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# AURORA SPORÆALIS

1997

## Minnesota's AOS Presidents Edition



E.M. Freeman, 1918



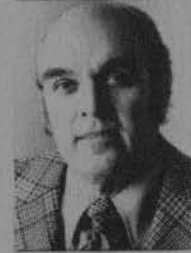
Wiley N. Garrett, 1981



E.C. Stakman, 1922



Carol E. Windels  
1998 President-elect  
1999 President



John F. Schaefer, 1979



J.G. Leach, 1941



James Tammen, 1975



J.J. Christensen, 1944

### PLANT PATHOLOGY UNIVERSITY OF MINNESOTA

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Alumni Speak  
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Thor Kommedahl, 1971



J.H. Craige  
1946



Helen Hart  
1956



C.S. Holton  
1963



Harold H. Flor  
1968

# AURORA SPOREALIS

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The *Aurora Sporealis* is the alumni news magazine of the Department of Plant Pathology. First published in 1924, it is the oldest continuously produced departmental news magazine in the history of the University of Minnesota.

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*Aurora Sporealis* is an annual publication mailed to former and current faculty, staff and graduate students, and to *Old Timers* who worked in the Department of Plant Pathology, at some time or other. Any contributions can be sent to the Department Head at the address below.

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## COVER STORY

by Richard J. Zeyen

When Dr. Carol E. Windels, a faculty member stationed at the Northwest Experiment Station in Crookston Minnesota, becomes President-elect of the American Phytopathological Society in 1998 and President in 1999 she will join Minnesota's twelve previous APS presidents. In fact, a highly significant proportion of all former APS presidents were faculty and/or alumni of the Department of Plant Pathology at Minnesota.

Minnesota's APS presidents are a diverse group. In every decade, with the exception of the 1930's, there has been an APS president with direct ties to Minnesota. Some were Minnesota alumni or faculty who became presidents and some were presidents who later became Minnesota faculty. All had distinguished themselves in the eyes of their peers. They were elected to the APS presidency for a variety of reasons some because of their personalities and contributions to APS, and some primarily on the merits of scientific achievement.

In this issue of the *Aurora* we honor these twelve past presidents with Minnesota connections: Wiley Garrett (1981), John Schafer (1979), James Tammen (1975), Thor Kommedahl (1971), Harold Flor (1968), Charles Holton (1963), Helen Hart (1956), John Craigie (1946), Jonas Christensen (1944), Julian Leach (1941), Elvin Stakman (1922), and Edward Freeman (1918).

For this issue, professors Neil Anderson and Richard Zeyen collaborated on a profile article of "Minnesota's APS Presidents" (see pages 2-5). We hope you enjoy this piece of departmental history.

# MINNESOTA'S APS PRESIDENTS

by Richard J. Zeyen and Neil A. Anderson

The American Phytopathological Society (APS) was founded in 1908 with 130 charter members and has grown to approximately 5000 members. It is now an international organization whose members are research scientists, teachers, extension professionals, students, sales representatives, private consultants, administrators, technicians, agricultural field representatives and pest management personnel.

Faculty from the Department of Plant Pathology at the University of Minnesota have played crucial roles in APS history, and are largely responsible for locating APS Headquarters in Saint Paul Minnesota. Over the years, Minnesota's faculty and alumni have devoted tens of thousands of hours of service to APS. Even today it is difficult to find a senior faculty member at Minnesota who has not shared their expertise by serving on APS editorial and other committees.

Given this record of involvement by faculty and alumni of Minnesota it is not surprising that twelve of them have served as APS presidents. They were elected for a variety of reasons, some for their personalities and contributions to APS and some on the merits of their scientific achievements. No other department in the nation can compare with Minnesota when it comes to APS leadership.

When Carol Windels assumes the APS presidency in 1999 she will become the thirteenth "Minnesota President". Therefore we devote this issue of the *Aurora Sporealis* to those men and women faculty and alumni who have served as APS presidents. We have, for the sake of posterity, reached into departmental archives and our own memories to provide short biographies of each of these thirteen individuals.

## E.M. Freeman—1918

President of APS in 1918, E.M. Freeman was born February 12, 1875 in St. Paul, Minnesota. He received all of his academic degrees from the University of Minnesota and the PhD degree with Conway MacMillan as advisor in 1905. As part of his doctoral experience he studied for 2 years with Marshall Ward at Cambridge University. His book, *Minnesota Plant Diseases*, published in 1905 is said to be the first Plant Pathology text in the U.S. He was "Founder and guiding genius" of the department that he headed from 1907—1940. In 1913 he became Assistant Dean and in 1917 Dean of the College of Agriculture, Forestry, and Home Economics. He shaped educational efforts in Agriculture in the University as dean of the College for the next 26 years. A charter member of APS he was an associate editor of *Phytopathology* for its first 3 years. A mycologist by inclination his "In Praise of Parasitism" in the 1936 Proceedings of the Minnesota Academy of Sciences is a classic. Drs. Stakman and J.J. Christensen wrote of Dean Freeman that "his dreams were translated into sound concepts by his scholarship, and his concepts were translated into effective and far-reaching programs by his skill and wisdom."

## E.C. Stakman—1922

President of APS 1922, was born May 17, 1895 in Algoma, Wisconsin, and grew up in Brownton, Minnesota. He received the BA degree from the

University of Minnesota in 1906. Following two years of high school teaching in Red Wing and Mankato, he was superintendent at Argyle, Minnesota. In 1909 he began his graduate education under professor Freeman and received his MA degree in 1910 and his PhD degree in 1913. He received honorary doctorates from the Universities of Halle, Cambridge, Yale, Wisconsin, and Minnesota. A National Academy of Science member, and an architect of the green revolution, Dr. Stakman was noted for his epidemiology work on the wheat stem rust fungus. A marvelous communicator, teacher, researcher and statesman for science his influence still shapes and guides plant pathology today.

## J.G. Leach—1941

J.G. Leach, president of APS in 1941, was born November 16, 1885 in Somerville, Tennessee. His BS was from the University of Tennessee in 1917, and his MS (1918) and PhD (1922) in Plant Pathology from the University of Minnesota. His studies on the blackleg disease of potatoes is a classic and the insects involved with this disease in nature were the source of his interest and development of a course and a text "Insect Transmission of Plant Diseases" published in 1940. The course at Minnesota was co-taught by Dr. A.A. Granovsky the world famous aphidologist. Dr. Leach became head of the West Virginia Department of Plant Pathology in 1938. He remained head of that department until 1960 when he resumed his teaching and

research until retirement in 1965. An extremely able administrator, Dr. Leach encouraged excellence in teaching and research and will be remembered for his contributions to faculty welfare and government.

#### **J.J. Christensen—1944**

J.J. Christensen, president of APS in 1944, was born in 1872 in Hutchinson, Minnesota. His BS degree (1921), MS degree (1922), and PhD degree (1925) were all from the University of Minnesota. Pre-doctoral experiences included teaching in a rural school in Mercer, North Dakota, serving as a sergeant in the U.S. Army Medical Corps in World War I, as a field potato inspector, and instructor in Agricultural Botany in the School of Agriculture at the University of Minnesota. In 1925 he became an Assistant Professor in the department of Plant Pathology and Botany and Professor in 1938. From 1953-61 J.J. was head of the Department. Those of us fortunate enough to have taken his courses, Genetics of Plant Pathogens, Diseases of Field Crops, and Insects in Relation to Plant Disease, will never forget the subject matter nor his tremendous enthusiasm and unique teaching style. As a field crop pathologist, J.J. was among the very best and he worked tirelessly with plant breeders to develop disease resistant crops. He excelled as a mentor-advisor to graduate students. His concern for each student's development was genuine and the student's research experience with him an unforgettable adventure. Lots of honors and recognition came to Dr. Christensen but he remained himself and will be remembered for his unbounded enthusiasm and devotion to Plant Pathology.

#### **J.H. Craigie—1946**

John Hubert Craigie, President of APS in 1946 was born December 8, 1887 at Merigomish, Nova Scotia. He served 2 years on the western front in WWI and received a commission in the British Army. He received his AB from Harvard (1924), the MS in Plant Pathology, University of Minnesota (1925), and the PhD (1930) from the University of Manitoba. He was appointed to the Dominion Rust Research Laboratory in 1925 and was head of that laboratory from 1928-1945. He served administratively as the Dominion Botanist from 1945-52. His discovery of the function of rust pycnia made studies on host:parasite genetics possible. Scrupulously honest, he reported how he and A.H.R. Buller had observed the seasons first flies sipping pycnial nectar on plants in the Dominion Rust Research greenhouse in Winnipeg. It was May 17, 1927 (Stakman's birthday) and it was Buller who suggested that "the solution to the function of the

pycnia may be an entomological one". A fellow of the Royal Society of Canada and London, he received honorary doctoral degrees from the Universities of British Columbia, Saskatchewan, Manitoba and Dalhousie. He was President of the Canadian Phytopathological Society in 1934. From the University of Minnesota he received the Outstanding Achievement Award and the Stakman Award. A dedicated scholar, scientist, and administrator, Dr. Craigie lived to be 102 years old.

#### **Helen Hart—1956**

Helen Hart, president of APS 1956, was born in Janesville, Wisconsin in 1900. She received the BA (1922), MS (1924) and PhD (1929) in Plant Pathology from the University of Minnesota. She was an Instructor in the department before becoming an Assistant Professor in 1939. She became an Associate Professor in 1944 and full Professor in 1947. A marvelous editor, Dr. Hart chaired the departments Editorial Committee for 25 years. She was also Editor of the *Aurora Sporealis* for 2 decades and during the 1930's and 40's it was truly "Helen Harts Aurora". She was Editor-in-Chief of Phytopathology from 1944-1951 and served on the APS council for 12 years. She was APS' first woman President, Fellow, and Editor-in-Chief. Her research on cereal rusts was on the nature of resistance. A careful mentor to her graduate students, their theses and publications were promptly and beautifully done.

#### **C.S. Holton—1963**

C.S. Holton, president of APS in 1963, was born December 8, 1904 in Wilmer, Louisiana. His BS (1927) was from Louisiana State University and his MS (1929) and PhD (1932) were in Plant Pathology from the University of Minnesota. Early experiences involved farm work as a youth, lab instructor in Plant Pathology at Louisiana State University, barberry eradication work in Minnesota, instructor in Agricultural Botany in School of Agriculture, and instructor in Plant Pathology, University of Minnesota. In 1931 he joined the office of Cereal Crops and Diseases, USDA, as an Assistant Pathologist with headquarters at Pullman, Washington. He became an Associate Pathologist in 1935 and Pathologist in 1941. He was Head of the Cereal Disease Laboratory at Washington State University from 1932-1969. Dr. Holton was known internationally for his research work on cereal smut fungi and the diseases they cause. He authored two

books on the smut fungi. A Fulbright scholar in 1960 and as a Stakman Awardee in 1971 he was honored for "pioneering research and a life time of research on genetic variability on smut fungi."

#### **H.H. Flor—1968**

Harold H. Flor was president of APS in 1968. Born in St. Paul, Minnesota, May 27, 1900, he grew up in Minneapolis and graduated from Central High School in 1918. His BS (1922) and MS (1924) were from the University of Minnesota. During his doctoral work he was in residence at the University of Minnesota, Iowa State University for one year, and as a USDA assistant plant pathologist at the University of Louisiana for 3 years. His research there was on the root rot complex of sugar cane and this was presented as his thesis for a PhD from the University of Minnesota in 1929. He then became an Associate Plant Pathologist with the USDA Cereal Disease Laboratory at Pullman, Washington working on bunt of wheat. In 1931 he transferred to Fargo, North Dakota where he began his work on the flax rust disease. His simultaneous genetic studies on both the pathogen and host led to the "gene-for-gene" hypothesis where host resistance occurs when specific avirulent pathogen alleles interact with specific host resistance alleles. He also pioneered the development of single gene differential lines used in breeding for disease resistance. A quiet, deeply perceptive and thoughtful person, Harold was also a superb athlete. He received an Honorary Doctor of Science degree from North Dakota State University, an Outstanding Achievement Award from the University of Minnesota, the USDA's Superior Service Award and the Ruth Allen Award from APS.

#### **Thor Kommedahl—1971**

A native of Minneapolis Minnesota, Thor Kommedahl received the Ph.D. in Plant Pathology (1951) from Minnesota. He worked on factors affecting the pathogenicity of *Fusarium lini* under the direction of J.J. Christensen. After graduation from Minnesota Dr. Kommedahl spent two years on the faculty of the Department of Plant Pathology at Ohio State before returning as an assistant professor to Minnesota in 1953. Thor Kommedahl is renowned for his career-long association with the American Phytopathological Society and other professional organizations. Although officially "retired" from the University of Minnesota in 1990 Dr. Kommedahl devotes the majority of his time to volunteer services for various professional societies and the Science Museum of Minnesota.

#### **James Tammen—1975**

A native of Sacramento California, Jim Tammen received the Ph.D. in Plant Pathology (1954) from California, Berkeley. Dr. Tammen specialized in the diseases of ornamental and floricultural plants. He served as Head of the Department of Plant Pathology at the Pennsylvania State University from 1965-1975, before coming to Minnesota as professor of Plant Pathology and Dean of the College of Agriculture in 1976. At Minnesota Dr. Tammen introduced several administrative innovations and participated in setting the stage for the building of Borlaug Hall. Borlaug Hall is a 17.5 million dollar building, finished in 1985 and shared by Plant Pathology, Agronomy & Plant Genetics and Soil, Water, & Climate. James Tammen left Minnesota and academia in 1981 to become president of Oglevee Associates Inc. of Connellsville, a multinational horticultural company. Dr. Tammen has since retired from Oglevee Associates but remains active in the affairs of the American Phytopathological Society.

#### **John Schafer—1979**

A native of Pullman Washington, John F. "Jack" Schafer received the Ph.D. (1950) in Plant Pathology and Agronomy from the University of Wisconsin—Madison. He began his career as a cereal pathologist at Purdue University in 1949, becoming a full professor in 1958. He served as professor and head of the Department of Plant Pathology at Kansas State University and later as chairman of Plant Pathology at Washington State University, where his father "Ed" Schafer had served as chairman of the Agronomy Department. Jack and Ed became the only father-son combination ever to serve as department chairs in the history of Washington State. A well-known and highly respected cereal pathologist, Dr. Schafer joined the faculty of the Department at Minnesota in 1982 as supervisor of the USDA's Cereal Rust Laboratory. Dr. Schafer retired from Minnesota in 1987 and he and Joyce now reside in California.

#### **Wiley Garrett—1981**

A native of Kosse Texas, Wiley Garrett received the Ph.D. in Plant Pathology (1962) from Minnesota. He worked on the asexual production of new races of *Puccinia graminis* f. sp. *tritici* under the guidance of J.J. Christensen and Helen Hart. Prior to coming to Minnesota he graduated from Texas A&M University where he had played football for future coaching icon, Paul "Bear" Bryant. Dr. Garrett's entire 34-year career was spent at the University of Georgia, as an extension plant pathologist and department head. He headed the

Department of Plant Pathology and Genetics from 1970 through 1996. Dr. Garrett and his wife Diane reside in Athens, Georgia.

#### Carol Windels—1999

A native of Long Prairie Minnesota, Carol Windels (Schrenk) received the Ph.D. in Plant Pathology (1980) from Minnesota. Dr. Windels worked on the biological control of pea root rot by seed treatment with *Penicillium oxalicum* under the guidance of Thor Kommedahl. In 1984 she joined the faculty of Plant Pathology as an assistant professor at the Northwest Experiment Station

in Crookston Minnesota.

Dr. Windels is a specialist in soil borne fungi and in the taxonomy of the genus *Fusarium*, and works closely with the sugar beet industry in the Red River Valley region of Minnesota and the Dakotas. She is renowned for her professional service contributions to the American Phytopathological Society and other professional societies. Dr. Windels assumes her APS Presidency in 1999 and joins Helen Hart as the second woman alumnus of Minnesota to become an APS president.

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## MESSAGE FROM THE HEAD

Dear Friends of the Department:

This past year has been interesting, challenging, and rewarding for the department. Let me share with you what I mean.

First, there has been a change in department headship. Dr. Neil Anderson decided that he wanted to release the headship responsibilities and resume his research and teaching activities. Neil plans to join the ranks of Emeritus Professor at the close of the academic year. He has several interesting research projects that he plans to bring to closure. He is actively working on projects such as biocontrol of potato scab, evaluation of potato breeding lines with potential resistance to verticillium wilt and screening Aspen for resistance to hypoxylon canker. Neil will resume teaching mycology in partnership with Dr. Jim Groth and Dr. Jim Percich. The department extends its appreciation to Neil for the leadership and service he provided over the past 3 years.

