful. I wish to recognize Profs. M.F. Kernkamp, Stuart Fenton of Chemistry and once more C. M. Christensen, all of who were instrumental in the development of my career in Plant Pathology.

Plant Physiology's Relationship to Plant Pathology Dr. Al Linck

(Emeritus faculty - Department of Plant Pathology and Physiology, and former Dean of the College of Agriculture --- Dr. Linck passed away shortly after writing this article)



Al Linck

Reaching the hundred-year mark for any University department like Plant Pathology is indeed a milestone. Plant pathology within the University of Minnesota and other major land grant universities is a cornerstone in the field of agriculture. At Minnesota the history of plant pathology and applied plant physiology were tightly intertwined for the first 60 of its 100 years.

Prior to 1907, courses in agricultural botany were taught in the Botany Department on the Minneapolis Campus. These courses were logically oriented toward noxious plants and weeds, the latter the bane of crop agriculture. Plant diseases caused by fungi were covered when elements of mycology were taught. This arrangement was dramatically altered in response to the devastating wheat stem rust epidemic of 1905. That epidemic was so severe that it caused wheat growers, millers and railroad interests to approach senator Knute Nelson and the United States Department of Agriculture to obtain funding for the University of Minnesota to set in place a formal department within the University to investigate and solve this problem.

In 1907 the Division of Vegetable Pathology and Botany (agricultural botany) began. It was funded in part by a special federal appropriation, through the USDA, by state of Minnesota funds administered by Board of Regents of the University of Minnesota. After some discussion the new entity was housed within the College of Agriculture on the Saint Paul Campus. Dr.

Edward Freeman, a former Botany department faculty member, then working for the USDA in Beltsville, became the head of this new unit. In 1913 the unit's name was changed to the Division of Plant Pathology and Botany with Dr. Freeman's prize student, Dr. Elvin Stakman as its leader. In 1919 a section within the Division was designated as Applied Plant Physiology and Dr. L.I. Knight was its leader. Dr. Rodney B. Harvey later succeeded Dr. Knight.

In the 1920's the discipline of plant physiology emerged as a field of specialization unto itself, and like plant pathology it had developed a national organization. It became a field of study leading to degrees in Plant Physiology. At the University of Minnesota the Division of Plant Pathology and Botany grew into a large unit with identified sub-fields, partially defined by important Minnesota crops. Meanwhile its physiology component remained relatively small, having no more than two or three professors at any one time and relatively few undergraduate or graduate students.

The leader of this small group for over three decades was Dr. Rodney B. Harvey, a nationally known plant physiologist. In the 1920's Dr. Harvey became President of the American Society of Plant Physiologists. His research interests varied widely but could be described as areas of applied botany. He discovered that crops such as bananas, which were shipped green from tropical countries, could be artificially ripened by treatment with ethylene. He was also credited with developing a process for the coloration of oranges, which until then came onto the market with a more greenish tinge than the brilliant orange of today. He was also internationally known for his work on cold hardiness, ethylene and on weed killing chemicals like 2,4-D. At one point in Dr. Harvey's career he was ranked as one of the 25 leading botanists in the United States. He was the author of three books

and several hundred scientific papers.

Plant physiology faculty was housed in the old Drill Hall on the Saint Paul Campus. The building was renamed the Agricultural Botany Building, although its residents named it the “Tottering Tower.” For a time, the Tottering Tower housed the entire Department of Plant Pathology and Botany. In 1940 the plant pathology faculty moved to a new building, now known as Stakman Hall. Unfortunately the new building had to be scaled back due to lack of funds; therefore, due to space limitations the plant physiologists and agricultural botanists remained in the Tottering Tower. Despite Harvey’s reputation in plant physiology the discipline did not thrive as a degree granting area. Plant physiology course offerings were limited and did not attract many students. Dr. Harvey passed away in 1945 leaving a hole in the area of physiology.

Nevertheless, Dr. Harvey’s research legacy continued to be meaningful at the University of Minnesota. Harvey published the first paper in the plant sciences demonstrating that plants could be grown “from seed to seed” under artificial lights. He accomplished this in the basement the “Tottering Tower.” Harvey’s work was the foundation on which a larger controlled environment facility, funded by the National Science Foundation, was built (1963). It was in the Plant Science Building – Phase I (now known as the Crop Science Building). Faculty and USDA staff housed in several departments initially shared this building.

In 1953 Dr. J.J. Christensen became department head of the Plant Pathology and Botany. He decided to reinvigorate plant physiology and selected areas within agricultural botany. Thus in the early 1950’s three new faculty members were added – Dr. Ray Landon, a colleague of Dr. Harvey’s, Dr. Jim DeVay and Dr. Thor Kommedahl. They formed the core of the research and teaching effort in plant physiology and agricultural botany.

Subsequently Dr. DeVay left for a position in California, and was replaced by Dr. Richard Durbin. Both Drs. Durbin and Kommedahl continued their research in physiological plant pathology and agricultural botany. Dr. Kommedahl took over the responsibility for courses in weed science and noxious plants. These faculty were the beginning of a new era in the department.

In 1955 Dr. Jonas J Christensen, then Head of the Department of Plant Pathology and Botany recruited Al Linck, a graduate in plant physiology at Ohio State University, to join its faculty. Dr. Christensen’s goal was to expand plant physiology course offerings and to develop a research program in this area. At that time there was little sophisticated laboratory equipment for teaching and research in plant physiology. Dr. Linck obtained the first liquid scintillation counter for the department and took a subsequent leadership role in obtaining better facilities and equipment and expanding the role of physiology as it was applied to the plant

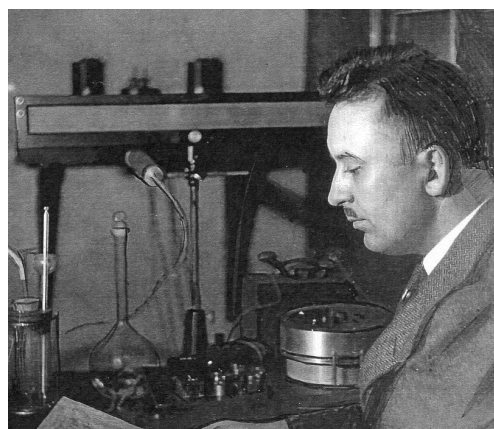
sciences.