The search for Neil's successor was internal and after several months from application through the interview process, I was offered and pleased to accept the position of head. I consider it an honor to serve the department, college and University in this capacity. My new duties officially began July 1, 1997. Let me take this opportunity to share with you my background and responsibilities as a faculty member of the department. I received my Ph.D. degree from Oregon State University in 1972. I then accepted a position with ARS-USDA Plant Pathologist in the Regional Plant Introduction Station at Cornell University. In 1974, I accepted an Assistant Professor position in Plant Pathology at the University of Minnesota. My research and extension

work has been in the areas of vegetable and floriculture pathology and arbuscular mycorrhizal fungi. I have had a long-standing battle with common root rot (*Aphanomyces euteiches*) on peas grown for processing. This work includes cooperative breeding efforts with Horticulture for selection and identification of plant disease resistance, fungicide seed treatments, cultural management practices such as soil compaction and its influence on disease development and soil incorporation of oat plants in the fall that results in suppression of root rot. Control of this disease certainly represents a major challenge and it seems the pathogen is well equipped to continue to elude our efforts to provide effective control. The mycorrhizal research that I have been involved with includes the interaction of these symbionts on roots of soybean and corn in various crop rotations with sustainable agriculture in mind. Additionally, I am studying the importance of these fungi in restoration ecology of severely disturbed sites for example, mine tailings in northern Minnesota.

On August 20, the department had a wonderful birthday party for Dr. Carl Eide. There was standing room only as the group enthusiastically joined in celebration of Carl's 93rd birthday. We started the party in the morning with cake and all the trimmings honoring Carl and Johanna and son Charles along with friends, graduate students and staff joining in the gala affair. Dr. Eide expressed his appreciation as he wrote "A thousand

thanks for the wonderful party. It was the best I ever had and probably the best I ever shall have, although I am optimistic and shall be looking forward to August 20, 1998". Dr. Eide's message should serve as an inspiration to all of us.

Good news—we plan to have two new assistant professors in the department in 1998. We have been given permission to hire a potato pathologist and a turf grass pathologist. The search committees for both positions will be meeting soon to put the finishing touches on the position descriptions and to initiate the search process. This is, of course, very good news and represents what I hope is a turn around from the retrenchment mode that we have experienced for several years. It will be good to see new faces and be apart of the excitement that these young faculty members will bring into the department.

The faculty continues to be very active in research, teaching and extension. Traditional sources of funding for the University continue to shrink, and retrenchment has caused faculty to seek external sources for funding their programs. The faculty has responded to this challenge. In fact, approximately 75% of our research funding come from external sources and from endowment funds. The success of the faculty to secure grant funds was also reflected in publications in 1996 as 47 referred articles, 40, abstracts, 8 book chapters, 1 book, over 70 extension papers were published and 6 patents issued. We continue to make adjustments in our teaching program as we move to semesters beginning the fall of 1999. Members of the teaching committee as well as other faculty have been working over time to make sure all the necessary changes are reflected in graduate level courses. We are now in the process of identifying faculty who will teach these courses once semesters are in place. Several retreats were organized by the Education Committee to facilitate active discussion by the faculty to address all the issues that arise from such major changes in our graduate curriculum. Moreover, conversion to semesters has presented an opportunity for our faculty to negotiate with other departments on offering plant pathology courses to students in various undergraduate majors. I am pleased to say that we were successful and now certain plant pathology courses are an integral part of several majors and in some cases are required. The extension faculty continues to be very active with their extension and applied research programs. Their programs are excellent and are highly visible throughout the state and region. Diseases of high profile include soybean cyst nematode, white mold on

soybean, wheat and barley *Fusarium* head blight, *Aphanomyces* on sugar beet, potato scab, and blight, white mold and root rot on dry and snap beans.

I would like to share with you some highlights of faculty involvement over the past year. Dr. Carol Windels will assume the responsibilities of President of APS in 1999. She somehow continues to find time to carry on a very active research program even with her additional society activities. Dr. Nyvall continues his duties as editor of *Phytopathology News* and has agreed to an additional 3-year term of duty. Even Bob wonders how in the world did he agree to another 3 years as editor. I certainly have enjoyed reading Bob's editorial column. He writes with feeling and describes situations that we all can relate to. He is working on the 3rd edition of his book *Field Crop Diseases* that should be published in early 1999. Kurt Leonard was invited to present a paper on stem rust at the APS meetings in Rochester, New York. He is Editor-in-Chief of the APS Press and participated in meetings with APS Council, APS Financial Advisory Committee and APS Publication Board. In late August, he traveled to Mexico to participate in the North American Cereal Rust Workshop at CIMMT. Kurt and Don McVey were successful in obtaining a US-Egypt Science and Technology Joint Fund, Agricultural Technology Utilization and Transfer grant to fund research on diversity of virulence in the U. S. and Egyptian populations of *Puccinia recondita* f. sp. *tritici* and genetics of resistance to leaf rust in wheat. Dr. Chet Mirocha attended the International Symposium of *Fusarium* held in Szeged, Hungary. He presented a paper on the chemistry and physiology of *Fusarium* head blight in wheat and barley. Also, he was invited to present several lectures in the Polish Academy of Science and the Food Institute of the University. Dr. Ruth Dill-Macky attended the same meeting and presented a paper authored with Dr. Roger Jones on the effect of previous crops and tillage on *Fusarium* head blight of wheat. Ruth went on to visit several scientists in Austria who are conducting research on *Fusarium* head blight. *Fusarium* head blight continues to cause devastating losses to growers in Minnesota and the Dakotas. This disease is why Dr. Bill Bushnell will shift a part of his research from rusts and powdery mildew to *Fusarium* head blight in response to the serious problems with this disease. Dr. Nevin Young maintains a highly visible research program and either he or persons in his laboratory have attended numerous meetings related to biotechnology and disease control. A Ph.D. student of Nevin's, Dr. Vergel Concibido recently accepted a position with

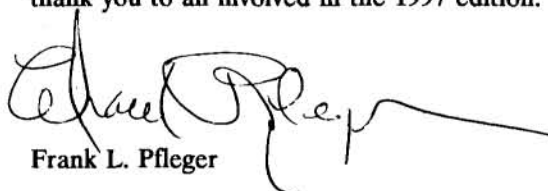
Monsanto as Project Leader for Soybean Breeding. Dr. Ward Stienstra is part of a new regional Soybean Cyst Nematode education program funded by the North Central Soybean Research Program. Twelve Midwestern land grant universities and Canada will work with seed companies, chemical firms, farm media, co-ops, private consultants and local elevators to increase the awareness of this serious disease. Dr. Deborah Savaş is actively working cooperatively with scientists at Monsanto to produce high value products in transgenic alfalfa. She presented a poster on developing transgenic alfalfa plants with delayed leaf senescence and improved disease resistance held in Colorado. She continues her work with Minnesota Agri-Power in development of alfalfa varieties for biomass production for use in generating electricity. Dr. Linda Kinkel, who always welcomes a challenge, found one when she co-taught an undergraduate Agricultural Honors course with Dr. Deborah Allan in the Department of Soil, Water, and Climate titled Women in Science. She says that the students (16 women and 2 men) were highly motivated and that she learned a lot and had fun teaching this new audience. The interactions and activities described above represents only a portion of our faculty; there is not time or space to include activities of all the departmental faculty. What is presented certainly provides you with an overview of the diversity of some of the departmental activities and programs.

We have had several faculty changes this year. Dr. Earnest Banttari retired after an extremely productive and successful career. Since we were not able to replace this position, Dr. Benham Lockhart has agreed to pickup Ernie's virology research and teaching responsibilities. Ernie continues to be active in the department, as he wants to bring closure to several projects and to finalize manuscripts for submission. Also, Dr. Chet Mirocha retired on September 30, 1997. Chet also has enjoyed a highly productive and successful career. He plans to continue his mycotoxin research on *Fusarium* head blight on wheat and barley via a 2 year grant from the Minnesota Wheat Research and Promotion Council and the Minnesota Association of Wheat Growers. There is no doubt, both Ernie and Chet have had a very positive impact on the department and we sincerely thank them for their many contributions.

Our graduate student numbers are down, but the quality remains high. The current group of students is highly motivated, energetic and actively engage faculty in lively discussion. They continue to organize and coordinate a yearly symposium that is sponsored by the department and they host a Friday happy hour several

times throughout the academic year. I am sorry to report that they continue to dominate the Stakman Softball Game and true to form, again this year managed to squeak out another victory by the score of 18 to 4. The faculty has no trouble hitting the ball we just can't run. Just wait until next year as we will have two new and younger faculty members then when I write this letter for the next *Aurora* the outcome will be different (hopefully, maybe, well, ok probably not).

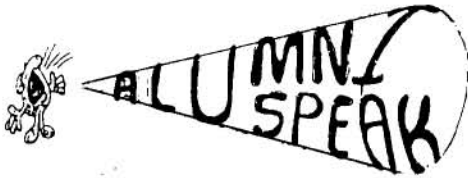
As I finish this letter to you, I would like to express our sincere appreciation for all the moral and financial support that all of our alumni and friends has extended to the department over the years. The department is truly fortunate to have so many loyal supporters who really care about the department and its programs. Be assured we will continue to provide high quality research, teaching and extension programs for our students and for the people we serve. Please remember you are always welcome and by all means, if you are in the area stop by and see us. The lights are on, there is coffee in the pot and we would be delighted to see you anytime. We appreciate the efforts of Dr. Richard Zeyen who again is the editor of *Aurora Sporealis* and I extend a hearty thank you to all involved in the 1997 edition.



Frank L. Pflieger







# ALUMNI SPEAK

by Richard J. Zeyen

Alumni speak is a column devoted to news and views from alumni as told directly to us. We are interested in what you are doing, advice you might have for today's students, and favored reminiscences. All alumni are invited to drop us a line (see envelope enclosed) or push some pixels our way <alumnis-plpa@puccini.crl.umn.edu>. We are especially interested in alumni from the following decades. Don't delay, have your say, write or push some pixels our way!

YEAR AND STUDENT	DEGREE	ADVISOR	YEAR AND STUDENT	DEGREE	ADVISOR
<b>1996</b>			John H. Hill	MS	Hart
Wendy Jo White	MS	Blanchette	Mengistu Hulluka	MS	J.J. Christensen
Kasia M. Duellman	MS	Meronuck	Bobbie Lee Keeling	PhD	Banttari
Dennis N. McDouball	MS	Blanchette	M.J. Kenney	MS	Eide
Kuo-Chih Lin	PhD	Bushnell	Kenneth T. Leath	MS	Rowell
Bruce E. Paulsrud	MS	N.A. Anderson	Kenneth T. Leath	PhD	Rowell
Bruna Bucciarelli	PhD	N.A. Anderson	Clark H. Livingston	PhD	Eide
Junping Chen	PhD	Mirocha	Luis C. Lopez-Frias	PhD	C.M. Christensen
Miriam Newton	MS	Kinkel,Leonard	Robert F. Nyvall	MS	Kommedahl
Akhilesh N. Mishra	PhD	Roelfs	Mahesh M. Pandey	MS	Wilcoxson
Dionicio Alvarado-Rosales	PhD	Blanchette	Paul D. Rick	MS	Mirocha
<b>1986</b>			Eugene E. Saari	PhD	Kernkamp
Therese Atcham	PhD	Banttari	Meria Bogin Silberman	MS	Sudia
Adalberto M. Barreras	MS	Roelfs	Mark A. Smith	MS	Hart
Peter J. Bedker	PhD	Blanchette	Gilbert F. Stallknecht	MS	Calpouzos
Mohammed Boulif	PhD	Wilcoxson	Ming-hsien Sun	MS	Kommedahl
Brahim Ezzahiri	PhD	Roelfs	<b>1956</b>		
In-Sung Hoang	PhD	Teng,Reolfs	Julio Bird	PhD	King
David R. Johnson	MS	Rothman	Robert F. Drescher	PhD	C.M. Christensen
Kenneth B. Johnson	PhD	Teng	George C. Failes	MS	Kernkamp, DeVay
David A. Ross McQueen	PhD	N.A. Anderson	Eugene B. Hayden, Jr.	PhD	Stakman
Nora S. Plesofsky-Vig	PhD	Brambl	Elmer J. Hawn	PhD	Kernkamp
Frisby Davis Smith III	MS	Banttari	Kenneth Knutson	MS	Eide
<b>1976</b>			P. Narayanan Nair	PhD	J.J. Christensen
Jon D. Jeresek	MS	French	Charles R. Olien	PhD	Rowell,Hart
John A. Laurence	PhD	Wood,Kennedy	Kishun D. Paharia	PhD	J.J. Christensen
Gusti Sarbini	MS	Kommedahl	Manuel Rojas-Garciduenas	MS	Kommedahl
Bent Skovmand	PhD	Wilcoxson	Joaquim C. Santiago	PhD	Hart
Gloria M. Warner	PhD	French	Charles L. Schneider	PhD	J.J. Christensen
<b>1966</b>			Sheodhan Singh	PhD	J.J. Christensen
George E. Ahlgren	PhD	Sudia	John F. Tuite	PhD	C.M. Christensen
Kenneth E. Bohnenblust	PhD	Eide	<b>1946</b>		
Sister M. Stephana Choong	MS-B	Linck	Mohan Lal Gattani	PhD	Stakman
John E. Cross	PhD	Kennedy	Nancy Ju Shen Hsu	MS	Stakman,Eide
Charles E. Dorworth	PhD	C.M. Christensen	Martha A. Kotila	MS	Eide,Stakman
John Dueck	MS	Bushnell,Rowell	C. Benjamin Ortega	MS	Stakman,Eide
Leslie H. Fuchigami	MS	Kernkamp	Leonel Hildebrando Robles	MS	J.J.Christensen
			Morris N. Teller	MS	Stakman
			Coyt T. Wilson	PhD	Stakman(?)

# OLD TIMER NEWS

## (Alumni Speak)

**Virgil L. Jons** (MS 1975) brings greetings from the land of high waters. "What a year! We had record snow fall (119 inches), record blizzards, destructive ice storms, and are now having record floods. I have lived in the fertile Red River Valley (Moorhead) for the past 20 years. I worked for APHIS/USDA for two years and the rest as a private self employed agricultural consultant. My clients grow wheat, sugarbeets, field corn, barley, soybeans, sunflowers, alfalfa, crambe, and edible beans. This area is one of the most fertile dryland, agricultural regions of the world and one of the most challenging. The summer of 1993 was one of the coldest and wettest, and now 1997's snow and floods. Aerial views of spring flooding reminds us that we live in the bottom of the old glacial lake Agassiz which stretched from the South Dakota border northward into Canada."

"I have many good memories from the days on the St. Paul campus. Afternoon and evening seminars and lively discussions in the coffee room with the likes of Drs. Stakman and Eide were highlights. There have been many changes in agriculture the past 20 years. Exciting advances in biotechnology to enhance pest resistance, new environmentally friendly low rate pesticides, the use of satellites and computers to guide the applications of fertilizers and farm chemicals, the fine tuning of integrated pest management, and the dissemination of information on the Internet have all changed farming in a very short time."

"What an exciting time to be in agriculture! What an exciting and opportunistic time to be a student. We are motivated by the increasing power of technology, science, and research. We are challenged to grow food for an expanding population. At the same time we are humbled by the incredible and awesome power of nature."

**Edward A. Andrews** (MS 1943, Ph.D. 1953 — advisers Stakman and J.J. Christensen).

The news concerning Ed Andrews was E-mailed by his son, Bruce Andrews. We share with you excerpts from Bruce's communication. "Greetings from Wyoming! My name is Bruce L. Andrews. I am Ed's son and one of the 'Hatcher Hall' progeny. My father-in-law, Richard S. Davidson recently had you send a copy of last year's *Aurora Sporealis* — the one that had the write up about Norm Borlaug. I grew up hearing stories about how kind he (Norm) was to Dad when practicing some wrestling together. I have also heard the names 'Stake', C.M. Christensen, Chen and the like since I was young. I have

often envied experiencing such a 'graduate school family'. Such a combination of learning and nurturing are to be cherished."

Bruce goes on to say that Ed is now 88 and living in Sheridan, Wyoming close to his family. Ed is as healthy as his years allow. Ed taught for 20 years (1955-1975) in the Plant Science Department at the University of Wyoming and also worked in South America. He made trips for FAO, the United Nations and USAID to Ecuador and Uruguay where he was reunited with another old timer Constancio Lazaro. After retirement Ed and his wife moved to Milwaukee where Ed worked part time and finished his work years at the Performing Arts Center at age 80. Ed enjoys beautiful voices and by working at the Performing Arts Center could listen to practices by Beverly Sills and other great stars. In 1988 Ed and his wife moved back to Sheridan, Wyoming to be near his son's family. Ed remains an avid Green Bay Packer fan. He sends his greeting to all Plant Pathology 'Old Timers' and wishes us well.

**Howard L. Bissonnette** (MS 1958; PhD 1964) says plans are being made for the 4th "Pea Pickers Convention". We have had 3 conventions at Haines City, Florida. The convention is held the last week in February. Annual meeting members are **Ted Reiling** (PhD 1957) (retired Green Giant), **Bill Haglund** (MS 1958; PhD 1960) (retired University of Washington), **Howard Bissonnette** (retired University of Minnesota) and wives. "We do not have too many papers but a lot of 'old' presentations are brought up." For registration etc.—contact: Howard Bissonnette, 2122 St. Andrews Blvd., Panama City, FL 32405.



Left to Right: Howard Bissonnette, Lois Reiling, Jean Haglund, Ted Reiling, and Bill Haglund. Behind the camera—Karwyn Bissonnette.

**Kuo-Chih Lin (K.C.)**, who received a PhD in 1996 under the direction of Bill Bushnell, spent a year in the laboratory of Pete Lindgren, North Carolina State University, working on genes for calcium binding protein, thought to have a role in the hypersensitive resistance. Currently he works with David Byrd, also at NC State, on genes specific for giant cell formation in tomato in response to the tomato cyst nematode. In October, K.C. will start in a permanent position at the Taiwan Sugar Research Institute as an Assistant Research Scientist. This is in the city of T'ainan, in southern Taiwan, not far from the home of K.C.'s wife, Sandy, in Kaohsiung. K.C. and Sandy have a son, Justin, born in April, 1997.

**Beth E. Hazen (MS 1981)** owns Willows End, a desktop publishing and design company in Cortland, NY and specializes in scientific editing and writing. She edits English manuscripts for the *Annals of the Phytopathological Society of Japan*, as well as teaches scientific writing and editing. Beth received her MS under the direction of Dr. W. Bushnell at the Cereal Rust Lab and a PhD with Dr. J. Aist at Cornell University.

**Cecilia Jones (MS 1994 with Deborah Samac)** has recently started a PhD program at the University of California—Davis with Ariena Van Bruggen in the area of biological control of plant disease. Cecilia worked the past three years as a member of the faculty of Agronomy in Paysandu, Uruguay where she instructed students and conducted research, including a survey of plant parasitic nematodes in Uruguay.

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## MINNESOTA'S GREAT TENURE DEBATE

by Richard J. Zeyen

The University of Minnesota attracted unwanted national and international attention during its recent, grueling "tenure debate". Many friends and alumni have been concerned by what they've read and heard about the debate. So numerous have been the questions that we decided to briefly chronicle the debate, the accompanying turmoil, and to relay the resolution of "Minnesota's Great Tenure Debate".

Aspects of the "Great Minnesota Tenure Debate" were featured in dozens of newspapers, magazines, scientific journals and were addressed by many professional organizations. Because of its importance to research universities and higher education in general, aspects were covered by the *New York Times*, the *Washington Post*, the *Chronicle of Higher Education*, the *American Association of University Professors*, and the *American Association for the Advancement of Science* among others. It was also a hot topic on the Internet, and between serious legal scholars. The debate and turmoil surrounding it resulted in numerous resolutions of support for Minnesota's faculty from other universities across the United States and internationally. It seemed like everyone weighed in with an opinion(s). What factors precipitated the uproar? Why did the University of Minnesota, a normally placid institution, attract so much attention?

The uproar stemmed directly from the economics of managing a large research institution. This was coupled with a misunderstanding of the necessity for freedom of inquiry which is the backbone of a research university. In retrospect most would agree that the genesis of the

debate began with financial problems in the University's Academic Health Center (AHC). The AHC was highly dependent on revenues from the University's Hospital. The popularity of Health Maintenance Organizations (HMO's) and resultant managed-care economics of HMO's led to a drastic decline in AHC patients, and in a dramatic decline in the University Hospital's and AHC's revenues.

AHC's revenues had not only maintained the University Hospital but also paid for many of its tenured faculty and staff. Thus, the AHC had become a severe and chronic financial drain on the University. Because many of the clinical positions in the AHC were tenured, a rapid downsizing of the AHC was not an option. The University's Board of Regents seized this issue as central to changing the existing tenure code, which they believed would help resolve the AHC dilemma.

The Board of Regents hired the Washington law firm of Hogan and Hartson to draft a new tenure code. The first draft of this code made it easier to lay off tenured faculty, to cut their salaries, or to discipline them for not maintaining a "proper attitude of industry and cooperation." This and other language in the Hogan-Hartson draft struck at the heart of free inquiry, freely

pursued; *i.e.* the time-honored right to academic freedom which has existed in western universities for 350 years. Academic freedom is prized above all other things by university faculty members everywhere. In addition, the University's faculty senate had already put forward a new tenure code to the Regents. Many faculty saw the Hogan-Hartson draft code as a repudiation of their efforts and a breach of faith.

Factors in addition to the AHC's financial woes, and the lack of faculty trust in the Board of Regents, served to increase the range and fury of the debate. Decades of decreased state funding, internal budget cuts and "reallocations", rise in the number of administrative positions within the University, rising tuition rates, lack of legally mandatory retirement, low faculty salaries, and post-tenure review processes mixed into and fueled the debate. Lurking in the background was the public perception that tenure with academic freedom is simply a lifetime guarantee of employment regardless of performance. Lost was the fact that many tenured faculty are subjected to annual performance reviews and that the existing tenure code included removal of "deadwood" provisions.

When the Hogan-Hartson draft tenure code was examined in detail, scholars throughout the nation responded. Historians reminded the Board of Regents that the University of Minnesota had a checkered and unsavory history relative to academic freedom, especially in the early 1900's and 1950's. Others said that if the language of the Hogan-Hartson draft was incorporated into a new tenure code that there would be severe long-term consequences for the University of Minnesota. Minnesota would cease to be a high quality research institution. They argued that research would be stifled, only "safe" or "politically correct" research would be conducted because faculty engaged in unpopular research could be intimidated, harassed and fired. Attracting and keeping quality faculty under these circumstances would be very difficult. In addition, some faculty from other universities had warned their graduates not to consider the University of Minnesota as a place for a career.

While faculty and some administration, including University President Nils Hasselmo, searched for ways to relay their objections to the harsh wording and implications of the draft Hogan-Hartson tenure code, the Board of Regents pushed for adoption. To make an economic argument, faculty pointed out that only 11 % of University employees held tenured positions and that their salaries accounted for only 13% of the University's total budget. In addition they pointed out that faculty

annually brought in about 300 million dollars of research support through grants and contracts, most of which financed students and technical help in the University. They argued that research support dollars they brought in could be jeopardized if faculty and staff lacked adequate freedom of inquiry. The Board of Regents seemed unfazed by these arguments and concerns. The rhetoric flew on all sides and the "debate" became white hot when a member of the Board was quoted as stating that they were not interested in learning about history but rather in "making history". At this point the faculty responded.

The faculty response took the form of a legal maneuver. Wide-spread faculty support, including most Regent's Professors, was mustered to call for a collective bargaining vote, and this call was approved. According to Minnesota law, once the faculty agreed to take a vote on collective bargaining the conditions of their employment could not be altered, until after the vote was taken. Essentially, faculty "froze" adoption of the Hogan-Hartson draft tenure code. They bought time for further debate which they hoped would lead to a resolution of the problem. However, this maneuver fueled yet another debate, whether to vote in collective bargaining (unionize the faculty). Thus, a new chapter in the "Great Minnesota Tenure Debate" began.

The prospect of an impending collective bargaining vote by faculty of the Twin Cities campuses was sobering. Old wounds were opened and long-standing grievances were introduced into the debate. Faculty opposed to collective bargaining argued that although the situation was grave, collective bargaining might make things worse by imposing yet another level of bureaucracy between faculty and the Regents. They argued that collegial-governance of the University might be destroyed by collective bargaining. Faculty in favor of collective bargaining argued that the Board of Regents had proven untrustworthy and that collegial-governance of the University was a concept of the past. Furthermore they pointed to the fact that faculty salaries had declined for decades and were now at the very bottom of the top 30 research universities in the nation.

As the pros and cons of collective bargaining were being debated, the Board of Regents began to entertain the possibility of changes in their Hogan-Hartson draft tenure code. Dean Sullivan of the University Law School proposed yet another version of a potential tenure code, whose language was remarkably like that of other Big Ten Universities tenure codes. This "Sullivan Compromise" stimulated discussion, as all concerned

looked for a way to end the hostile rhetoric surrounding the debate. Meanwhile, the Regents began formalizing an agreement by which the AHC would partner with the private sector's Fairview Hospitals. This partnership would create a "Fairview-University Hospital" and relieve the financial pressures by moving many university employees into this private sector partnership.

Other events added to the tension and turmoil surrounding the issues. Simultaneously with the debate, faculty and administration were busy converting the University from a quarter-based system to a semester-based system. A series of scandals and law suits emanating from mismanagement charges against areas of the Medical School added to the gloomy atmosphere.

As the collective bargaining election date drew near a number of behind-the-scenes events took place. Some members of the Board of Regents announced their resignations. There was evidence that the Minnesota State Legislature would review the process by which University Regents are selected and appointed. A new University of Minnesota President, Mark Yudof from the University of Texas at Austin, was hired. Then, the University of Minnesota Law School, independent of the rest of the University, adopted the "Sullivan Compromise" tenure code. What followed was a statement by the Board of Regents indicating that the "Sullivan Compromise" code could form the basis of a University-wide code.

On February 11 and 12 of 1997 the faculty of the University of Minnesota Twin Cities campuses voted on the collective bargaining issue. The election was conducted by the Bureau of Mediation Services. A total of 1,358 out of 1,595 eligible faculty voted. The vote required a simple majority and was very close, 692 against and 666 in favor. Following the vote, University of Minnesota Board of Regents Chair Tom Reagan was quoted as stating: "I hope we can build from the strong foundation of shared governance, incorporate the lessons we have learned over the last six months and bring our university to a new level of greatness. I look forward to working with our new president, with his administration and the traditional faculty governance structure to prepare our university for the 21st century."

In the spring of 1997 a new University of Minnesota tenure code, very closely aligned with those used by other Big Ten Universities like Michigan State and Purdue, was adopted. The new code defends academic freedom and has provisions allowing better financial management and control. With a huge sigh of relief from all concerned the "Great Minnesota Tenure Debate" ended.

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"Drama often obscures the real issues."

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## University of Minnesota Facts

### Higher Education Rules!

For a state with 4.7 million people, Minnesota has an abundance of institutions of higher learning. Minnesota has 107 colleges and universities within its borders. Sixty six of these are public supported, the remainder are privately supported. The state also has 79 vocational institutions.

### Many Students!

Minnesota-Twin Cities campuses have the second largest student enrollment in the United States. The five largest are the Community College of the Air Force (69,611), University of Minnesota-Twin Cities (51,445), Ohio State University - main campus (48,676), University of Texas at Austin (47,905) and Miami-Dade Community College (47,060).

### Alumni Support

The University of Minnesota ranked 12 th among all institutions of higher learning in the United States in fund raising, and fifth among public supported institutions in 1996. Stanford ranked number one and Ohio State number twenty.

### U of MN the Oldest in State?

Minnesotans disagree over which is the oldest higher education institution in the State. The University of Minnesota - Twin Cities was chartered in 1851 but did not admit freshman until 1869. Hamline University was chartered in 1854 and began classes in Red Wing that same year.

# THE FACULTY OF THE 90'S

by Richard J. Zeyen

In the past decade there have been many changes in the composition of the department's faculty. The faculty of the 1990's are truly as diverse and talented as we have ever had at Minnesota. By way of introduction to friends and alumni, each faculty member prepared a short statement of their research interests and provided two or three relevant publications.

## State-Supported Faculty

**Neil A. Anderson**, Professor and former Department Head, Genetics of Plant Pathogens, Ph.D. 1960, University of Minnesota. E-mail address: neila@puccini.crl.umn.edu



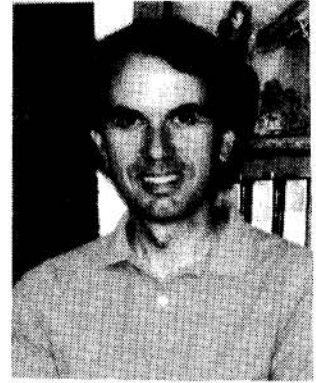
Our laboratory personnel are involved in an interdisciplinary study on biological control of soil-borne plant pathogens.

Cooperators in this project are Dr. Janet Schottel, biochemistry, and Dr. Linda Kinkel, plant pathology. We also have forest resource studies on mycorrhizal genetics and resistance in aspen to Hypoxylon canker. Collaborators in this research are Dr. Glenn Furnier, forest resources, and Dr. Mike Ostry, USDA Forest Service. As a member of the Minnesota Potato Breeding Project, I help develop cultivars with resistance to late blight, scab, and Verticillium wilt diseases.

### Sample Publications:

- Bowers, J. H., Kinkel, L. L., Jones, R. K., and Anderson, N. A. 1996. Influence of disease suppressive strains of *Streptomyces* on the native *Streptomyces* community in soil as determined by the analysis of cellular fatty acids. *Can. J. Microbiol.* 42:27-37.
- Hoyos, G. P., Zambino, P. J., and Anderson, N. A. 1991. An assay to quantify vascular colonization of potato by *Verticillium dahliae*. *Am. Potato J.* 68:727-742.
- Doudrick, R. L., Furnier, G. R., and Anderson, N. A. 1990. The number and distribution of incompatibility alleles in *Laccaria laccata* var. *moelleri* (Agaricales). *Phytopathology* 80:869-872.

**Robert A. Blanchette**, Professor, Forest Pathology; Deterioration of Wood Products, Ph.D. 1978, Washington State University. E-mail address: robertb@puccini.crl.umn.edu



My major interests are in the area of forest pathology with research in tree defense mechanisms, microbial degradation of wood, biotechnological uses of forest fungi, biological control of forest pathogens, and the conservation of archaeological wood and wood of historic value. Projects involve novel, interdisciplinary approaches to solving tree disease problems and understanding biodegradation processes.

### Sample Publications:

- Blanchette, R. A. 1995. Degradation of the lignocellulose complex in wood. *Can. J. Bot.* 73:999-1010.
- Behrendt, C. J., Blanchette, R. A., and Farrell, R. L. 1995. Biological control of blue-stain fungi in wood. *Phytopathology* 85:92-97.
- Zimmerman, W. C., Blanchette, R. A., Burnes, T. A., and Farrell, R. L. 1995. Melanin and perithecial development in *Ophiostoma piliferum*. *Mycologia* 87:857-863.

**Senyu Chen**, Assistant Professor, Southern Experiment Station, Waseca, Nematology, Ph.D. 1994, University of Florida. E-mail address: chenx099@gold.tc.umn.edu



My research interests include the biology, ecology, and management of plant-parasitic nematodes. Current research focuses on

the biology and management of the soybean cyst nematode (SCN). Research projects involve determining life cycle, population dynamics, and race composition of the soybean cyst nematode in southern Minnesota; optimizing crop rotation schemes for SCN management; evaluating soybean cultivars for SCN-resistance; and investigating biological control of the nematode.

#### Sample Publications:

- Chen, S., and Dickson, D. W. 1996. Fungal penetration of the cyst wall of *Heterodera glycines*. *Phytopathology* 86:319-327.
- Chen, S., Dickson, D. W., and Mitchell, D. J. 1996. Population development of *Heterodera glycines* in response to mycoflora in soil from Florida. *Biol. Contr.* 6:226-231.

**Ruth Dill-Macky**, Assistant Professor, Small Grains Pathology, Ph.D. 1993, The University of Queensland, Australia. E-mail address: ruthdm@puccini.crl.umn.edu



My research focuses on the management of diseases of barley, wheat, and oats. My principal interests include: studies of plant disease losses, epidemiology and the effects of the environment, and cultural practices on disease development. At present, significant efforts are being directed toward Fusarium Head Blight of both wheat and barley and the smut diseases of oats. We collaborate closely with the scientists in small grain breeding programs in developing strategies for the management of plant disease through the deployment of host resistance.

#### Sample Publications:

- Dill-Macky, R., and Roelfs, A. P. 1994. Stand density effect on the development of *Puccinia graminis* f. sp. *tritici* — QCCJ in barley (*Hordeum vulgare*). *Phytopathology* 84:1139.
- Dill-Macky, R., Rees, R. G., and Boyd, W. R. J. 1992. Sources of resistance to *Puccinia graminis* in barley. *Plant Dis.* 76:212.
- Dill-Macky, R., and Rees, R. G. 1991. Inoculum pressure and the development of stem rust epidemics in barley. *Aust. J. Agric. Res.* 42:769-777.