In 1961 Dr. Milton Kernkamp became Head of the Department and continued to recruit more plant physiology faculty. And in 1963 the Department of Plant Pathology and Botany was renamed the Department of Plant Pathology and Physiology. Additional expertise was added to physiology within the department, either as state supported faculty or USDA adjunct faculty. Thus, in addition to Dr. Linck several more faculty including Drs. Eduard Stadelmann, Lee Olsen, Ted Sudia, Lucas Calpouzoz, William Bushnell and Chester Mirocha were added.

A general plant physiology course and laboratory were offered, along with the first course incorporating radioisotope techniques to be taught on the St. Paul Campus. Other courses were in weed physiology and finally a graduate degree program offering M.S. and Ph.D. degrees in plant physiology was created. This degree program involved physiologists from several departments in the University, particularly the Department of Botany on the Minneapolis Campus. It was very common for graduate students majoring in plant pathology to minor in plant physiology.

Eventually the demand for physiology expertise in all the plant sciences evolved to the point that departments like Agronomy and Plant Genetics, Horticulture, and “pure” Botany in Minneapolis hired plant physiologists on their faculties. Ultimately positions in plant physiology were so widespread outside the Department of Plant Pathology and Physiology, that in 1966 it was decided to make Plant Physiology a separate Graduate Program entity, within the new College of Biological Sciences with Dr. Al Linck as its Chairman. However, plant physiology faculty remained where they were physically, and were tenured in the various departments that had hired them.

Thus the “coming of age of plant physiology” coincided with renaming the Department of Plant Pathology and Physiology. In 1967 the department was officially renamed The Department of Plant Pathology and as remained so ever since.



Dr. Rodney B. Harvey (circa 1930)

A 4.8 Million Dollar, Plant Pathology Bio-Safety (BL3) Laboratory/Glasshouse Combating New and Emerging Plant Diseases

The \$4.8 million dollar Plant Pathology Bio-Safety Level (BL3) laboratory/glasshouse on the Saint Paul Campus was completed in time for the Department's Centennial in September of 2007. Its completion culminated years of effort by the Department of Plant Pathology (and the USDA-ARS Cereal Disease Laboratory), the Minnesota Soybean Growers Association, the Minnesota Agricultural Experiment Station and the Minnesota Department of Agriculture.

Why a BL3 level Bio-Safety laboratory/glasshouse in Minnesota? Simply put, the facility allows preemptive research and readiness planning for new and emerging plant diseases caused by pathogens. Use of a BL3 containment facility allows research on otherwise quarantined pathogens like the fungus causing sudden oak death and races of stem rust like Uganda 99 that can attack the genetic base of the Mexican wheat varieties used in the "Green Revolution." The impetus for the laboratory began in June 2004, with the Minnesota Soybean Research and Promotion Council's Research and Technology Transfer Committee. Their motivation was the concern for the introduction of Asian

soybean rust into Minnesota and the upper Midwest. The Association's support was unwavering and tenacious. They deserve much of the credit for making this specialized laboratory facility a reality.

Plant Pathologists from the University of Minnesota, the Minnesota Department of Agriculture, the Minnesota Department of Natural Resources, the U.S. Forest Service and the U.S. Department of Agriculture will all use the facility.

The Plant Pathology BL3-level Research Laboratory is the final phase of the University of Minnesota's \$24 million plant growth complex began in 2001. The complex includes classrooms and teaching laboratories, 15,000 square feet of plant growth space in state-of-the-art greenhouses and a BL2 Insect Quarantine Facility.



Dr. Zhishan Wu, Director of the BL3 explains elements of the BL3 Facility to a tour group of alumni and friends. Left to right are Mahesh Pandey, John and Mary Dueck, Lois Johnson, Carol VanWhy and Bill Anderson.

Faculty Development Program Enhances Plant Pathology Research *Dr. James Bradeen*



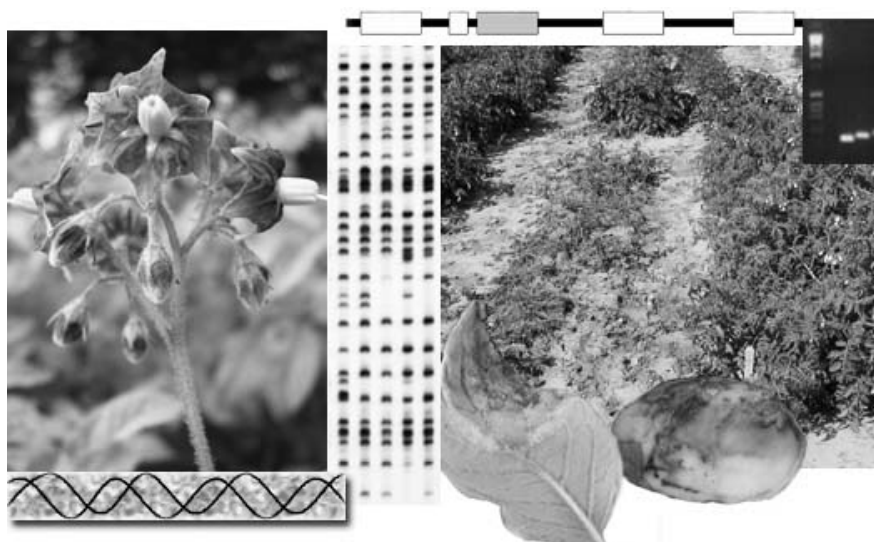
During Spring Semester 2008, Jim Bradeen participated in the University of Minnesota's Single Semester Leave program. It is in essence a "mini-sabbatical", providing faculty members the opportunity to re-tool research and explore new research directions. Faculty participating in the program are relieved of their normal teaching and service obligations for one semester. To be selected for the program, each faculty member prepares a written research proposal, detailing what will be accomplished and how the leave will benefit the researcher, the Department, and the College.

So what did Jim do during Spring Semester? He took this opportunity to begin a new research project funded by the USDA CSREES NRI Plant Genome program. The goals are to develop new tools for high throughput mapping of the genomes of wild potato species, to explore genome structure and evolution in the genus *Solanum* (which includes potato, tomato, eggplant and about 1,500 wild taxa), and to compare genome location of disease resistance genes in wild potato, cultivated potato, and tomato. Jim spent the month of February in Canberra, Australia working with project cooperator Andrzej Kilian of Diversity Arrays Technology (DArT). DArT is a microarray mapping platform for plants. Benefits of the approach include its inexpensive cost, rapid generation of thousands of markers, and the communal nature of the resource. Once an array is developed for a particular species, researchers throughout the world have low cost access.