**James V. Groth**, Professor, Population Genetics of Plant Pathogens, Ph.D. 1974, University of British Columbia, Canada. E-mail address: jamesg@puccini.crl.umn.edu

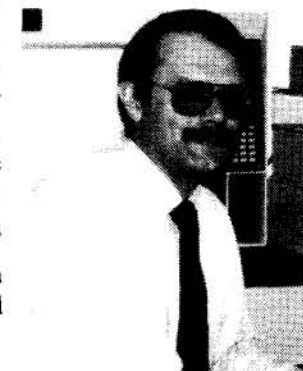


I use the bean rust fungus as a model organism to better understand the population/ecological genetics of plant pathogenic fungi; it can be readily crossed or selfed and it has high levels of variation in the field. Virulence and isozymes have traditionally been used to describe diversity. More recently, DNA markers (RFLPSs and RAPDs) are proving to be useful phenotypically and genetically. These markers are used descriptively and ultimately, to reveal the underlying forces determining variation. Experimental greenhouse studies, often involving genetic manipulation, are also featured. In cooperation with plant breeders, I also have a long-term involvement in resistance breeding to common rust of processing sweet corn and, most recently, to head scab of wheat.

#### Sample Publications:

- Martinez, J. P., Groth, J. V., and Young, N. D. 1996. Non-Mendelian and skewed segregation of DNA markers in wide crosses of the bean rust fungus, *Uromyces appendiculatus*. *Curr. Genet.* 29:159-167.
- Gingera, G. R., Davis, D. W., and Groth, J. V. 1995. Identification and inheritance of delayed first pustule appearance to common leaf rust in sweet corn. *J. Am. Soc. Hort. Sci.* 120:667-672.
- Groth, J. V., McCain, J. W., and Roelfs, A. P. 1995. Virulence and isozyme diversity of sexual vs. asexual collections of *Uromyces appendiculatus* (bean rust fungus). *Heredity* 75:234-242.

**Roger K. Jones**, Associate Professor, Minnesota Extension Service, Diseases of Small Grains, Sugar Beets, and Potatoes, Ph.D. 1980, North Carolina State University. E-mail address: rogerj@puccini.crl.umn.edu



I work primarily with small grain, sugar beet, and potato growers. My

responsibilities include the development of educational programs and recommendations that integrate the genetic, chemical, and cultural control tactics into profitable but environmentally sound production strategies.

#### Sample Publications:

Milus, E. A., Rothrock, C. S., Lorince, T., and Jones, R. K. 1995. Ecology of seedborne *Pantoea agglomerans* and *Enterobacter agglomerans* on wheat. in: Proceedings 6th International Symposium on Microbiology of Aerial Plant Surfaces, Bandol, France. 88 pp.

Jones, R. K. 1994. Understanding head scab epidemics in wheat. Pages 88-89 in: Proceedings of the 14th Annual Crop Pest Management Short Course, November 15-16, University of Minnesota Extension Service.

Johnk, J. S., and Jones, R. K. 1994. Comparison of whole-cell fatty acid compositions in intraspecific groups of *Rhizoctonia solani* AG-1. *Phytopathology* 84:271-275.

**Linda L. Kinkel**, Associate Professor, Epidemiology and Microbial Ecology, Ph.D. 1988, University of Wisconsin, Madison. E-mail address: lindak@puccini.crl.umn.edu



In my lab, we investigate the ecology of microbes on plant surfaces, including both leaves and roots. Specifically, I am interested in the relative importance of different mechanisms of interaction (for example, competition for resources, antibiotic production, and parasitism) in microbial community dynamics on plants. I am involved in collaborative research with Dr. Neil Anderson on the biological control of potato scab using antibiotic-producing soil bacteria. Overall, our goal is to use information on microbial ecology to enhance the sustainability of agricultural systems through strategies such as biological control.

#### Sample Publications:

Bowers, J. H., Kinkel, L. L., Jones, R. K., and Anderson, N. A. 1996. Influence of disease suppressive strains of *Streptomyces* on the native *Streptomyces* community in soil as determined by the analysis of

cellular fatty acids. *Can. J. Microbiol.* 42:27-37.

Jacques, M. A., Kinkel, L. L., and Morris, C. E. 1995. Population sizes, immigration and growth of epiphytic bacteria on leaves of different ages and positions of field-grown *Cichorium endivia* var. *latifolia*. *Appl. Environ. Microbiol.* 61:899-906.

Kinkel, L. L., Wilson, M., and Lindow, S. E. 1995. Effect of sampling scale on the assessment of epiphytic populations. *Microbial Ecol.* 29:283-297.

**Sagar V. Krupa**, Professor, Effects of Air Pollutants and Global Climate Change on Plants, Fil. Dr. 1971, University of Uppsala, Sweden. E-mail address: sagark@puccini.crl.umn.edu



Since 1972, I have conducted interdisciplinary research on atmospheric processes and the effects of air pollutants (ozone and sulfur dioxide) on crops and trees. My research emphasizes the integration of atmospheric chemistry, meteorology, air pollutant removal processes and vegetation response functions. My most recent research is directed to modeling crop response to whole growth season exposures to ambient ozone. I have also examined the issue of continental scale surface level ozone background. I am presently developing methods for modeling the response of sensitive plant species to ozone in Class I wilderness areas.

#### Sample Publications:

Manning, W. J., Krupa, S. V., Bergweiler, C. J., and Nelson, K. I. 1996. Ambient ozone (O<sub>3</sub>) in three Class I wilderness areas in the northeastern USA: Measurements with Ogawa passive samplers. *Environ. Pollut.* 91:399-404.

Krupa, S. V., and Legge, A. H. 1995. Air quality and its possible impacts on terrestrial ecosystems in the Great Plains: An overview. *Environ. Pollut.* 88:1-11.

Krupa, S. V., Grünhage, L., Jäger, H.-J., Nosal, M., Manning, W. J., Legge, A. H., and Hanewald, K. 1995. Ambient ozone (O<sub>3</sub>) and adverse crop response: A unified view of cause and effect. *Environ. Pollut.* 87:119-126.



**Philip O. Larsen**, Professor and Associate Dean of Research, Turfgrass Diseases, Diseases of Plants in the Urban Landscape, Ph.D. 1969, University of Arizona. E-mail address: phill@puccini.crl.umn.edu



I have resumed full time administrative duties, as Associate Dean for Research in the College of Agriculture, Food and Environmental Science at Minnesota. Therefore, my research and teaching obligations are suspended at the present time.

**Benham E.L. Lockhart**, Professor, Virus Diseases; Diagnostic Technology, Ph.D. 1969, University of California, Davis. E-mail address: benhaml@puccini.crl.umn.edu



My research involves the identification, characterization, and epidemiology of plant viruses and virus diseases, including those of tropical and subtropical crops. Research activities include serology, electron microscopy, and insect transmission of plant viruses of cereals, legumes, vegetables, and ornamentals.

**Sample Publications:**

- Ahlawat, Y. S., Pant, R. P., Lockhart, B. E. L., Srivastava, M., Chakraborty, N. K., and Varma, A. 1996. Association of a badnavirus with citrus mosaic disease in India. *Plant Dis.* 80:590-592.
- Lockhart, B. E., Morelli, G., and Websterdorp, J. 1995. Occurrence of tobnavirus infections in *Peperomia*, *Hosta* and *Phlox* in the Midwestern U.S. *Plant Dis.* 79:1249.
- Lockhart, B. E. L., and Olszewski, N. E. 1994. Badnavirus Group. in: *Encyclopedia of Virology*. R. G. Webster and A. Granoff, eds. Academic Press, New York. 516 pp.

**David H. MacDonald**, Professor, Plant Parasitic Nematodes, Ph.D. 1966, Cornell University. E-mail address: davidm@puccini.crl.umn.edu

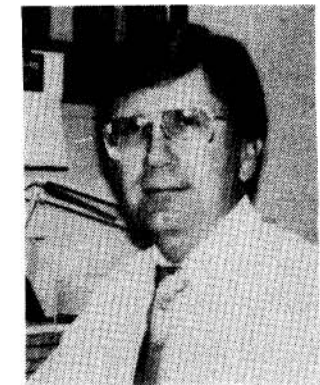


Plant parasitic nematodes can be significant pathogens of several crops of importance grown in the Upper Midwest. I am most interested in the study of the ecology of some of those nematodes. I believe that a better understanding of the environmental requirements of those nematodes should aid in their management.

**Sample Publications:**

- Orf, J. H., and MacDonald, D. H. 1995. Registration of 'Faribault' soybean. *Crop Sci.* 35:1227.
- Orf, J. H., MacDonald, D. H., and Wallace, M. K. 1995. Registration of M87-1569 soybean germplasm resistant to soybean cyst nematode. *Crop Sci.* 35:1516.

**Richard A. Meronuck**, Professor, Minnesota Extension Service, Deterioration of Stored Grains, Ph.D. 1971, University of Minnesota. E-mail address: richm@puccini.crl.umn.edu



I have an extension appointment with the responsibility for grain storage pathology, mycotoxins, dry bean diseases, and pesticide applicator training. My extension programs in crop production are designed to assist producers in minimizing losses in stored grain and in dry bean production. My research programs are in the area of grain storability and dry edible bean diseases. Research programs in storability are designed to quantify mold development and subsequent losses in nutrition, quality, grade, and dry matter in grain stored at various moisture contents, temperatures, and fungicide treatments.

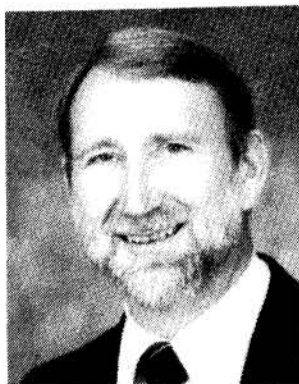
**Sample Publications:**

Ng, H. F., Morey, R. V., Wilcke, W. F., Meronuck, R. A., and Lang, J. P. 1995. Relationship between equilibrium relative humidity and deterioration of shelled corn. *Trans. ASAE* 38:1139-1145.

Wilcke, W. F., Ng, H. F., Meronuck, R. A., and Lang, J. P. 1995. Dry matter loss in storage for sound and diseased wheat. In: *Transactions of ASAE*. ASAE Paper #956132.

Meronuck, R. A. 1994. The Northern Wheat Scab Epidemic: What happened and what we are doing about it. Pages 35-37 in: *Proceedings of the IV National Stored Grain Pest Management Training Conference*, Sept. 18-21, 1994, Manhattan. Kansas Oklahoma Cooperative Extension Service Circular E-946.

**Robert F. Nyvall**, Professor, North Central Experiment Station, Grand Rapids, Diseases of Cultivated Wild Rice and Development of Mycoherbicides, Ph.D. 1969, University of Minnesota. E-mail address: nyval001@gold.tc.umn.edu



My research interests center on two subjects, biological control of weeds and diseases of cultivated wild rice. Specific biological control work is currently directed to the development of mycoherbicides to control purple loosestrife. Biological control of other weeds will be investigated in the future. Current work on cultivated wild rice is on the control of fungal brown spot with Dr. James Percich. Future work will include investigating the etiology of the causal organisms and biological control of the disease.

#### Sample Publications:

Nyvall, R. F., and Hu, A. 1996. Laboratory evaluation of indigenous North American fungi for biological control of purple loosestrife. *Biol. Contr.* 8:37-42.

Nyvall, R. F. 1995. Fungi associated with purple loosestrife (*Lythrum salicaria*) in Minnesota. *Mycologia* 87:501-506.

**James A. Percich**, Professor, Plant Disease Management: Wild Rice and Vegetables, Ph.D. 1975, Michigan State University. E-mail address: jamesp@puccini.crl.umn.edu



My research centers on the integrated management of vegetable and wild rice diseases. The vegetable disease program focuses on the ecology, etiology, and molecular biology of *Aphanomyces euteiches*, the causal organism of common pea root rot. My current and future wild rice research goals are directed toward the role(s) plant ecology, nutrition, and genetics play in plant health. Special emphasis is being placed on the study of the life and disease cycle of *Bipolaris oryzae*, the causal organism of Fungal Brown Spot (FBS). The continued development of a wild rice callus system to help screen for FBS resistance is being investigated. Also, wild rice growth, development, and FBS disease incidence and severity as influenced by nutrition are being studied by the use of hydroponics.

#### Sample Publications:

Davis, W. D., Fritz, V. A., Pflieger, F. L., Percich, J. A., and Malvick, D. K. 1995. MN 144, MN 313 and MN 314. Garden pea lines resistant to root rot caused by *Aphanomyces euteiches* Drechs. *Hort. Sci.* 30:639-640.

Nyvall, R. F., Percich, J. A., Porter, R. A., and Brantner, J. R. 1995. Comparison of fungal brown spot severity to incidence of seedborne *Bipolaris oryzae* and *B. sorokiniana* and infected floral sites on cultivated wild rice. *Plant Dis.* 79:249-250.

**Frank L. Pflieger**, Professor and Head, Minnesota Extension Service, Diseases of Vegetable and Ornamental Plants and Ecology of VA Mycorrhizae, Ph.D. 1972, Oregon State University. E-mail address: francisp@puccini.crl.umn.edu



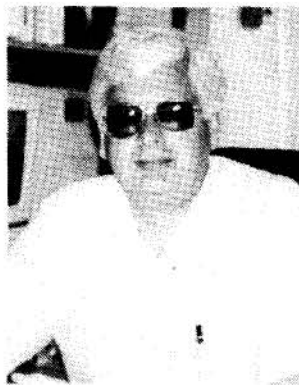
My research and extension responsibilities

include developing disease control programs for commercially grown vegetables and floriculture crops. Additional areas of research emphasis include the taxonomy of vesicular arbuscular mycorrhizal (VAM) fungi, and ecological studies on VAM fungi and their importance in plant growth under conditions to promote sustainable agriculture and in disturbed and undisturbed ecosystems.

**Sample Publications:**

- Noyd, R. K., Pflieger, F. L., and Russelle, M. P. 1995. Interactions between native prairie grasses and indigenous arbuscular mycorrhizal: Implications for reclamation of taconite iron ore tailing. *New Phytol.* 129:651-660.
- Kurle, J. E., and Pflieger, F. L. 1994. Arbuscular mycorrhizal fungal spore populations respond to conversions between low-input and conventional management practices in a corn-soybean rotation. *Agron. J.* 86:467-475.
- Pflieger, F. L., and Linderman, R. G., eds. 1994. *Mycorrhizae and Plant Health*. APS Press, Minneapolis, MN. 344 pp.

**Ward C. Stienstra**, Professor, Minnesota Extension Service, Soybean, Corn, Turf, and Fruit Disease Management, Ph.D. 1970, Michigan State University. E-mail address: wards@puccini.crl.umn.edu



I educate crop production people in the diagnosis, management, and control of diseases. The major crop diseases include root rots, stalk rots, and foliar diseases of corn. The effects of leaf disease in seed corn production is much greater than the disease damage on hybrid corn. Soybean production has significant losses due to *Phytophthora* root rot, brown stem rot, the soybean cyst nematode, and *Sclerotinia* white mold. These disease losses are researched on farm plots where the problems exist and in campus research plots. One method of disease management is with fungicides, and a portion of my time is devoted to improving aerial application of pesticides.

**Sample Publications:**

- Rehm, G. W., and Stienstra, W. C. 1993. Reducing the severity of *Phytophthora* root rot in soybeans with selected management options. *J. Prod. Agric.* 6:222-226.
- Stienstra, W. C., and Rehm, G. W. 1990. Evaluation of potassium fertilizer, metalaxyl fungicide and soybean varieties on soybean production in Minnesota. *Phytopathology* 80:1040-1041.

**Carol E. Windels**, Associate Professor, Northwest Experiment Station, Crookston, Field Crop Diseases, Ph.D. 1980, University of Minnesota. E-mail address: cwindels@mail.crk.umn.edu



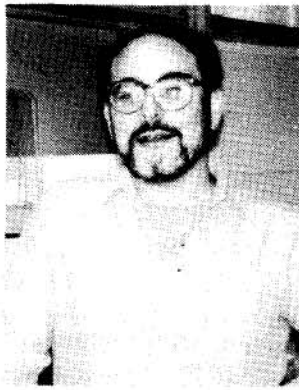
My research focuses on management of soil-borne diseases of sugar beet (*Pythium*, *Aphanomyces cochlioides*, and *Rhizoctonia solani*). It integrates production practices, plant resistance, and biological and chemical control strategies. Research also includes other crops (cereals, beans) that have the same, or different (*Fusarium*, *Bipolaris*) pathogens, as sugar beet.

The Northwest Experiment Station is 300 miles from the St. Paul campus. It offers a unique opportunity for field research in the agriculturally rich Red River Valley. The station has a plant pathology research laboratory, greenhouse, field facilities, and housing for graduate students.

**Sample Publications:**

- Engelkes, C. A., and Windels, C. E. 1994. Relationship of plant age, cultivar and isolate of *Rhizoctonia solani* AG-2-2 to sugar beet root and crown rot. *Plant Dis.* 78:685-689.
- Hansen, J., Nelson, B., and Windels, C. E. 1994. *Corynespora cassiicola* isolated from soybean roots in the Red River Valley of Minnesota and North Dakota. *Plant Dis.* 78:1122.

**Nevin D. Young**, Associate Professor, Molecular Genetics of Plant Disease Resistance, Ph.D. 1984, Yale University. E-mail address: nevin@puccini.crl.umn.edu



My research focuses on the genetic basis of disease resistance in plants. Using DNA technology to map the locations of resistance genes, my associates and I dissect the mechanisms of plant-pathogen interactions and accelerate the development of disease resistant plants. In the future, we hope to use mapping technology to isolate and clone plant resistance genes.

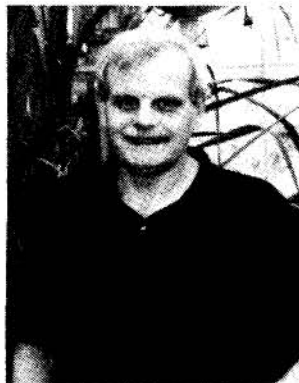
#### Sample Publications:

Boutin, S., Young, N., Olson, T., Yu, Z.-H., Shoemaker, R., and Vallejos, C. 1995. Genome conservation among three legume genera detected with DNA markers. *Genome* 38:928-937.

Concibido, V., Denny, R., Boutin, S., Hautea, R., Orf, J., and Young, N. 1994. DNA marker analysis of loci underlying resistance to soybean cyst nematode (*Heterodera glycinea* Ichinohe). *Crop Sci.* 34:240-246.

Danesh, D., Aarons, S., McGill, G., and Young, N. 1994. Genetic dissection of oligogenic resistance to bacterial wilt in tomato. *Mol. Plant-Microbe Interact.* 7:464-471.

**Richard J. Zeyen**, Professor, Director MAES Electron Optics Facility, Physiological and Molecular Control of Disease Resistance, Ph.D. 1970, University of Minnesota. E-mail address: richz@puccini.crl.umn.edu



Our long-term research objective is to understand the biochemical and molecular basis of genetically conditioned disease resistance in plants, and to use this information for genetically engineering "durable" fungal disease resistance in cereals. Our research focuses on defining the biochemical and molecular processes that underlie "ephemeral" and "durable" resistances. This basic research is linked to a

joint program with the USDA Cereal Rust Laboratory and the Department of Agronomy and Plant Genetics aimed at improving resistance by genetically engineering oat for disease resistance. Other research includes the metabolic role of elemental silicon in disease resistance and plant virology.

#### Sample Publications:

Banttari, E. E., Zeyen, R. J., and Gamez, R. 1995. Marafiviruses. Pages 51-64 in: *Pathogenesis and Host Specificity in Plant Diseases: Histopathological, Biochemical, Genetic Bases. Vol. II: Viruses and Viroids.* U. Singh, R. P. Singh, K. Kohmoto, eds. Pergamon/Elsevier Science, Inc., Oxford, UK.

Zeyen, R. J., Bushnell, W. R., Carver, T. L. W., Robbins, M. P., Clark, T. A., Boyles, D. A., and Vance, C. P. 1995. Inhibiting phenylalanine ammonia-lyase and cinnamyl-alcohol dehydrogenase suppresses Mal1 (HR) but not mlo5 (non-HR) barley powdery mildew resistance. *Physiol. & Mol. Plant Pathol.* 47:119-140.

Carver, T.L.W., Zhang, L., Zeyen, R.J., and Robbins, M.P. 1996. Phenolic biosynthesis inhibitors suppress adult plant resistance to *Erysiphe graminis* in oat at 20 C and 10 C. *Physiol. & Mol. Plant Pathol.* 49:121-142.

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## Adjunct Faculty

**Yehoshua Anikster**, Associate Professor  
Department of Botany, Faculty of Life Sciences  
Tel Aviv University  
Biology of Rust Fungi from Cereal Crops and Their Wild Relatives  
Ph.D. 1977, Tel Aviv University, Ramat-Aviv, Israel

My research is done principally at the Institute for Cereal Crops Improvement, which is part of the Faculty of Life Sciences, Tel Aviv University. For many years, however, I have collaborated closely with faculty members at the University of Minnesota. My research is focused on the relatives of cereal crops that grow wild in Israel and elsewhere in the Middle East. These plants are often resistant to diseases of wheat, oats, and barley. Plant breeders worldwide are crossing these wild plants with cereals to make them disease resistant. To help in these efforts, we collect and preserve wild cereals and evaluate them for disease resistance. We also develop park reserves where wild cereals will be maintained for posterity. In addition, I have a major interest in the fungi that cause rust diseases on cereals. For many

years, I have studied the complex life cycle of these pathogens and also have tried to understand how rusts from wild plants relate to rusts in cereal crops.

**Sample Publications:**

- Eilam, T., Bushnell, W. R., and Anikster, Y. 1994. Relative nuclear DNA content of rust fungi estimated by flow cytometry of propidium iodide-stained pycniospores. *Phytopathology* 84:728-735.
- Anikster, Y. 1989. Host specificity versus plurivory in barley leaf rusts and their microcyclic relatives. *Mycol. Res.* 93(2):175-181.

**Robert Brambl, Professor**  
Department of Plant Biology  
Ph.D., 1970, University of Nebraska  
E-mail address: [brambl@molbio.cbs.umn.edu](mailto:brambl@molbio.cbs.umn.edu)

We are using cells of *Neurospora crassa* and techniques of genetics, biochemistry, and molecular biology to study the regulation of mitochondrial gene expression at the level of translation. We wish to identify nucleus-encoded proteins that are involved in the recruitment of specific mRNAs into the mitochondrial translational system. We are also interested in the synthesis and assembly of protein components of the mitochondrial respiratory membrane and in post-translational modifications of these mitochondrial proteins, such as fatty acylation, that may be involved in their enzymatic function. In another project in our laboratory, we are studying the cellular localization and function of the heat shock proteins, or chaperones, and the role of the heat shock response in protecting cells against physical stress.

**Sample Publications:**

- Plesofsky-Vig, N., and Brambl, R. 1995. Disruption of the gene for hsp30, an  $\alpha$ -crystallin-related heat shock protein of *Neurospora crassa*, causes defects in thermotolerance. *Proc. Natl. Acad. Sci. USA* 92:5032-5036.
- Vassilev, A. O., Plesofsky-Vig, N., and Brambl, R. 1995. Cytochrome c oxidase in *Neurospora crassa* contains myristic acid covalently linked to subunit 1. *Proc. Natl. Acad. Sci. USA* 92:8680-8684.

**William R. Bushnell, Professor**  
Cereal Rust Laboratory, USDA Agricultural Research Service  
Physiology of Host-Parasite Relations  
Ph.D. 1960, University of Wisconsin, Madison

E-mail address: [billb@puccini.crl.umn.edu](mailto:billb@puccini.crl.umn.edu)

My colleagues and I are interested in the defense responses of plants to fungal parasites, especially in diseases caused by powdery mildew and rust fungi. These parasites have a well developed specificity for certain plant varieties. We would like to understand the basis of this specificity and also understand the natural defenses of plants so that we can find ways to enhance their effectiveness. We use living tissues under the microscope to observe and manipulate host-parasite interactions at the cellular level. We are also trying to isolate and identify the genes that are activated by parasite attack in both resistant and susceptible plants. Finally, we are using both microinjection and microprojectile bombardment to introduce genes into cells of parasites and into plants in order to evaluate the role of genes in specificity and resistance.

**Sample Publications:**

- Nelson, A. J., and Bushnell, W. R. 1996. Transient expression of anthocyanin genes in barley epidermal cells: Potential for use in evaluation of disease response genes. *Transgene Res.* (In press).
- Zeyen, R. J., Bushnell, W. R., Carver, T. L. W., Robbins, M. P., Clark, T. A., Boyles, D. A., and Vance, C. P. 1995. Inhibiting phenylalanine ammonia-lyase and cinnamyl-alcohol dehydrogenase suppresses *Mla1* (HR) but not *mlo5* (non-HR) barley powdery mildew resistances. *Physiol. Mol. Plant Pathol.* 47:119-140.

**Kurt J. Leonard, Professor**  
Director, Cereal Rust Laboratory, USDA Agricultural Research Service  
Epidemiology of Cereal Rust Diseases  
Ph.D. 1968, Cornell University  
E-mail address: [kurtl@puccini.crl.umn.edu](mailto:kurtl@puccini.crl.umn.edu)

My research involves the study of pathogen population dynamics and the genetics of host-pathogen interactions in rust diseases of small grains with emphasis on crown rust of oats. The work includes studies of race-specific and slow-rusting resistance, national virulence surveys, pathogen population genetics, and simulation models of host-pathogen coevolution.

**Sample Publications:**

- Welz, H. G., and Leonard, K. J. 1995. Gametic phase disequilibria in populations of race 2 and race 3 of *Cochliobolus carbonum*. *Eur. J. Plant Pathol.*

101:301-310.

Leonard, K. J. 1994. Stability of equilibria in a gene-for-gene coevolution model of host-parasite interactions. *Phytopathology* 84:70-77.

**Donald V. McVey**, Associate Professor  
Cereal Rust Laboratory, USDA Agricultural Research Service  
Cereal Rust Diseases  
Ph.D. 1959, University of Illinois  
E-mail address: donm@puccini.crl.umn.edu

My research involves resistance of wheat to stem and leaf rusts. Studies on wheat's inheritance and research into stem and leaf rusts use conventional genetics. Resistance factors are also postulated using rust isolates with different avirulence/virulence combinations. I am working on the development of hard red spring and winter wheat cultivars and germplasm.

Sample Publications:

McVey, D. V. 1992. Genes for rust resistance in international wheat nurseries XII through XVII. *Crop Sci.* 32:891-895.  
Baenziger, P. S., Schmidt, S. W., Peterson, C. J., Johnson, V. A., Mattern, P. S., Drier, A. F., McVey, D. V., and Hatchett, J. H. 1992. Registration of rawhide wheat. *Crop Sci.* 32:283.

**Deborah A. Samac**, Assistant Professor  
USDA Agricultural Research Service, Plant Science Research  
Molecular Biology of Host-Parasite Interactions  
Ph.D. 1988, University of Wisconsin, Madison  
E-mail address: debbys@puccini.crl.umn.edu

The objective of my research is to identify and characterize the biochemical and molecular disease defense mechanisms of alfalfa (*Medicago sativa*) with the goal of increasing disease resistance. The focus is on isolating and cloning the genes expressed by resistant plants in response to pathogen invasion. Such genes will be characterized by studying their expression (or engineered lack of expression) in transgenic plants.

Sample Publications:

Samac, D. A. 1995. Strain specificity in the transformation of alfalfa (*Medicago sativa*) by *Agrobacterium tumefaciens*. *Plant Cell Tiss. Org. Cult.* 43:271-277.  
Vance, C. P., Miller, S. S., Gregerson, R. G., Samac, D.

A., Robinson, D. L., and Gantt, J. S. 1995. Alfalfa NADH-dependent glutamate synthase: Structure of the gene and importance in symbiotic N<sub>2</sub> fixation. *Plant J.* 8:345-358.

**Les J. Szabo**, Assistant Professor  
Cereal Rust Laboratory, USDA Agricultural Research Service  
Molecular Genetics of Rust Fungi  
Ph.D. 1983, Oregon State University  
E-mail address: lszabo@puccini.crl.umn.edu

My colleagues and I are using the tools of molecular biology and molecular genetics to study host-parasite interactions in rust diseases. We are particularly interested in identifying, cloning, and characterizing the fungal genes involved in race-specific resistance and pathogenicity. In addition, we are using DNA sequence analysis to study evolution and phylogenetic traits of rust fungi.

Sample Publications:

Berres, M. E., Szabo, L. J., and McLaughlin, D. J. 1995. Phylogenetic relationships of auriculariaceous basidiomycetes based on 25S ribosomal DNA sequences. *Mycologia* 87:821-840.  
Liu, Z., Szabo, L. J., and Bushnell, W. R. 1993. Molecular cloning and analysis of abundant and stage-specific MRNAS from *Puccinia graminis*. *Mol. Plant-Microbe Interact.* 6:84-91.

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## Emeritus Faculty

Ernest E. Banttari  
Norman Borlaug  
Carl J. Eide  
Thor Kommedahl  
Chester J. Mirocha  
Alan P. Roelfs  
Roy Wilcoxson

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Being judgmental is a sign of life.

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# DEPARTMENT NEWS

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## DEPARTMENTAL AWARDS 1997

by Delores Huebner and Richard J. Zeyen

The Department of Plant Pathology at Minnesota conducts its annual award program every spring. Exceptional achievements by alumni, friends, students and faculty are recognized. In 1997 the following were recognized:

### DISTINGUISHED ALUMNUS AWARD

#### **Dr. Barry Jacobsen**

Awarded to Barry J. Jacobsen for Extraordinary Achievements as an Advocate and Statesman for the Profession and Science of Plant Pathology.

Dr. Jacobsen (Ph.D. 1973) began his career at the University of Illinois as an Extension Plant Pathologist. At Illinois he became the Extension Project Leader and Director of their Plant Disease Clinic and rose to the rank of full professor in 1983. In 1987 Dr. Jacobsen was appointed Professor and Head of the Department of Plant Pathology at Auburn University. In 1992 he was named Dean of the College of Agriculture/Director of the Montana Agricultural Experiment Station and Assistant Director for Agriculture and Natural Resources at the Montana State University. From 1994-1996 he served as the National Coordinator of the USDA Integrated Pest Management Initiative in Washington D.C.

Throughout all of these activities Barry Jacobsen provided time and leadership to various professional societies and has been a constant and articulate advocate for the science of plant pathology. As an alumnus he has distinguished himself and the Department at Minnesota through his excellence and achievements.

### M. F. KERNKAMP FELLOWSHIP 1997

#### **Ms. Silvia Peñuela**

Silvia Peñuela received her B.S. degree in Microbiology at the University of Los Andes in Colombia. Since coming to Minnesota in 1994 as a graduate student she has maintained a perfect 4.0 GPA throughout a rigorous Ph.D. course work program.

During her tenure as a graduate student she distinguished herself in research and as an enthusiastic advocate for international agriculture and communication. In research she discovered several gene analogues that may function as soybean cyst nematode resistance genes. To accomplish her research objectives she became proficient and skilled at computer-based

DNA sequence analysis, the polymerase chain reaction and physical mapping of plant DNA. She has been a leader in the highly successful International Agriculture Discussion Group and the Brown Bag Discussion Series for graduate students in Plant Pathology and other departments.

Silvia is a convivial and creative person and has donated her time and talents to numerous committee and social activities in the Department. She is past president of the graduate student organization in Plant Pathology and has an abundance of talents that the late professor Kernkamp prized in graduate students.

### FRED I. FROSHISER FELLOWSHIP 1997

#### **Ms. Tsitsi Ndowora**

Ms. Tsitsi Ndowora received her BS degree in Crop Science, with first class honors, from the University of Zimbabwe in 1991. In 1994 she received her MS degree in Plant Pathology at the University of Minnesota while maintaining a perfect 4.0 GPA.

As a Ph.D. student Ms. Ndowora has distinguished herself in the classroom, in research and as an advocate for international agriculture and understanding. She is a member of the American Phytopathological Society, Sigma Xi and of the Third World Organization of Women in Science. While a graduate student she has been the author of two refereed journal articles and several abstracts.

Tsitsi excels in research and perfected a greatly improved triple-antibody serological assay for banana streak badnavirus. This protocol has been put to use in many countries including Nigeria, France, Australia and Costa Rica where the banana streak virus is a serious problem. Most recently she has taken up a very fundamental problem in banana and plantain, namely the integration of badnavirus genomic sequences in these plant species. The finding of integrated virus genomes inside plant genomes is unprecedented in plant virology and has practical and evolutionary implications. Tsitsi has given freely of her time and talents and was





## DEPARTMENT GROUP PICTURE

First Row — left to right: Julie Jenkins, Todd Burnes, Dariush, Danesh, Roy Wilcoxson, Randy Giroux, Grace Bucher, Chester Mirocha, Chad Behrendt, Ruth Dill-Macky, Richard Meronuck, and Donna Becker.

Second Row — left to right: Sandra Scagliusi, Kyoko Shimizu, Dean Malvick, Deborah Samac, Silvia Peñuela, Matthew McBride, Christine Newby, David Long, Marc Bardin, John Haight, Christine Schraut, Alan Dyer, Andrea Moffatt, and Gilbert Ahlstrand.

Third Row — left to right: C. Kent Evans, Charles Hu, Rhoda Burrows, Roxanne Denny, Kathryn Kromroy, Sandra Gould, Colleen Shearon, Laurie Brand, Yeshi Wamishe, Judy Cox, Debra Drange, Dean Herzfeld, Julien Mercier, Amar Elkaad, William Bushnell, Warren Kruger, Ann Arendt, Elaine Kolaczowski, and Andrew Ryan.