Jim and Andrzej had already begun the development of an array for wild potato species and mapping in three different species began in February. In April, Jim went to Naples, Italy where he will spend two months in the laboratory of Domenico Carputo at the University of Naples. Jim and Domenico are collaborators on the DArT project, each developing mapping populations for wild potato species carrying traits useful for improvement of cultivated potato. Research in Domenico's laboratory focused on DArT marker analysis and preliminary map construction and *in silico* comparison of wild potato marker sequences and whole genome sequence from tomato. (The gene-rich genome space of tomato is currently being sequenced by an international consortium; researchers at the University of Naples lead the effort to sequence chromosome 12.)

When Jim was not getting his fingers dirty in the lab, he visited colleagues. In mid-January he visited Glenn Bryan and other potato researchers at the Scottish Crops Research Institute in Invergowrie, Scotland. In March he visited Tony Connor and Jeanne Jacobs at Crop & Food Research in Christchurch, New Zealand. While there, he presented a seminar on the late blight resistance gene RB. Finally, in connection with a collaborative project with Emily Hoover (UM Horticultural Science) on regulation of anthocyanins in 'Honeycrisp' apple, Jim and graduate student Adriana Telias visited apple researchers at HortResearch in Auckland, New Zealand.

All in all, Spring Semester was an exciting and productive time for research in the Potato Pathology and Genomics program.



Aurora Sporealis Online Access & Indexing

Laura Wiegand and Susan Tertell

The Aurora Sporealis has been published since 1924. No other department, outside of Medicine, in the history of the University of Minnesota is so well documented. No other department of Plant Pathology in the United States has such an historical record. The Aurora is important to students, staff, faculty, alumni and friends. However until this year, there was no index for those 82 years of Auroras and neither was there electronic access to past editions. Two projects changed all that: the Aurora Sporealis indexing project and the digitizing project.

The Aurora online

Every issue of the Aurora Sporealis going back to 1924 is now available in PDF format through the University of Minnesota's Digital Conservancy. You can access the digitized Aurora at <http://conservancy.umn.edu/handle/817> and you may search by keyword, or simply browse issues by date.

The Aurora gets an index

In mid-2008, a two-year indexing project, encompassing about 400 hours of volunteer time, is expected to be completed. The index will be made available electronically on the University Digital Conservancy's website, as well as on the Plant Pathology Library's website (<http://plant.lib.umn.edu>).

About the Index

Approximately 75% of the index is devoted to personal names – including faculty, staff, and students, and there is a special section for alumni and “Old Timers.” Significant events in individuals' lives, both personal and professional, are included. The index

includes job changes, promotions, activities in professional associations (primarily the American Phytopathological Association), marriages and births, obituaries, moves, etc.

The subject index includes topics about the department, about professional organizations, and the University as a whole; especially when department operations were directly affected. Things like college reorganizations and the change to the semester format are in the subject index. Social activities of the department are included, like parties, sports (the annual Stakman Cup student-faculty softball game) and activities like the annual corn roast.

Building projects and renovations like the replacement of the Tottering Tower (old military Drill Hall) and greenhouse construction are also in this section. Major natural events such as droughts and flooding conditions were included when they impacted plant pathology.

What was not included in the index:

References to visiting scientists are excluded except when their stay in the department was a lengthy one.

Seminar topics were excluded, except on occasion when an Old Timer was back to address the seminar.

Scientific information in general is not included, since there are other sources for those topics. A few things such as the first case of Dutch elm disease in Minnesota were included because the indexers found them interesting.



Ms Susan Tertell (retired Chief of the Minneapolis Public Central Library) and Ms Laura Wiegand (former Head of the Plant Pathology Library) share a moment during the indexing of all volumes of the Aurora going back to 1924. Susan volunteered her professional skills and spent one and a half years indexing the Aurora. Laura recently joined the University of North Carolina's Library at Wilmington.



Hao Zhou

Hao was born in Ningbo, China. He got his B.S. in Biological Science (2004) and got his M.S. (2007) in Microbiology at Nankai University, China. Hao will be a Ph.D. student working with Dr. Brian Steffenson on association mapping of disease resistance genes in cultivated barley as part of the USDA CSREES supported Barley Coordinated Agricultural Project (Barley CAP).



Dan Schlatter

Dan grew up in New Brighton, MN, and went to the University of Minnesota-Morris where he majored in Biology and French. He is working with Dr. Linda Kinkel to develop a real-time quantitative PCR assay for tracking specific strains of *Streptomyces* in soil. The technique will be used for quantifying the competitive dynamics of antibiotic producing strains in soil.



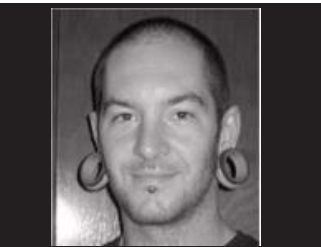
Jihyun Park

Jihyun received her B.S. and M.S. degrees from Seoul National University in South Korea in the Department of Forest Resources. The title of her M.S. thesis was "Identification of exobasidium species causing exobasidium diseases on Korean rhododendron species." She is currently a Ph.D. student working with Dr. Jennifer Juzwick on the etiology and assessment of hickory decline in the Midwest and Northeastern United States.



Tammy Kolander

Tammy grew up on a farm near Lakefield, MN. She received a B.S. in Microbiology and in Plant Biology at Minnesota State University, Mankato. She is a M.S. student co-advised by Dr. Dean Malvick and Dr. Jim Kurlle. Tammy's research will focus on the microbial ecology and management of the pathogen *Fusarium virguliforme*, the casual agent of soybean Sudden Death Syndrome (SDS).



Sam Stoxen

Sam received his B.S. in Ecology, Evolution and Animal Behavior from the University of Minnesota. He is currently working with Dr. Les Szabo on the causal agent of stem rust on wheat *Puccinia graminis*. His main interest is the genetic determinants of pathogenicity.



Matt Rouse

Matt graduated from Oklahoma State University with a B.S. in 2005, and from Kansas State University with a M.S. in 2007. His Masters thesis was about a resistance gene in big bluestem, a prairie grass. He is a Ph.D. student working with Yue Jin on wheat resistance to stem rust.