Fourth Row — left to right: Neil Anderson, Linda Kinkel, Vergel Concibido, Nevin Young, Tsitsi Ndowora, Gacheri Muriuki, Hong Ma, Les Szabo, Rebecca Krull, Robert Blanchette, Dean Flanders, and Kurt Leonard.

Fifth Row — left to right: Ernest Banttari, Kurt Stromberg, László Gyenis, James Percich, Roger Jones, Matthew Keepman, Frank Pfleger, and Dann Adair.

Not Pictured: Faculty — Senyu Chen, James Groth, Thor Kommedahl, Sagar Krupa, Philip Larsen, Benham Lockhart, David MacDonald, Donald McVey, Robert Nyvall, Alan Roelfs, Ward Stienstra, Carol Windels, and Richard Zeyen.

Academic Professional — Gerald Baldrige, Jason Brantner, Fa-jun Chen, Mark Hughes, Darryl Krueger, John McCain, and Weiping Xie.

Visiting Scientist — Saruul Purevin, Sammy Sackey, and Hirofumi Yoshioka.

Graduate Student — Jill Calabro, Consuelo Estevez de Jensen, Pedro Figueroa, J. Patrick Martinez, Akhilesh Mishra, Mary Moberg, Miriam Newton, Hui Yu.

AFSCME/Civil Service — Marguerite Clemens, Deborah Gardner, Thomas Gearhart, Delores Huebner, Leslie Johnson, Aaron Krohn, Douglas Lange, Migule Linares, Dennis McDougall, Elizabeth Ozmon, Melissa Pauna, and Patricia Toivonen.

Federal Civil Service — David Casper, James Mork, Jacolyn Morrison, Gerald Ochocki, and Rosalind Richards.

Editors note: The 1997 departmental photo is the seventh annual group picture. It was taken with a 4 x 5" format view camera. Special thanks to our photographer, Gilbert G. Ahlstrand.

vice president of the graduate student organization in the Department.

#### DISTINGUISHED FRIEND OF THE DEPARTMENT

##### **Mrs. Barbara Anderson**

Mrs. Barbara Anderson was presented the Distinguished Friend of the Department Award for 1997. Barbara's sincere and tireless efforts to bring together members of the department, and to include their spouses and families is an inspiration to us all. Her warmth and enthusiasm are contagious. She enriches our lives in so many ways. She makes all of us welcome members of the department and of her family. Incidentally, Neil Anderson is her husband.

#### DISTINGUISHED FRIEND OF THE DEPARTMENT

##### **Dr. John McCain**

Dr. John McCain has been a very important contributor to the Department since 1991. Dr. McCain frequently published excellent scientific papers on a broad range of topics related to mycology and plant pathology. He gave guest lectures in mycology and plant pathology courses. He gave freely of his time and talents, actively serving on the Professional and Equity Committee, Seminar Committee and Teaching Committee. He shared his unique intellect and expertise with the rust fungi by adding to and organizing our extensive herbarium collection. For his willingness to become a full member of the department and for his many contributions we present John McCain with the Distinguished Friend of the Department Award.

#### DISTINGUISHED FRIEND OF THE DEPARTMENT

##### **Professor Emeritus Roy Wilcoxson**

Since his retirement professor emeritus Roy Wilcoxson has made many excellent contributions to our Department. He has selflessly shared his experience and knowledge with graduate students, faculty and alumni. His sense of history and willingness to attend to crucial departmental archives have been invaluable. His editing of alumni news magazine the *Aurora Sporealis* and *Book of Graduates* are but a few examples of his continued many contributions. For his friendship and kindness to all of us we present him with the 1997 Distinguished Friend of the Department Award.

#### DEPARTMENTAL CERTIFICATES OF APPRECIATION

##### **Mr. Kimon Karelis and Mr. James Karelis**

— Awarded in genuine appreciation for many years of exemplary service to the Department of Plant Pathology at the Rosemount Farm.

**Mr. James Rowe** — Awarded for his leadership, wisdom and exemplary service to the Department of Plant Pathology, and for many wonderful years of organizing and running those memorable autumn corn roasts!

**Professor Emeritus Thor Kommendahl** — Awarded in deep appreciation for his editing and production of the Department's Weekly Newsletter.

#### **OTHER AWARDS**

**Hammed K. Abbas** (Ph.D. 1988) was awarded the USDA-ARS Early Career Research Scientist of the Year Award for the Mid-South Area of the United States.

**Gilbert G. Ahlstrand**, Outstanding Technical Staff Award — Civil Service, College of Agricultural, Food, and Environmental Sciences 1997.

**William R. Bushnell**, USDA-ARS Superior Performance Award, November 1996

**Mark E. Hughes**, USDA-ARS Outstanding Performance Award, June 1996.

**Linda L. Kinkel**, Associate Editor, Phytopathology.

**Sagar V. Krupa**, Associate Editor, Environmental Pollution.

**Kurt J. Leonard**, USDA-ARS Superior Performance as Research Leader Award, November 1996.

**David L. Long**, USDA-ARS Outstanding Performance Award, June 1996.

**Richard A. Meronuck**, Nominated to participate in the National Extension Leadership Development (NELD) Fellowship, 1997.

**Robert F. Nyvall**, Editor-in-Chief, Phytopathology News, 1996-98.

**Gerald E. Ochocki**, USDA-ARS Outstanding Performance Award, June 1996.

**Rosalind J. Richards**, USDA-ARS Outstanding Performance Award, June 1996.

**Deborah A. Samac**, Received USDA-ARS Outstanding Performance Award, 1996.

**Deborah A. Samac**, Accepted Mentor Award — Twin Cities Regional Science Fair, 1996, on behalf of all participating ARS personnel.

#### **Civil Service Length of Service Recognition**

Ann M. Arendt, 20 years

Judy A. Cox, 30 years

Amar M. Elakkad, 5 years

## **RETIREMENTS**

### **Professor Ernest E. Banttari**

Although still active in the department, professor Ernest Banttari officially retired on January 1st, 1997. The department held a celebration for Ernie and Marlene in Borlaug Hall on Monday, 13 January 1997. It was attended by 90 of Ernie and Marlene's family, friends and colleagues. Professor Banttari gave a summary of his years on the St. Paul Campus and was in turn honored in speeches given by Neil Anderson and Richard Zeyen. For the occasion, the mayor of St. Paul made the following declaration:

#### **E.E. Banttari Day in St. Paul**

WHEREAS: Ernest E. Banttari is a treasured faculty member of our great University of Minnesota, associated with the St. Paul Campus for forty five years as a student, teacher, scientist, author and an advocate for crop improvement; and

WHEREAS: Ernest E. Banttari is recognized worldwide for his published research into the biology of plant-infecting viruses of economically important crop plants, and for educating and training plant virologists and plant pathologists; and

WHEREAS: All citizens of St. Paul and the state of Minnesota owe a debt of gratitude and respect to this scientist-teacher who is retiring after these many years of excellence and exemplary service;

THEREFORE: Be it resolved, that I, Norman Coleman, Mayor of the great city of St. Paul declare Monday, January 13, 1997 as Ernest E. Banttari Day.

### **Professor Chester J. Microcha**

Professor Chester "Chet" Mirocha retired from the Department of Plant Pathology on September 1, 1997. A native of Cudahy Wisconsin, he received his B.S. degree (1955) from Marquette University and his Ph.D. from California Davis (1960). From 1960 to 1963 he was employed by Union Carbide and joined the faculty at Minnesota as an assistant professor in disease physiology in 1963. His interest in fungal toxins as attacking mechanisms against plants led to a general interest in mycotoxins and a long-term collaboration with Clyde Christensen and others interested in grain storage and related mycotoxin problems. His fame as a researcher in grain storage and mycotoxins led to being named a Fellow of the American Phytopathological Society in 1983 and a consultant to the World Health Organization on

Mycotoxins. Throughout his career at Minnesota he taught excellent courses in the physiology and biochemistry of plant disease. An avid outdoors and exercise enthusiast professor Mirocha continues to amaze us with his energy and drive. He and his wife Donna are active in local hospice activities. Although officially "retired" Chet plans to remain active in the department, working with *Fusarium* toxins.

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## **PLANT PATHOLOGY AT THE NORTH CENTRAL EXPERIMENT STATION**

by Robert F. Nyvall

Plant pathology research at the North Central Experiment Station continues to concentrate on diseases of cultivated wild rice and mycoherbicide development to control purple loosestrife. Additional assistance is rendered in the area of backyard horticultural problems in northern Minnesota. Personnel include Dr. Robert Nyvall; Laura Wagner, junior laboratory technician; Dan Neery, summer technician; and Andi Moffatt, research assistant who is scheduled to finish her M.S. in 1997. Cooperative work is done with Dr. Jim Percich, Dr. Raymie Porter, Dr. Dave Wildung, and Dr. Ric Cother.

Work on cultivated wild rice diseases is concentrated in the following areas: Etiology of *Bioplaris oryzae*, the causal fungus of fungal brown spot; chronology of diseases throughout the growing season; effect of "new" diseases on cultivated wild rice; determination of the interaction of fertility and disease; and testing of new fungicides to control fungal brown spot. Mycoherbicide development continues to concentrate on testing of suitable fungi to control purple loosestrife.

Outreach programs concentrate on cultivated wild rice farmers and home gardeners in northern Minnesota. Laboratory visitors this year included Dr. Ric Cother of the New South Wales Department of Agriculture.

## **NORTHWEST CORNER**

by Carol E. Windels

Weather, Flood, Scab — three words commonly heard in the Red River Valley in 1997. First the Weather: eight blizzards dumped over 100 inches of snow across the flat terrain of the Red River Valley, the former lake bed of ancient Lake Agassiz. Then came the Floods of April. Ada was the first to be inundated — by overland flooding and the Wild Rice River. Snow melt from two dozen tributary rivers drained into the Red

River of the North, flooding Breckenridge, Fargo, and many cities and farmsteads within its spreading path. Crookston narrowly escaped flooding when the Red Lake River crested and started to flow over permanent dikes, but an ice jam gave way in the nick of time, releasing the flow to the Red River. Bridges between Dakota and Minnesota were closed from Fargo to the Canadian border. Lake Agassiz II.

When the Red River crested in the "twin cities" of Grand Forks, ND and East Grand Forks, MN, it had swollen from a shallow, placid river flowing north at 15 cubic feet per second to a torrential force of 135 cubic feet per second! All of East Grand Forks, MN and 85% of Grand Forks, ND were inundated. Nearly all residents (over 60,000) evacuated. Upon their return, nearly 3 weeks later, most discovered their homes and businesses damaged or destroyed. The downtown areas were in ruins. Members of the plant pathology department who frequented Whitey's (a historic cafe and lounge) in East Grand Forks will be disappointed to learn that it sustained over four feet of water on the main floor — the building will be demolished to make way for new dike that widens the floodway. Dramatic change now is regular fare in Grand Forks and East Grand Forks and will be for several years.

Overall, direct effects of the flood on agriculture in the Red River Valley were less than one might expect. Some potato warehouses were flooded and their contents lost. Many of the fertilizer and pesticide dealers moved their inventory to high ground. Fields inundated by the Red River were avoided or planted late. On an individual basis, however, many farm families and employees in various sectors of agriculture continue to struggle daily — with the emotional, physical, and financial loss of home, business, and community.

Ironically, the spring of 1997 was unseasonably dry. Then the threat of Scab developed: regular rainfall began in mid-June and coincided with anthesis of wheat and barley. Environmental conditions were ideal for production of inoculum of *Fusarium graminearum*. Scab, for the fifth consecutive year, caused substantial losses in yield and quality of much of the wheat and barley crops. Summer precipitation also favored development of other diseases such as white mold on bean crops and *Aphanomyces* root rot on sugar beet.

In my recollections of the history of the Red River Valley, I am reminded of reports from expeditions into the area in the early 1800's. An expedition in 1823 encountered extremely dry weather and explorers

concluded the area had poor prospects for agriculture. The next expedition, in 1848, found the Valley soil to be very rich, but noted that obstacles to settlement included spring flooding and the torture of mosquitoes, gnats, and sandflies. Folks who live in the Valley recognize that extremes and some annoyances are part of life here — and that most of the time, life is very good. And there always is the promise of next year.

## USDA/ARS CEREAL RUST LABORATORY

by Kurt J. Leonard

There are two new employees at the Cereal Rust Lab. Mary Lou Mohn began working half-time at the USDA-ARS Cereal Rust Laboratory March 24, 1997, as a Senior Laboratory Technician. She was promoted to Principal Laboratory Technician July 1, 1997, and continues to work half-time with Drs. Randy Giroux and Bill Bushnell on transient gene expression. She has a B.S. in Medical Technology and has worked in laboratory medicine before taking this position. Tara Carson began working for Bill Bushnell as a part-time Senior Laboratory Technician in April and was appointed full-time as of July 1, 1997. She holds a B.A. in Biology and Environmental Studies from Augsburg College.

Marc Bardin, a postdoc from the Station de Pathologie Végétale, INRA, Centre de Recherches d'Avignon, France arrived at the Cereal Rust Lab in November, 1996, for a 13-month postdoc funded by INRA. At the Cereal Rust Lab Marc is working with Kurt Leonard examining the effects of selection on frequencies of unnecessary virulence genes in a genetically heterogeneous population of the oat crown rust fungus, *Puccinia coronata*. He is also examining the potential of *P. coronata* to adapt to adult plant partial resistance in two oat lines that were developed by Matt Moore and Paul Rothman by breeding for durable resistance in the St. Paul buckthorn nursery.

Yeshi Andenow from Alemaya University of Agriculture, Debre Zeit Agricultural Research Center, Ethiopia, is completing a 6-month stay (April through October, 1997) at the Cereal Rust Lab on a research fellowship funded by the International Atomic Energy Agency. Yeshi brought accessions of tef, *Eragrostis abyssinica*, and tef rust, *Uromyces eragrostidis* from Ethiopia for her research at the Cereal Rust Lab in developing methodology for inoculation, maintenance of cultures, and evaluation of resistance of tef lines and virulence of rust isolates under controlled conditions. At the Cereal Rust Lab Yeshi worked with Dave Long. She

also participated in summer courses in the Department of Plant Pathology.

Laura Carsten, an M.S. student at Montana State University spent two weeks at the Cereal Rust Lab working with Les Szabo learning techniques for DNA extraction, PCR, AFLPs, and DNA sequencing for her research on genetic variability in populations of the oat crown rust fungus, *Puccinia coronata*, on wild oats on the island of San Clemente, California. Her research relates to possible use of crown rust as a biocontrol agent to suppress the introduced wild oats on the island.

Dr. Jose A. Martinelli of the Federal University of RioGrande do sul State, Porto Alegre, RS, Brazil spent three weeks at the Cereal Rust Lab in May, 1997, working with Kurt Leonard on techniques for evaluation of crown rust resistance in oat.

Brian Kristensen arrived in September from Risø National Laboratory, Roskilde, Denmark, to work with Bill Bushnell in testing effects of peroxidase genes and other putative host response genes on expression of resistance to powdery mildew in the transient expression assay developed at the Cereal Rust Lab. Brian will stay through mid-December.

Pedro Figuero completed his Ph.D. research at the Cereal Rust Lab with Alan Roelfs and departed for a position at Campo Experimental Valle del Yaqui, Cd. Obregón, Mexico on September 12, 1997. He will return to St. Paul later in the year to defend his thesis in the Plant Pathology Department.

Brent McCallum, former graduate student with Alan Roelfs at the Cereal Rust Lab and Jim Groth in Plant Pathology, sent the following news: After completing his Ph.D. in June of 1995, Brent went to Winnipeg to start a postdoc at the University of Manitoba working on anthracnose disease of lentil. He then accepted a postdoc opportunity at the Cereal Research Centre, Agriculture and Agri-Food Canada at the University of Manitoba in October of 1996. He is working on *Fusarium* head blight of barley, looking for resistance and trying to understand the way the disease works in barley. This year, 1997, was another bad year for *Fusarium* there. Brent's wife, Jo-Ann, is also employed at the Cereal Research Centre, working as a technician on oat crown rust with James Chong. She has been employed there for approximately 5 years. Christopher Donald was born to Brent and Jo-Ann on August 8, 1997, weighing in at 8 lbs. 2 oz.

Dr. Randal Giroux is nearing the completion of his

postdoc assignment at the Cereal Rust Lab with Bill Bushnell. At the CRL, Randy helped develop a transient expression assay to test the effectiveness of host response genes and antifungal compounds to enhance disease resistance in cereals. This assay will serve as a method to quickly prescreen genes prior to the development of stable transgenics. Additional projects include using the transient expression assay to test victorian binding protein genes in oats and the development of expression vectors for a number of host response genes. Randy will be leaving the Rust Lab in mid-November to begin a Research Scientist position in the Grain Research Lab (GRL) at the Canadian Grain Commission (CGC). The CGC is located in downtown Winnipeg. The Commission has two main activities: the regulation of grain handling in Canada, and the establishment and maintenance of standards of quality for Canadian grains. The Commission provides expertise in the science and understanding of end-use grain quality, thus enhancing the marketability of Canadian grain. In this program, Randy will develop a program in molecular biology to complement ongoing research efforts in grain quality and variety identification and serve as a technical liaison between the Cereal Research Center (AgCanada) and the GRL. Randy and his wife Janet have a new son, Corey Jonathon, born on September 5, 1997, who joins his sister, Taylor, just in time to prepare for the move north.