2007 Graduate Student Symposium

“The Good, the Bad, and the Endophytes: The Continuum from Mutualism to Parasitism.”

The biennial graduate student symposium was held on the 6th of November. Five speakers were invited to address various aspects of the topic.

Speakers:

Dr. Betsy Arnold (University of Arizona): “Endophytic fungi from the tropics to the tundra: clues to the evolution of fungal symbioses with plants.”

Dr. Ford Denison (University of Minnesota): “Cooperation and conflict in legume-rhizobium symbiosis.”

Dr. Stanley Faeth (Arizona State University): “Asexual endophytes and host grass interactions: the inside story.”

Dr. Rusty Rodriguez (USGS): “It’s a very thin line between love and hate: symbiotic adaptation, modulation and lifestyle switching.”

Dr. Glen Stanosz (University of Wisconsin): “Latent or blatant: contrasting phases in the lives of fungal pathogens of woody plants.”



Speakers and organizing committee (left to right):

Ford Denison, Pravin Gautam, Brett Arenz, Betsy Arnold, Stan Faeth, Rusty Rodriguez, Matt Bakker, Glen Stanosz, Ann Impullitti, James Jacobs, Ben Millett

The graduate student organizing committee thanks the speakers, and sponsors that made this event possible, and the 85+ participants. Members of the graduate student organizing committee received very positive feedback on the symposium. It was a stimulating and enlightening experience for all. DVD’s of the Symposium presentations are available in the Plant Pathology Library in Borlaug Hall.

Sponsors:

Department of Plant Pathology

College of Food, Agricultural & Natural Resource Sciences

Student Unions Administrative Grant

Coca-Cola Academic Grant

Graduate and Professional Student Assembly Academic Grant

Professor of Plant Pathology, **Dr. Richard J. Zeyen** has retired. Richard came to Minnesota in 1967 as a National Defense Education Act Fellow, and received his Ph.D. in Plant Pathology and Physiology in 1970. In 1971 he was appointed a tenure track Research Associate in charge of the Minnesota Experiment Station's Cooperative Electron Optics Facility. He directed this MAES facility continuously for 30 years.

In addition to his MAES responsibilities, in 1973 Richard was appointed to the Plant Pathology faculty as an Assistant Professor. He taught Principles of Plant Pathology, and later portions of two of three Ph.D. core courses, "Plant Disease -Molecular to Cellular" and "Plant Disease Cellular to Whole Plants." In 1992 he helped establish the College of Agriculture's undergraduate honors program and taught two freshman honors courses - "Agriculture in the Public Sector" and "Things that Plague Us: The Physical and Biological Constraints on Agriculture." For the past 13 years he taught "The Physiology and Molecular Biology of Plant-Microbe Interactions" for Plant Pathology and other plant science graduate students.

From 1979 through 1985 Richard represented Plant Pathology in the planning, architectural design and equipping of Borlaug Hall on the Saint Paul Campus. In 1984 he drafted the Department's first Constitution and then its 1996 and 2007 revisions. The Constitution and its five standing committee structure provided a workable, durable governance structure through several changes in Department Heads. Throughout the 1980's and 1990's he represented the Department and College of Agriculture, Food and Natural Resources in University-wide governance structures and on Graduate School committees.

The Department has always provided Richard separate research laboratory space. He initially had a wide-ranging plant virology research program. In 1976 he and his students took responsibility for virus diseases of maize in Minnesota. From 1976-1994 he had a Maize Dwarf Mosaic Virus (MDMV) summer research program. It involved purification, antibody production, diagnosis and epidemiology of MDMV. For 19 years he cooperated with Dave Davis in Horticulture to produce broad based MDMV resistance in sweet corn, and with James Groth's group added resistance to common corn rust.

In the winters Richard joined with William Bushnell (USDA/ARS) in an enjoyable, career-long collaboration into the physiological and molecular aspects of the barley powdery mildew disease system. Their laboratory groups were tightly interwoven and highly productive. Richard's laboratory specialized on plant defenses while Bill's laboratory concentrated more

on *Blumeria graminis* infection and its biotrophic life habit. Sabbatical leaves at the University of London's Imperial College of Science and Technology and the Institute for Grasslands and Environmental Research in Wales, added insights, depth and collaborators to this research effort. The North Atlantic Treaty Organization's Scientific Travel Grant Program greatly enhanced exchange between laboratories during a 25-year collaboration with Dr. Timothy W. Carver and colleagues in Wales.

There were applied research spin-offs. These were accelerated by graduate student results with regulation of plant resistance response genes to fungal attack and collaboration with Horticulture's Alan Smith. In the 1990's Richard's laboratory group became involved in genetic engineering of oat, wheat and barley for fungal disease resistance. They provided and proofed bacterial plasmids encoding antifungal proteins for use in biolistic transformations of barley, oat and wheat useful for powdery mildew and *Fusarium* head blight disease resistance. These efforts were in collaborations with Professors David Sommers and Gary Muehlbauer of Agronomy and Plant Genetics. Sommers and Muehlbauer used the plasmids to produce adult plant transformants for glasshouse and field-testing.

Recently, Richard co-chaired the Department's 2007 Centennial Celebration. He is now involved in archiving the Department's historical materials in Minnesota's Elmer L. Anderson Library Archives on the West Bank of the Minneapolis campus. He is keeping professionally active, and address a special session of the Brazilian Congress of Plant Pathology in August. He is collaborating with Clemson University's historian Paul Peterson. Richard is researching and documenting the early life experiences of E.C. Stakman. This biographical work will extend and enrich that written by Clyde Christensen, about this most influential plant pathologist of the 20th century.



Dr. Zeyen

Meetings, Babies, & Sports

Meetings

The North Central Division of the American Phytopathological Society met at Lafayette, Indiana on June 19-21, 2007. Soybean rust was one of the major topics at this meeting.

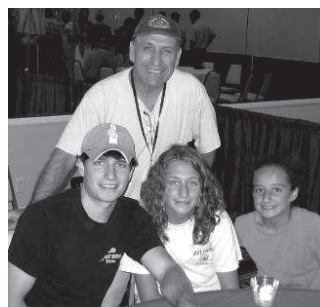
The American Phytopathological Society held its 2007 annual meeting in conjunction with the Society of Nematologists in San Diego, California on from July 28- August 1, 2007. There were 1,650 persons registered from 45 countries. Minnesota's Department was well represented. Many alumni, especially those from west of the Mississippi River were present.



The department's first couple, Dan and Carol Ishimaru. Carol has been Professor and Head of Plant Pathology at Minnesota since 2004.



Professor Brian Steffenson (MS 1983) and Dr. Mary Palm (MS 1979, Ph.D. 1983) at the Minnesota reception in San Diego.



Dr. Hamed Abbas (Ph.D. 1988) and his children enjoy the Minnesota alumni evening reception.



Ph.D. student Pravin Gautman, who hails from Nepal, beside an poster advertising the 2008 APS Centennial Celebration. It will be held at the Convention Center in Minneapolis, Minnesota from July 26-30.

Babies



Kaitlyn Minh-Tam Hoang

On August 22, 2007 Kim Nguyen, a laboratory technician in Dr. Les Szabo's lab, at the USDA Cereal Disease Laboratory gave birth to Kaitlyn Minh-Tam Hoang. She weighed 6 pounds 11 ounces, and was 19 inches long.

Stephanie and John Dahl are the proud parents of a baby girl, Violet Rae. Born October 19, 2008. Stephanie is Junior Scientist working for Professor Brian Steffensen.

Ben and Chris Held are the proud parents of a baby boy, Joshua. Ben is working on his Ph.D. under Professor Robert Blanchette.

Sports

The annual E.C. Stakman student-faculty softball game, endowed by E.C. Stakman in 1973, was rained out. It was scheduled on September 18th as part of the Centennial Celebration. Special Centennial T-shirts were produced for game participants, but playing conditions were impossible. Vows of "wait until next year" were heard over the sounds of the torrential rainfall.

Professor Ruth Dill-Mackey skied the famous American Birkebeiner cross-country ski race. The "Birkie" is one of the longest and most grueling cross-country races in North America. It is held in the woods of northwest Wisconsin and finishes on Main Street in Hayward, Wisconsin. This irrepressible native of Queensland, Australia can now be called a true Minnesotan.

Professor Richard Zeyen won the 28th Annual Sun Bowl Tournament. The 5-week tournament is held in the Student Center Bowling Lanes on Saint Paul Campus. The tournament is open to all students, staff and faculty. There were 247 entrants. Professor Zeyen had a two game total of 585 pins. Not bad for a fellow who is closer to age 70 than 60.

Help Wanted - History

During the Centennial Celebration we featured this 1959 Department portrait. All individuals were unnamed and some of our emeritus faculty and alums had a go at naming them. Where we could not identify individuals we put “unknown” in that place. Mature alums and friends, please help us out by naming “unknowns” if you can, and by providing correct spellings. Mail your observations to Professor Richard Zeyen in care of the Department of Plant Pathology.

We suspect that some of the unknown individuals may be in this “memory aid” list – Arne S. Anderson, Bimala Charavarti, Paul Gustfson, Bill Haglund, Thomas Kavanagh, Charles Miller, Dave Mumford, Jacobo Ortega, Donald Penner, Richardo Rodriguez, Eric Schleder, Myron Tumbleson, Bernardo Castillo, Ronald Covery Jr., Richard Herret, Sirphong Intrama, Roland Line, Richard Lutey, or Subhi A Qasem.



Plant Pathology Department – 1959

Row 1 – Left to Right: Wiley Garrett, Rick Durbin, Dave Schroeder, Unknown, Jim Miller, Art Elliot, Dick Fredrickson, Ken Heath, Howard Bissonette, Monte Harrison, Matt Moore, Karl Feger

Row 2 – Left to Right: Mr. Eagle, Roy Wilcoxson, Helen Hart, Milton Kernkamp, E.C. Stakman, Jonas J. Christensen, Carl Eide, Thomas King, Mary Abrahamson

Row 3 – Left to Right: Unknown, Tom Kavenough, Unknown, Bobby Renfro, Bill Kennedy, Bill Roberts, Bob Goth, George Bean, Grace Aschenbach, Laura Hamilton, Unknown, Unknown, Dave Mumford, Unknown, Herb Johnson, Dr. Cotter, Unknown, Unknown

Row 4 – Left to Right: Unknown, Unknown, Unknown, Unknown, Unknown, Unknown, Lauren E. Carlson, Thor Kommedahl, Ted Sudia, Herb Sax, Unknown, Dick Lutey, Al Wood, Rollie Line, Ernest Banttari, Fred Frosheiser

Row 5 – Left to Right: Mr. Lu, Neil Anderson, Bob Milholand, John Ohman, Tom Wiley, Bill Merrill, Merrill Fallstad, Don Taylor, Unknown, Unknown, Unknown, Yong Sup Cho, Unknown, Unknown, Unknown, Ron Covey, Ken Knutson.

Row 6 – Left to Right: Ron Welty, Unknown, George Ahlgren, Nagi Oshimid, Ted Ryan, John Kraft, Stein Telnesset, Bill Haglund

Alumni

Dr. John Dueck

Dr. John Dueck (M.S. 1966, Ph.D. 1971) passed away unexpectedly in Saint Paul, Minnesota on September 23, 2007. He was 67. John and Mary were attending the Department's Centennial Celebration on the Saint Paul Campus when his brief illness occurred.

John, a native of Canada, began his career working as a scientist in the Agriculture and Agri-Food Canada Research Center (AAFC) in Harrow Ontario, researching control measures for fire blight of apple and pear. His seminal work, however, came in controlling canola diseases when he worked in Saskatoon on the Canadian prairies.

John then served Canada and the AAFC in several capacities: as Director of the Research Center in Regina, Saskatchewan; as a research director on a Canadian oil seed project in Pakistan; as Director of the Research Center in the Okanogan Valley in British Columbia; and as Director of the Eastern Cereal and Oilseed Research Center in Ottawa, Ontario.

In 1998 John joined AAFC headquarters in Ottawa and helped form Genome Canada for the AAFC. He finished this distinguished career by leading Canada's delegation in negotiations for the International Treaty on Plant Genetic Resources for Food and Agriculture. Canada was the first nation to ratify this landmark international treaty.

John's considerable administrative skills, his humor and wit, and most of all his friendship and regard for the Department and its alumni are legendary. He is greatly missed.