Dr. John McCain, a long time collaborator with the Cereal Rust Lab, moved from the Twin Cities to Toledo, Ohio in 1997. John has been a valued colleague in a series of research projects on biology, genetics, and phylogeny of rusts of cereals and grasses. John was always ready to help with questions on taxonomy, evolution, and general biology of rust fungi and with identification of host plants. His departure leaves a great void at the Cereal Rust Lab.

Noted visitors to the Cereal Rust Lab in 1996-97 included: Gerhard Fischbeck, Weihenstephan, Germany; Maria Finckh, Swiss Federal Institute of Technology, Zurich; Moussa Seck, Enda. T.M. Sental, Dakar; Lucy Gilchrist, CIMMYT, Mexico; Jesse Dubin, CIMMYT, Mexico; Zahir Eyal, Tel Aviv University, Israel; Yehoshua Anikster, Tel Aviv University, Israel; Menachem Assaraf, Faculty of Agriculture, Rehovot, Israel; Carlos Camargo, Instituto Agronomico, Campinas, Av. Barao De Itapura, Brazil; Fazil Dusuneli, CRIFC, Ankara, Turkey; Sofija Kalinina, State Stende Plant Breeding Station, Dizstende Talsizeg, Latvia; Adrian Newton, SCRI, Dundee, Scotland; M. Nazim, Minufija

University, Egypt; Bill Pfender, Kansas State University; Ilya Raskin, Rutgers University, NJ; Matthew Parker, State University of NY at Binghamton; Patricia Okubara, USDA, Albany, California; and Charles F. Murphy, USDA, ARS, NPS, Beltsville, MD.

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## SUMMER FIELD PATHOLOGY 5204

by David H. MacDonald

Four summer session students and a visiting scientist from Ethiopia had a busy and informative-enjoyable series of field trips. The field pathology field trips started with sessions conducted by an assistant "specialty cuts" grower, and a rose grower at Len Busch Roses in Plymouth, and ended 9 weeks later with an overnight trip to the Forestry Center at Cloquet. Included were stops at the General Andrews Forest Nursery at Willow River, an afternoon session on forest pathology with Bob Blanchette, a visit to a dwarf mistletoe infestation in the Fond Du Lac State Forest, and a session on the disease and other problems of wild rice with Jim Percich in paddies near Aitkin. There were six Thursday afternoon sessions conducted in the St. Paul and Rosemount field plots; and Dutch elm and oak wilt etiology and control, plant disease control at Bailey Nursery, plant disease prevention and management at the Minnesota Landscape Arboretum, and disease management at the U of M golf course.

Old timer, professor Al Ellingboe brought the University of Wisconsin—Madison summer plant pathology class to St. Paul in mid-July for a morning at the Cereal Rust Lab and a lecture by Chet Mirocha on mycotoxins. In the afternoon his class visited the buckthorn-oat-crown rust nursery, learned about Ruth Dill-Macky's work with head blight, and then traveled to the Plant Science area at Rosemount (formerly the Plant Pathology "farm") for sessions with Dick Meronuck and Ken Walter on grain storage and a session on Hypoxylon canker with Ellingboe and MacDonald. Al and his group camped overnight and fed the mosquitoes at Rosemount. They left just as the July monsoons resumed. They traveled down Highway 61 along the Mississippi to a small farm near Kellogg where the rain stopped and the students were able to see textbook quality signs and symptoms of the soybean cyst nematode and so-so symptoms of the needle nematode on corn. In late July the University of Minnesota class joined the University of Wisconsin class for the 3 day long "Northern Wisconsin Tour" during which there were sessions on cranberry

production and diseases and marketing in the Babcock area, diseases and other problems of ginseng in the Wausau area, the operation of the University of Wisconsin Lelah Starks Seed Potato farm near Rineland, potato early and late blight research at Antigo, and apple and tart cherry diseases and research in Door County.

The U of M students were exposed to the wisdom, experiences, and philosophies of 29 professionals including 12 USDA-University of Minnesota and 7 University of Wisconsin. I am very grateful for the enthusiastic and effective participation of all of those individuals in the summer field pathology course.

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## DEPARTMENT SEMINARS 1996-97

- August 29. **Dr. Don Kenney**, Gustafson, Inc. Development of a Biological Control Agent to Promote Plant Growth and Control Plant Pathogens. Host: Dr. Linda L. Kinkel.
- September 13. **Dr. Maria Finckh**, Gruppe Phytomedizin/Pathologie, Zurich, Switzerland. Developing Strategies for the Management of Rice Blast in Traditional Farming Systems in Bhutan. Host: Dr. Linda L. Kinkel.
- October 4. **Dr. Tim Paulitz**, McGill University, Montreal, Canada. Epidemiology of *Gibberella zeae* in Inoculated Wheat Fields. Host Dr. Ruth Dill-Macky.
- October 21. **Dr. Ann MacGuidwin**, Professor, University of Wisconsin—Madison. Early Dying of Potato.
- October 28. **Mr. Warren Kruger**, Graduate Student. Discovery and Exploitation of *mlo* Alleles in Barley.
- November 4. **Dr. C. Kent Evans**, Research Associate. Studies on Deoxynivalenol in Macroconidia of *Fusarium graminearum* and Production of Deoxynivalenol in Inoculated Spikelets of Robust and Chevron Barleys.
- November 11. **Dr. Hong Ma**, Research Associate. Genetic Association of *Septoria nodorum* Blotch and Tan Spot in Three *Triticum timopheevii* Derived Durum Wheats with Grain Color.
- November 18. **Mr. J. Patrick Martinez**, Graduate Student. Cutinase as a Pathogenicity Factor.

- November 25. **Mr. Francisco Salazar-Huerta**, Graduate Student. Karnal Bunt: An Emerging Plant Disease.
- December 2. **Mr. Chad J. Behrendt**, Graduate Student. Mycoparasitism.
- January 9. **Dr. Ellen Simms**, Ecologist, University of Chicago. The Evolution of Resistance and Tolerance to Fungal Pathogens in Morning Glory. Host: Dr. James V. Groth.
- February 3. **Ms. Consuelo Estevez de Jensen**, Graduate Student. The Rise of Gray Leaf Spot as a Serious Disease of Maize.
- February 10. **Dr. Steven Lindow**, Professor, University of California—Berkeley. Molecular Approaches to the Study of the Ecology of Bacteria on Plant Surfaces. Host: Dr. Linda L. Kinkel.
- February 17. **Mr. Kurt D. Stromberg**, Graduate Student. Elucidation and Exploitation of the Take-all Decline Phenomenon in Wheat.
- February 24. **Ms. Silvia Peñuela**, Graduate Student. Localization of Response mRNA in Resistance Reactions.
- March 3. **Ms. Andrea M. Moffatt**, Graduate Student. Hypovirulence of *Cryphonectria parasitica*.
- March 12. **Dr. Sammy Sackey**, Visiting Scientist, Cocoa Research Institute of Ghana, Plant Physiology and Biochemistry Department, Accra, Ghana. Genomic Variation in Badnaviruses: Implications for Control of Cocoa Swollen Shoot Virus in Ghana. Host: Dr. Benham E. Lockhart.
- April 21. **Dr. Matthew Parker**, Department of Biological Sciences, SUNY, Binghamton, New York. The Evolution of Specialization in Legume — *Rhizobium* mutualisms. Host: Dr. James V. Groth.
- May 22. **Dr. Mark Wilson**, Department of Plant Pathology, Auburn University, Auburn, Alabama. Molecular Microbial Ecology and the Development of Biocontrol Agents of Tomato Pathogens. Host: Dr. Linda L. Kinkel.
- June 24. **Mansour Karimi**, Genetics Lab, University of Gent, Belgium. Molecular Study of Plant-Nematode Interactions. Host: Dr. Dariush Danesh.

## NATIONAL MEETINGS

### American Phytopathological Society Annual Meeting August 9-13, Rochester, New York

by Ruth Dill-Macky

The 1997 meeting of the American Phytopathological Society was held at the Rochester Riverside Convention Center, Rochester, New York. Members of the department attending the meeting were **Donna M. Becker**, **Jason R. Brantner**, **Ruth Dill-Macky**, **Alan T. Dyer**, **C. Kent Evans**, **Kurt J. Leonard**, **David L. Long**, **Hong Ma**, **Dean K. Malvick**, **Andrea M. Moffatt**, **Tsitsi C. Ndowora**, **Robert F. Nyvall**, **Frank L. Pfleger**, **Deborah A. Samac**, **Kyoko Shimizu**, **Kurt D. Stromberg**, and **Carol E. Windels**. A total of 12 (5 oral and 7 poster) presentations were presented.

#### Oral Presentations

**DILL-MACKY, R.** *Fusarium graminearum* inoculation methods on wheat; **EVANS, C. K.**, and **Dill-Macky, R.** *Fusarium graminearum* inoculation methods on barley; **MALVICK, D. K.**, **Percich, J. A.** Pathogenic and genotypic variation among single zoospore progeny of *Aphanomyces euteiches*; **MOFFATT, A.**, **Nyvall, R.**, and **Percich, J.** Host range of *Bipolaris oryzae*, cause of fungal brown spot on cultivated wild rice; and **NDOWORA, T. C.**, **Lockhart, B. E.**, and **Olszewski, N. E.** Relationship between integrated and episomal badnavirus genomic sequences in *Musa* (Student Competition).

#### Poster Presentations

**BECKER, D. M.**, **Kinkel, L. L.**, and **Schottel, J. L.** Interspecies communication and its hypothesized role in pathogen suppression in a naturally-occurring disease suppressive soil; **EVANS, C. K.**, **Kolaczowski, E. K.**, **Mirocha, C. J.**, and **Dill-Macky, R.** Trichothecenes in florets of barley inoculated with *Fusarium graminearum*; **MA, H.**, **Dill-Macky, R.**, **Busch, R. H.** Effect of deoxynivalenol on wheat grain filling; **SAMAC, D. A.** Biological control of root-lesion nematodes in alfalfa by *Streptomyces*; **SHIMIZU, K.**, **Kinkel, L. L.**, and **Schottel, J. L.** Relationships of in vitro pathogen inhibition to potato scab biocontrol by antagonistic *Streptomyces* spp; **STROMBERG, K. D.**, **Kinkel, L. L.**, and **Leonard, K. J.** Reduction of *Xanthomonas campestris* pv. *translucens* populations and disease on wheat following inoculation of bacterial antagonists; and **WINDELS, C. E.**, **Brantner, J. R.**, and **Simms, A. L.** Reduction of *Aphanomyces* damping-off of sugar beet by an oat precrop and soil fertilization.

**Ruth Dill-Macky** presided over the Cereal Disease session. **Kurt J. Leonard** presented a paper "Stem Rust of Wheat: A Current Foe?" in a special session titled "Stem Rust of Wheat: From Ancient Enemy to Modern Foe." **Deborah A. Samac** chaired the APS committee for Biochemistry, Physiology and Molecular Biology.

A public exhibit of photos obtained from the Department of Plant Pathology, Cornell University was on display in Rochester during the conference. The exhibit "Plant Pathology: Images From Our Past" featured turn-of-the-century photographs from New York's plant pathology efforts, including horse-drawn spray rigs, and plant pathologists working in both the laboratories and field.

Faculty, students, old timers, and guests attended the hospitality party jointly sponsored by the University of Minnesota and the University of Wisconsin in the Empire Lounge at the Convention Center.

#### **Association of Education and Research Greenhouse Curators July 23-26, 1997**

by **Dann K. Adair**

The Association of Education and Research Greenhouse Curators (AERGC) meeting was held at Cook College of Rutgers University.

Dean Rod Sharp, Director of the New Jersey Agricultural Experiment Station and Dean of the Rutgers Agriculture and Environmental Sciences College, spoke of the current and future need of high quality environmental control for research and industry.

Rutgers is starting an Urban Environmental Station to parallel its Agricultural Experiment Station. They are partnering with Princeton in developing this New Jersey initiative to create jobs and markets. A new research greenhouse facility, is managed centrally, by Joe Florentine of the Department of Plant Pathology. Computer controls, thrips screening, energy-efficient shading and glazing, staff offices, and growth chambers are but some of the features of this facility.

An excellent presentation on using plants to remediate radioactive and heavy metal contaminated sites was presented by M. Blaylock of Phytotech, Inc.

H. Janes of Rutgers heads a NASA center (\$1M annual support) dealing with regenerative life support. This is research requiring high levels of environmental and computer control. Potential applications include a closed-loop life support system in space. Novel technology included the use of machine vision for sensing

plant needs.

A comprehensive field trip to both commercial and research greenhouses pointed out many practices that we can incorporate today.

A brief meeting outlined, among other items, the need for organizational structure with by-laws. Jim Kramer has asked Joan Leonard of Ohio State and Dann Adair of Minnesota to head up a committee to create this structure. The biggest recent change was an E-mail forum and Web page which has opened this organization to the world. Next year's meeting is scheduled for July 22-26 at McGill University, Canada.

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## **SOCIAL EVENTS**

### **1996 CORN ROAST**

by **Debra Baden Drange**

The Annual Corn Roast went on as planned despite rain showers. The rain held off long enough to get in one hayride for the day. This year, the turn out was smaller than usual, but fun was had by all. Thanks to Barbara Anderson for her donation of eye poppers and bubbles for the kids that attended, even some of the "bigger" kids, you know who you are, had fun with the bubbles.

As usual, there was plenty of food, roast hog and turkey, salad and beans for everyone and even some "doggie" bags were sent home with many people.

This year was the last year for the Annual Corn Roast as we know it. Now that Jim Rowe has been given a new position at the Rosemount Experiment Station, it has been decided that future Corn Roasts will most likely be held on the St. Paul Campus, or nearby picnic areas.

Special thanks to everyone that helped especially Jim Rowe and Jim Karelis for all their hard work before, during and after the Corn Roast. It's such a pleasure to work with the two of them. We would also like to thank Mike Strasser, retired civil service for his donation of pickles, tomatoes and German cucumbers.

### **PLANT PATHOLOGY INTERNATIONAL CELEBRATION**

by **Debra Baden Drange**

The Plant Pathology International Celebration was held on Friday, December 20. The Department participated in two holiday collections; Toys for Tots and



collecting food for the Merriam Park Food Shelf. With our collections, we hoped to bring a little of the holiday to people who would otherwise not have any. The thoughtfulness of our department was greatly appreciated.

Thanks goes to Neil Anderson for his donation of the fir tree for our Holiday party. It was beautiful! Wonderful music filled the halls of Stakman Hall. Thanks to Dann Adair, Gib Ahlstrand and Betsy Zimmerman for their contribution of holiday tunes.

The food, as usual was wonderful, with dishes from many countries. It is truly a wonderful time of year to gather with department members and old timers in the area to celebrate the holidays.

### THE 22<sup>ND</sup> ANNUAL STAKMAN SOFTBALL GAME

by Alan T. Dyer

On Friday, May 16, the 22<sup>nd</sup> Annual Stakman Softball game was held. The weather all week had been cold and damp, but come game time the sun was out and the temperature warm. Captained by the stingy pitching of Pat Martinez, the students resoundingly beat the faculty/staff by 18 to 4. Highlights of the game included the centerfield collision of Dean Flanders with John Haight resulting in John sitting out two innings, the excellent running skills displayed by Laura Felter despite her Burkenstock sandals and Dr. Neil Anderson's decisive officiating. A warm thanks to all who made the game and picnic a glowing success.

### Carl Eide's 93rd Birthday

"To the Department of Plant Pathology"

Dear Friends:

"A thousand thanks for the wonderful birthday party. It was the best I ever had and probably the best I ever shall have, although I am optimistic and shall be looking forward to August 20, 1998."

"The cake was beautiful and excellent and the pleasure of visiting with friends and hearing their congratulations was something I shall never forget."

"Please drop in and visit us when ever you can."

Carl J. Eide

### Thanks from Professor Emeritus Banttari

Thanks very much to so many of you who wrote letters of congratulation and who contributed gifts of money on my retirement. These were presented to me at my retirement reception, January 13, 1997. It was a memorable occasion which Marlene and I enjoyed very much.

As a "retirement trip" we traveled to Norway, Sweden, Finland and Tallin, Estonia in July and August 1997. We visited "Old-Timers" Lars Semb, Leif Sundheim and Stein Telneset at Ås, Norway, who sent their greetings to members of the Department.