Dr. Charles Logsdon

Dr. Logsdon (Ph.D. 1954) passed away in Palmer, Alaska on January 7, 2007. A potato pathologist at the University of Alaska, Chuck spent a sabbatical leave in Norway in 1961.

Upon returning to Alaska he served as associate director of the Alaska Agricultural Experiment Stations. He was civic minded and in the early 1960's served as mayor of Palmer, Alaska.

In retirement he was a member of the Palmer Historical Society and the Pioneers of Alaska. He was an advocate for seniors and lobbied for senior housing in Palmer.

Chuck Logsdon was an extraordinary individual, well liked and remembered by all.

Dr. Bent Skovmand

Dr. Bent Skovmand (B.S., M.S. and Ph.D. 1971-1976), a native of Denmark, passed away unexpectedly of medical complications on February 6, 2007 in Kävlinge, Sweden at age 62.

Bent's career began at the International Maize and Wheat Improvement Center (CIMMYT) in El Batan, Mexico in the wheat and triticale improvement programs. From 1983-1989 he was on loan to a United Nations Development Project for wheat improvement in Turkey.

Later, he headed the Wheat Genetic Resources program at CIMMYT where his scientific, social and organizational skills coupled with his ability to speak several languages were great assets.

In 2003, Queen Margrethe II of Denmark awarded him the Knight's Cross of the Order of Dannebrog for his scientific achievements in wheat research and for conservation of wheat genetic resources. He was then appointed Director of the Nordic Gene Bank (NGB) in Alnarp, Sweden. As NGB Director, Bent was heavily involved in construction of the Svalbard International Seed Vault (the so-called "Doomsday Vault") in a mountainside on Spitsbergen Island near the Arctic Circle.

The Department will miss this devoted alumnus, friend and internationally renowned plant scientist and plant genetic resource conservationist.

Dr. John W. Gibler

Dr. John W. Gibler (M.S. 1950, Ph.D. 1951) passed away in Hot Springs Village, Arkansas on December 13, 2006. He was 86.

After receiving his PhD, he spent five years in Mexico with the Rockefeller Foundation's cooperative agricultural program in Mexico. He went on to become an internationally acclaimed and award winning researcher and leader in Latin American crop development.

He achieved his life's mission "to train young scientists to do research, to feed people and change the face of the world." He accomplished this through his personal attributes of straight forwardness, commitment, vision, honesty and his sense of realism.

Simply put, John Gibler was a "doer;" he made good things happen. John was the 2006 recipient of the Department's E.C. Stakman Award. His career paralleled that of his Rockefeller Foundation mentors in international crop development, Drs. E.C. Stakman and Norman Borlaug.

Old Timers

Dr. Albert Linck

Dr. Linck passed away in Shoreview, Minnesota on September 26, 2007 at age 81. He received his Ph.D. in plant physiology from Ohio State University and joined the faculty of the Plant Pathology and Botany Department at Minnesota in 1955.

He was known as a calm, fair and friendly individual who could inspire others. He moved into academic administration in the turbulent 1960's and eventually became Dean of the College of Agriculture at Minnesota.

Al Linck was responsible for many improvements in research facilities for the Department and the College at Minnesota. In 1984 he became provost of Colorado State University until his retirement in 1994, at which time he and Vandora moved back to Minnesota.

In spite of a painful and debilitating illness Al wrote a brief history for us on Plant Physiology at the University of Minnesota (see "In Their Own Words" in this issue of the Aurora).

All who knew him always looked forward to seeing him; he made our world a much better place. He will be greatly missed.

Dr. John Schafer

Dr. John Schafer passed away on May 5, 2007 at age 86. He and Joyce were living in Santa Rosa, California at the time of his

death. Jack received his PhD from the University of Wisconsin.

His was a long and very distinguished career in cereal pathology, having served as a faculty member at Purdue, and as Department Head at Washington State and at Kansas State Universities.

Jack also served as editor-in-chief of Phytopathology and was a past president, and fellow of the American Phytopathological Society. Jack served as Head of the USDA Cereal Rust Laboratory at Minnesota from 1982 to 1987, when he retired.

All remember him for his kindness, professionalism and especially his friendship.

Dr. Minoru Aragaki

Minoru Aragaki, professor emeritus in the Department of Plant and Environmental Protection Sciences, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa passed away on April 7, 2007. In 1945, toward the end of WWII, he had 26 weeks of intensive Japanese Language training at the Military Intelligence Service Language Institute at Fort Snelling, Minnesota. Following that training he was part of the US occupation of Japan where he served as an interpreter for the US Army. Following the occupation of Japan, Dr. Aragaki spent the 1952 academic year studying plant pathology in Minnesota, but received his MS and PhD degrees from the University of Hawai.

Friends of the Department

Mr. Tom Anderson

Tom was a wheat farmer in the Barnesville, Minnesota area. He was a great friend to production agriculture and an advocate for wheat and barley research. Tom passed away on July 23, 2007.

Tom was a Distinguished Friend of the Department at Minnesota and a graduate of North Dakota State University. He helped establish both the Minnesota Small Grains Initiative and the U.S. Wheat and Barley Scab Initiative.

He testified at state legislatures and in the U.S. Congress on the need to research the devastating head blight disease of wheat and barley. The Minnesota Initiative brings hundreds of thousands of dollars of research funding to the University of Minnesota each year while the National Initiative's five million dollar effort supports 92 projects at 26 Land Grant Universities

and the USDA-ARS.

Tom's friendship and tireless advocacy on behalf of the University of Minnesota was a reminder to us that our research results have real world consequences. We miss his friendship, insight, gracious manner, work ethic, and especially his field and laboratory visits.

Ms. Norman Borlaug

Margaret Borlaug (Gibson) passed away as a result of injuries from a fall in Dallas Texas on March 8, 2007 at age 95.

Margaret majored in Education at the University of Minnesota and her late brother George Gibson was an All-American guard and captain of the Gopher football team. She married Norman Borlaug in 1937 in Minneapolis.

Mr. Fred Bucher

Grace Bucher's husband Fred was 75 years of age when he passed away on May 21, 2007.

Generations of plant pathology students enjoyed the friendship of Grace and Fred. Grace retired from the University in the early 1990's but came back to help with various projects until 2000.