Ernest E. Banttari

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### VITAL STATISTICS

#### BIRTHS

##### 1996

October 31, 1996. Juan Pedro Figueroa to Pedro and Irene Figueroa, 7 lbs., 1 oz., and 20 inches long in Minneapolis, Minnesota.

##### 1997

January 9, 1997. Warren and Delores Huebner proudly announced the birth of their second grandchild, Timothy Warren Wilbur, 7 lbs., 4 oz., and 20 inches long to Russ and Pam Wilbur in Cold Springs, Minnesota.

March 1, 1997. Stephen Jensen Estevez to Earl Jensen and Consuelo Estevez de Jensen, 10 lbs., and 20 inches long in Minneapolis, Minnesota.

March 16, 1997. Marina Lily Chen to Senyu and Hua Zhu Chen, 6 lb., 12 oz., and 20 inches long in Waseca, Minnesota.

April 6, 1997. Tinashe Samantha Rebecca Nyamupingidza to Edgar Nyamupingidza and Tsitsi Ndwora, 7 lbs., 5 oz., and 20 1/2 inches long in Edina, Minnesota.

June 10, 1997. Frank and Renee Pflieger proudly announce the birth of their first grandson, Sade Steven Sunderlund to Steven and Kim Sunderlund, 6 lbs., 11 oz., and 19 1/2 inches long in Wyoming, Minnesota.

June 23, 1997. Margaret Rebekah Kinkel Andersen to David E. Andersen and Linda L. Kinkel and brother Nat, 7 lbs., 8 oz., and 20 1/2 inches long in Minneapolis, Minnesota.

July 24, 1997. Robert and Sandra Nyvall proudly announced the birth of their second grandchild, Emily Madison Nyvall to Nathan and Tracey Nyvall, 7 lbs., 4 oz., and 20 inches long in St. Paul, Minnesota.

September 5, 1997. Corey Johnathan Giroux to Randy and Janet Giroux and sister Taylor, 7 lbs., 15 oz., and 19 1/2 inches long in Fridley, Minnesota.

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## VISITING SCIENTISTS

**Marc Bardin**, a Scientist from INRA, Station de Pathologie Vegetale, Domaine Saint-Maurice, France arrived October 15, 1997 for a 14-month visit. He is working with Dr. Kurt Leonard.

**Barbara Steiner**, a student from the University of Agricultural Sciences, Vienna, Austria visited us June 15 through August 31. She studied head blight of wheat in Dr. Ruth Dill-Macky's laboratory.

## NEW EMPLOYEES

**Fa-jun Chen** joined Dr. Senyu Chen's project as a research associate at Waseca on August 27, 1996. Fa-jun obtained a PhD degree in mycology from the University of Reading, U.K. in 1991, and worked at the Chinese Academy of Sciences, Beijing.

**Tara Carson**, Senior Laboratory Technician, began working in Dr. William Bushnell's laboratory March 31, 1997. She majored in Biology/Environmental Studies at Augsburg College.

**Ganesh Dahal**, Research Associate, joined Dr. Ben Lockhart's virology laboratory September 4, 1997. He works on molecular mechanisms of badnavirus integration and episomal expression in banana and plantain. He has a PhD in Plant Pathology (Virology), University of Philippines, Los Banos.

**Dawn Foster-Hartnett**, Post-doctoral Associate, began working with Dr. Nevin Young July 9, 1997. She is mapping and cloning genes for disease resistance in soybean. She holds a PhD in Molecular Genetics from Washington University, St. Louis, MO, 1994.

**Xingzhong Liu**, Research Associate, was appointed August 1, 1997 to work on Dr. Senyu Chen's project in biological control of nematodes. He received a PhD in Phytopathology, Beijing Agricultural University and worked at the Chinese Academy of Agricultural Sciences.

**Shiela Lutz**, USDA-ARS Biological Science Laboratory Technician, joined Dr. Deborah Samac's lab in August 1997. She is completing a M.S. degree in Plant Biology with Dr. Burle Gengenbach.

**Diana Magarian**, USDA-ARS Biological Science Laboratory Technician, works in Dr. Deborah Samac's laboratory on cloning of alfalfa genes and alfalfa transformation. She completed a MS degree in Plant Breeding, University of Minnesota.

**Julien Mercier**, Research Associate, from the University of California, Berkeley, joined Dr. Sagar Krupa's laboratory February 17, 1997. He works in the Urban Landscape-Turf Program. He holds a PhD from Laval University, Quebec, Canada.

**MaryLou Mohn**, Principal Laboratory Technician, began working in Dr. Bill Bushnell's laboratory March 24, 1997. She obtained a B.S. degree in Medical Technology, University of Minnesota.

**Miriam Newton**, Research Fellow, received a MS degree in Plant Pathology, 1997, with Drs. Linda Kinkel and Kurt Leonard. She completed a second MS degree in Statistics and continues working with Drs. Kinkel and Leonard on plant pathogens and epiphytic microbes.

**Kimberly Shinnick**, USDA-ARS recently joined Debby Samac's laboratory. She is working on cloning and characterization of alfalfa gene promoters and expression in transgenic alfalfa. She holds a BS in Genetics and Cell Biology from the University of Minnesota, 1997.

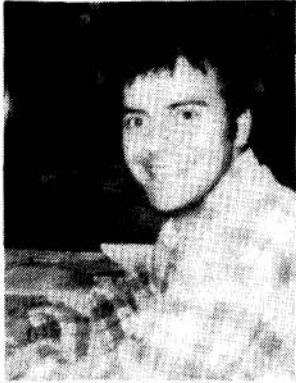
## NEW GRADUATE STUDENTS

**Jenkins, Julie C.** HS, Sparta, Sparta, WI; Associate Degree, Anoka Technical College, Anoka, MN; BS, University of Minnesota, St. Paul, MN.  
F 1997 Jones

**Pereyra, Silvia A.** HS, N 9 — Dr. Eduardo Scedo, Province of Montevideo, Uruguay; BS, University of Uruguay, Province of Montevideo, Uruguay.  
F 1997 Dill-Macky

**Xiao, Kun** HS, Zijingguan, Baoding, P.R. China; B.A., Agricultural University of Hebei, Baoding, P.R. China.  
F 1997 Kinkel

## NEW PEOPLE



Marc Bardin



Tara Carson



Ganesh Dahal



Dawn Foster-Hartnett



Shiela Lutz



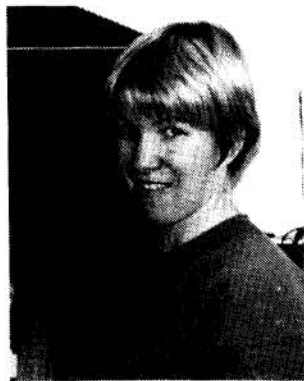
Julien Mercier



MaryLou Mohn



Miriam Newton



Julie C. Jenkins



Silvia A. Pereyra



Kun Xiao

## RECENT PROMOTIONS

**Kimon Karelis**, from Research Plot Technician to Research Plot Coordinator at the Rosemount Agricultural Experiment Station, August, 1997.

**James Rowe**, from Research Plot Coordinator to Plant Sciences Field Research Coordinator as an Executive Assistant at the Rosemount Agricultural Experiment Station, December 2, 1996.

## EXAMINATIONS PASSED

### 1996

September 11	Miriam Newton	MS
October 2	Akhilesh N. Mishra	PhD final
October 4	Dionicio Alvarado-Rosales	PhD final

### 1997

March 11	Dean K. Malvick	PhD final
June 6	Nora A. Altier	PhD final
June 12	Matthew J. McBride	MS
July 28	Chad J. Behrendt	PhD final

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## DEPARTURES

A farewell tea for **Douglas Lange** was held on September 17, 1997. He had been working in Dr. Nevin Young's laboratory and left to accept a graduate student assistantship in the Wood and Paper Science Department.

**Akhilesh Mishra** completed his PhD program and a farewell tea was held on October 23, 1996. He studied under Dr. Alan Roelfs in the Cereal Rust Laboratory. Akhilesh and his family returned home to India.

**Sammy Sackey** departed for his home in Ghana on April 27, 1997. He spent a year-long sabbatical working in laboratories with Drs. Ben Lockhart, Neil Olszewski (Plant Biology) and Neil Anderson.

We bid farewell to **Roy and Iva Wilcoxson** at a tea on June 11, 1997 as they were moving to West Plains, Missouri. Department members expressed appreciation to Roy for his many contributions to the Department.

A farewell tea for **Elaine Kolaczowski** was held July 28, 1997. She worked as a Research Associate in Dr. Chester Mirocha's mycotoxicology laboratory. Elaine and her husband moved to Waltham, Massachusetts.

**Dean Malvick** completed his PhD and accepted a

position at W-L Research, Inc., Evansville, Wisconsin. He worked as a Research Fellow and a graduate student in Dr. James Percich's laboratory. We bid Dean farewell at a tea on September 26, 1997.

**John McCain**, departed on March 15, 1997. He and his family moved to Perrysburg, Ohio. As a Research Associate, he worked on various projects in the department and the Cereal Rust Laboratory. The department is especially grateful to John for his contributions to the herbarium facility.

**Vergel and Kerstin Concibido** departed for St. Louis, Missouri July 1, 1997. Vergel, who worked with Dr. Roger Jones on potato pathology, accepted a Senior Research Scientist position at Monsanto.

A farewell tea for **Judy Cox** was held on September 19, 1997. Judy worked as a Senior Accountant and transferred to Student and Office Systems Support.

**Matthew McBride** completed a M.S. degree under the direction of Dr. Deborah Samac. He accepted a position with Rohn & Haas Company, Research Laboratories.

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## DEATHS

**Martha K. Roane** (M.S. 1946) died on December 31, 1996. Martha was an adjunct professor of Plant Pathology at V.P.I & S.U. She was an author and co-editor of the *Compendium of Rhododendron and Azalea Diseases* for APS and in addition to being a member of many prestigious scientific organizations she was a fellow of the Virginia Academy of Science.

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## Long-Term Research

Minnesota is the site of the first attempt in thousands of years to domesticate a totally wild cereal plant. University of Minnesota plant pathologists and breeders have been attempting to domesticate wild rice (*Zizania palustris* L.) for the past 30 years. Wild rice has its center of origin in the Great Lakes Region of North America.

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Calm is more conducive to creativity than is anxiety.

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# INTERNET SITES FOR ALUMNI AND FRIENDS

by Richard J. Zeyen

The Internet is now essential in education and research. It grew out of an experimental network of computers, called the ARPAnet, built for the US Department of Defense in 1969. In December of 1969 four universities were connected. The ARPAnet grew until in 1983 there were 562 networked "host" computers. In 1986 the US National Science Foundation established the NSFnet which grew into what we now know collectively as the Internet. In 1992 the World Wide Web (WWW) was developed in Switzerland. It permitted multimedia applications, graphics, audio and video linked by hypertext pointers.

There are now more than 15 million computer hosts and 120 million Internet users, with millions being added monthly. Virtually all universities in the US make extensive use of the Internet for E-mail, exchange of data, and in teaching and outreach activities. The members of the department made a list of some of the Internet sites they find most useful and informative. We share them with *Aurora* readers.

## Major Search Engines

**AltaVista** (<http://www.altavista.digital.com/>), a powerful search engine with multiple operating parallel computers.  
**WebCrawler** (<http://www.webcrawler.com/>), a general topic search engine.  
**Yahoo!** (<http://www.yahoo.com/>), a broad-based search engine.

## General Sites

**The "World Lecture Hall"** (<http://www.utexas.edu/world/lecture/index.html>), a powerful directory to all areas of knowledge.  
**The Chronicle of Higher Education** (<http://chronicle.merit.edu/index.html>).  
**APHIS Home Page: Animal and Plant Health Inspection Service** (<http://www.aphis.usda.gov/oa/aphishome.html>).  
**Agricultural Biotechnology** (<http://www.bio.org/bio/foodrep8.html#ix>).  
**Agricultural Network Information Center** (<http://www.agnic.org/agdb/agdbfind.html>).  
**Lycos Science Guide** (<http://golgi.harvard.edu/sequences.html>).  
**The Foreign Agricultural Service (FAS)** (<http://ffas.usda.gov/>).  
**Microscopy Online** (<http://microscopy-online.com/>).  
**The National Center for Biotechnology Information** (<http://www.ncbi.nlm.nih.gov/>).  
**National Agricultural Library** (<http://www.nalusda.gov/>).  
**National Library of Medicine** (<http://www.nlm.nih.gov/>).  
**National Science Foundation Web Site** (<http://www.nsf.gov/>).  
**Of interest to Botanists** (<http://meena.cc.uregina.ca/~liushus/bio/botany.html#A>).  
**Excite Career-Education Channel** (<http://www.excite.com/channel/career/?1-ched-t>).  
**Welcome to Science Online** (<http://www.sciencemag.org/>).  
**American Society of Plant Physiologists** (<http://www.aspp.org/>).

## Specific Sites

**Plant Pathology Internet Guide Book** (<http://www.ifgb.uni-hannover.de/extern/ppigb/ppigb.htm>).  
**Bean Genes: A Phaseolus/Vigna database** (<http://beangenes.cws.ndsu.nodak.edu/>).  
**Pesticide Education** (<http://ianrwww.unl.edu/ianr/pat/ephome.htm>), University of Nebraska best national pesticide page.  
**American Association of Pesticide Safety Educators** (<http://www.vtpp.ext.vt.edu:1080//aapse.html>), best list of pesticide links.  
**EXTOXNET** (<http://ace.orst.edu/info/extoxnet/>), Extension's pesticide toxicology information site.  
**Grain Genes** (<http://wheat.pw.usda.gov/graingenes.html>) a database for small grains and sugarcane.  
**Karnal Bunt Home Page** (<http://www.aphis.usda.gov/oa/bunt/kbhome.html>).  
**Mendel Web** (<http://www.stg.brown.edu/MendelWeb/homepage.html>), a richly linked web page for genetics.  
**Plant Viruses Online** (<http://biology.anu.edu.au/Groups/MES/vide/refs.htm#authors>).  
**FusKey** (<http://res.agr.ca/brd/fusarium/home1.html>), an interactive fusarium identification key.

**A Guide to the Use of Terms in Plant Pathology** (<http://www.bspp.org.uk/fbpp.htm>).  
**Association of Educational and Research Greenhouse Curators** (<http://www.life.uiuc.edu/aergc/>).  
**The Institute for Genomic Research (TIGR)** (<http://www.tigr.org/>).  
**Cold Spring Harbor Laboratory, Molecular Biology** (<http://www.cshl.org/>).  
**The World-Wide Web Virtual Library: Biomolecules** (<http://golgi.harvard.edu/sequences.html>).  
**Molecular Biology Protocols** (<http://www.apnet.com/www/journal/ab/abli.htm>).  
**National Genetics Resource Program** (<http://www.ars-grin.gov/>), Information on plant, animal, and microbial germplasm.  
**Scientific and Common Names of Common Weeds and Grasses** (<http://www.ampacseed.com/species.htm>).

#### Local Sites

**Department of Plant Pathology, University of Minnesota** (<http://www.plpa.agri.umn.edu/>).  
**University of Minnesota Extension Service** (<http://www.mes.umn.edu/mnext.html>).  
**COAFES University of Minnesota** (<http://beauty.agoff.umn.edu:80/~coafes/>).  
**Cooperative Electron Optics Facility, Minnesota Agricultural Experiment Station** (<http://biosci.umn.edu/MIC/MAES.html>).  
**Small Grains, Minnesota Association of Wheat Growers** (<http://www.rrtrade.org/smallgrains/>).  
**The Cereal Rust Laboratory** (<http://www.crl.umn.edu>).

#### Contributors

Dann K. Adair, Dean Herzfeld, Mark E. Hughes, James V. Groth, Michael Lyngkjaer, James A. Percich, Silvia Peñuela, Christine M. Schraut, and Richard J. Zeyen.

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## BITS & PIECES

### Grandmother runs Grandma's

The 21st running of Grandma's Marathon along the Lake Superior shore line from Two Harbors to Duluth is world-famous and is named for its sponsor Grandma's Restaurant in Duluth. This year's 26 mile run was made more difficult by rather hot and humid conditions. Dr. Lois Johnson, senior scientist at Du Pont in Wilmington DE (Ph.D. 1980) ran her third consecutive Grandma's marathon finishing 5th in the Women's 60-64 age class with a time of 5:13:38. Since marathon running is a recent preoccupation with Lois, she is progressing very well. Congratulations Dr. Lois Johnson.

### Noted Scientists

In a ceremony at Tsu City Japan, Professors William Bushnell and Chester Mirocha were honored for 30 years of contributions to the Japan/US Cooperative Science Program. They pioneered the area of physiological and biochemical plant pathology in this long-standing, productive international program.

### Technology Note

The polymerase chain reaction (PCR) method of DNA amplification was first unveiled at the American Society of Human Genetics in 1985.

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## POINTS TO PONDER

The world operates according to discoverable laws.

All things are delicately interconnected.

The most profound things are inexpensive.