Mrs. Sigrid Rothman

Dr. Paul Rothman's (deceased –USDA Oat Breeder CDL) wife, Sigrid, passed away at age 83 on November 15, 2007.

Sigrid was a Michigan State alum and a registered dietitian at Midway and Miller hospitals in the Twin Cities area. Sigrid and Paul's son Tom is Director of the Minnesota Farm Network that broadcasts on 33 regional radio stations in the upper Midwest.

Dr. Myron Brakke

Myron Brakke obtained his B.S. (1943) and Ph.D. (1947) in agricultural biochemistry at the University of Minnesota. A member of the National Academy of Science and a USDA-ARS scientist in the Department of Plant Pathology at the University of Nebraska, he pioneered swinging bucket density gradient

centrifugation for the purification of plant viruses and other macromolecules. Myron was a friend to, and much beloved by all plant virologists.

He was a "scientist's scientist." He mentored many of an entire generation of leaders in plant virology. Myron was honored as a Distinguished Alumnus of the University of Minnesota and was a member of the Agricultural Research Service Science Hall of Fame.

Mrs. Bernice Bielenberg

Orville Bielenberg's (deceased – Plant Pathology Rosemount Farm Supervisor) wife, Bernice, passed away on July 5, 2007 at age 85. Bernice, like Orville (former mayor of Woodbury, Minnesota), was very civic-minded and was active in the Woodbury Heritage Society. Generations of faculty, staff and students will fondly remember Orville and Bernice for their many kindnesses and friendship.

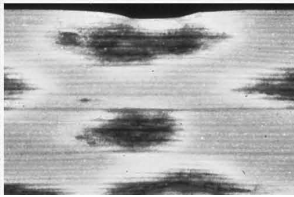
Plant Pathology's Intellectual Lineage at Minnesota



Professor Edward M. Freeman, ca. 1930

Plant Pathology's intellectual and scientific "geneology" can be traced to one man, Edward M. Freeman (a.k.a. Eduard M. Fryman). The founder and first head of department in 1907. Freeman received his Ph.D. from Minnesota in Botany in 1905 under the botanist Conway MacMillan, and had studied for a year under H. M. Ward in Cambridge University (England). Ward was famous for studies of Coffey Rust in Ceylon. Freeman gained expertise in rusts from Ward and from working as a Special Agent for the USDA on stem rust of cereals.

Among the first graduate students Freeman recruited into the fledgling department was Elvin C. Stakman (Ph.D. 1913). Freeman kept Stakman as a faculty member and placed him in charge of the Division of Vegetable Pathology (Plant Pathology). Thus was launched the career of one of the most influential plant pathologists of the 20th century, E.C. Stakman.



Department of Plant Pathology

UNIVERSITY OF MINNESOTA

Plant Pathology is a branch of biological science focused on the diagnosis, management, and prevention of plant disease. Research in this discipline covers all levels of biological organization from molecular genetics and genomics through ecosystems.

The Department of Plant Pathology at the University of Minnesota has a strong research and teaching emphasis in disease resistance, molecular genetics and genomics, control of diseases caused by biotic pathogens, wood deterioration, effect of air pollution on plants, biological control, ecology and evolution of plant-associated microbes, and in the physiology and molecular biology of plant-microbe interactions. The department also has a strong outreach emphasis through the extension service, plant disease clinic, and other avenues.

The Graduate Program in Plant Pathology offers courses of study leading to the M.S. and Ph.D. degrees with flexibility for students to design a program that fits their interests and career goals (e.g. the emphasis in Molecular Plant Pathology). Graduate education is designed to help students learn the scientific discipline of Plant Pathology, develop independent and team research expertise, and hone communication skills needed by professional scientists. The program supports and encourages students to carry out an international internship during their tenure of study.

The University: The University of Minnesota is one of the top public research and teaching institutions in the world and is the "land-grant" institution for the state. The Department of Plant Pathology is located in St. Paul, a life science campus with approximately 5,000 students.

Location: The Twin Cities metropolitan area of Minneapolis and St. Paul has a population of more than 2.5 million. It is the cultural center of the Upper Midwest with world class art galleries, museums, theaters, music groups, and a full complement of professional and amateur sports. Opportunities for year around outdoor activities abound in the many parks and nature preserves within the greater metropolitan area.

Research Facilities: Graduate faculty are housed in three interconnected buildings on the St. Paul Campus and at several research and outreach stations across the state. Resources available to students include modern laboratories, offices, and state-of-the-art teaching facilities; the Plant Pathology Library with nearly 6,000 books and 100 serials; controlled environmental chambers; over 100,000 sq. ft. of greenhouse space; personal computer facilities with Internet access; nucleic acid sequencing center; microscopy and imaging center; animal care facilities for antibody production; and high throughput equipment for genomic and proteomics research. There are field research facilities on the St. Paul campus and at six additional stations located at unique sites throughout the state. Forestry and biological field stations are located at Lake Itasca and Cloquet. Research is also conducted at the Cedar Creek NSF research site close to the Twin Cities.

Student Body: About half of the graduate students in Plant Pathology are U.S. citizens and half are from outside the country. There is considerable interaction among graduate students in various social and scientific activities. A full-day Graduate Student Symposium is organized biannually by students who determine the theme and invite speakers.

Financial Aid: Graduate students receive support from the department or from other sources. There are a variety of fellowships and scholarships available on a competitive basis as well as research and teaching assistantships through the department or individual faculty members. The availability of graduate research assistantships fluctuates annually. You must be accepted into the Graduate School to be considered for an assistantship. The current stipend for an assistantship is about \$18,000. In addition, students receive health benefits and fully paid tuition and fees. We encourage early fall inquiries to maximize opportunities for national fellowships. To be considered for University fellowships and assistantships, completed applications must be received by January 10.

Cost of Living: Off-campus housing is available in the Twin Cities at a wide range of prices (www.housing.umn.edu/offcampus/). Information on unfurnished university family apartments can be obtained at www1.umn.edu/cscs/.

Applying: Applications can be submitted at any time but should be completed at least three months before the desired entrance date. Newly admitted students usually begin studies in late August, although it is possible to start at other times of the year. Applicants should have a sound college background in the basic biological and physical sciences and mathematics, and have completed at least one course in inorganic chemistry, organic chemistry, biochemistry, and physics. Deficiencies can be corrected during graduate studies.

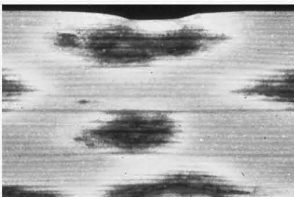
Prospective students must apply online to the Graduate School at www.grad.umn.edu/prospective_students/apply_online.html

Complete all parts of the online application, including the request for recommendation letters. Send the official transcripts of all past coursework and official TOEFL scores (if your native language is not English) to: The Graduate School, University of Minnesota, 309 Johnson Hall, 101 Pleasant Street SE, Minneapolis, MN 55455-0421

Additionally, send a copy, scan, or fax of your transcripts, GRE scores, and TOEFL scores (if applicable) to the Director of Graduate Studies in the Department of Plant Pathology

All inquiries about the application process should be addressed to the Director of Graduate Studies. Prospective students are encouraged to initiate correspondence directly with members of the faculty to obtain full information about individual research programs (see reverse side)





Department of Plant Pathology

UNIVERSITY OF MINNESOTA

Plant Pathology Faculty and their Research Interests

Robert A. Blanchette, *Professor*, Ph.D. 1978, Washington State University. Forest pathology, deterioration of wood products. robertb@umn.edu

James M. Bradeen, *Assistant Professor*, Ph.D. 1994, University of Wisconsin-Madison. Potato pathology and genomics. jbradeen@umn.edu

Martin Carson, *Adjunct Professor*, USDA-ARS Cereal Disease Laboratory. Ph.D. 1980, University of Illinois. Host resistance and pathogen population biology of crown rust of oats. mcarson@umn.edu

Senyu Chen, *Professor*, Southern Research and Outreach Center, Waseca, MN. Ph.D. 1994, University of Florida. Biology and management of the soybean cyst nematode. chenx099@umn.edu

Ruth Dill-Macky, *Associate Professor*, Ph.D. 1993, The University of Queensland, Australia. Small grains pathology. ruthdm@umn.edu

Dirk Hoffmeister, *Assistant Professor*, Ph.D. 2002, University of Freiburg, Germany. Genetics, biochemistry, and ecological relevance of fungal secondary metabolism. dirkh@umn.edu

Char Hollingsworth, *Associate Professor*, Northwest Research and Outreach Center, Crookston, MN. Ph.D. 2002, University of Wyoming. Small grains pathology and extension. holli030@umn.edu

Carol Ishimaru, *Professor and Department Head*, Ph.D. 1985, Michigan State University. Plant-bacterial interactions. cishimar@umn.edu

Yue Jin, *Adjunct Associate Professor*, USDA-ARS Cereal Disease Laboratory. Ph.D. 1990, North Dakota State University. Population genetics of stem rust fungi and host resistance. yuejin@umn.edu

Jennifer Juzwik, *Adjunct Associate Professor*, USDA Forest Service. Ph.D. 1983, University of Minnesota. Forest pathology, management of forest tree and nursery seedling diseases. juzwi002@umn.edu

Linda L. Kinkel, *Professor*, Ph.D. 1988, University of Wisconsin-Madison. Ecology and biological control of plant-associated micro-organisms in agricultural and in native prairie habitats. kinkel@umn.edu

Corby H. Kistler, *Adjunct Professor*, USDA-ARS Cereal Disease Laboratory. Ph.D. 1983, Cornell University. Genetics and genomics of fungal plant pathogens in the genus *Fusarium*. hckist@umn.edu

James Kolmer, *Adjunct Associate Professor*, USDA-ARS Cereal Disease Laboratory. Ph.D. 1985, North Carolina State University. Population genetics and biology of cereal rust fungi. jkolmer@umn.edu

Sagar V. Krupa, *Professor*, Ph.D. 1971, University of Uppsala, Sweden. Effects of air pollutants on crops and trees. krupa001@umn.edu

James E. Kurle, *Associate Professor*, Ph.D. 1994, University of Minnesota. Effects of cropping systems and management practices on soybean diseases. kurle001@umn.edu

Benham E. L. Lockhart, *Professor*, Ph.D. 1969, University of California-Riverside. Identification, characterization, and epidemiology of plant viruses and virus diseases. lockh002@umn.edu

Dean K. Malvick, *Assistant Professor*, Ph.D. 1997, University of Minnesota. Biology and management of soybean, corn, and alfalfa diseases; molecular diagnostics and ecology of fungal and Oomycete pathogens. dmalvick@umn.edu

David H. MacDonald, *Professor*, Ph.D. 1966, Cornell University. Ecology and management of plant parasitic nematodes in the upper Midwest. macdo002@umn.edu

James A. Percich, *Professor*, Ph.D. 1975, Michigan State University. Integrated disease management programs for vegetable cropping systems. jamesp@umn.edu

Deborah A. Samac, *Adjunct Professor*, USDA-ARS Plant Science Research Unit. Ph.D. 1988, University of Wisconsin-Madison. Alfalfa pathology and biotechnology; functional genomics of plant-microbe interactions. dasamac@umn.edu

Brian J. Steffenson, *Professor and Lieberman-Okinow Endowed Chair*, Ph.D. 1988, University of California-Davis. Disease resistance in cereal crops and their wild progenitors; host-parasite genetics. bsteffen@umn.edu

Les J. Szabo, *Adjunct Associate Professor*, USDA-ARS Cereal Disease Laboratory. Ph.D. 1983, Oregon State University. Molecular genetics of rust fungi. lszabo@umn.edu

Carol E. Windels, *Professor*, Northwest Research and Outreach Center, Crookston, MN. Ph.D. 1980, University of Minnesota. Etiology and integrated management of soilborne fungal pathogens of sugar beet. cwindels@umn.edu

Nevin D. Young, *Distinguished McKnight University Professor*, Ph.D. 1984, Yale University. Genomics of plants and plant disease resistance genes. nevin@umn.edu

Richard J. Zeyen, *Professor*, Ph.D. 1970, University of Minnesota. Physiological and molecular control of disease resistance; analytical electron microscopy. richz@umn.edu

Mailing address: 1991 Upper Buford Circle, 495 Borlaug Hall, St. Paul, MN 55108-6030

Phone: 612-625-8200 | Fax: 612-625-9728 | Director of Graduate Studies E-mail: plpathgp@umn.edu | Web site: www.plpa.cfans.umn.edu