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Curriculum Vitae

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Education

Ph.D. (Plant Pathology)	1989-1993	Clemson University, South Carolina, USA
Diplom Agrar-Ingenieur (MS-equivalent; Agricultural Sciences)	1986-1989	Technical University Munich, Germany
Vordiplom (Agricultural Sciences)	1983-1985	University of Bonn, Germany
German High School Diploma (*Abitur*)	1982	Stefan George Gymnasium Bingen/Rhein

Employment and Appointment Experiences

2017 – present: Charles F. Curtiss Distinguished Professor

2006 – 2017: Professor, Department of Plant Pathology (Department of Plant Pathology and Microbiology since 2011), Iowa State University.

2005 – 2020: Chair, Department of Plant Pathology and Microbiology (Department of Plant Pathology before 2011), Iowa State University.

2004 – 2007: Interim Director, Center for Plant Responses to Environmental Stresses (CPRES) of the Plant Sciences Institute (PSI), Iowa State University.

2002 – 2004: Chair, Interdepartmental Genetics Major, Iowa State University.

2000 – 2006: Associate Professor, Department of Plant Pathology, Iowa State University.

1995 – 2000: Assistant Professor, Department of Plant Pathology, Iowa State University.

1993 - 1995: Postdoctoral Researcher in the laboratory of Dr. R. S. Hussey, Department of Plant Pathology, University of Georgia.

1989 - 1993: Graduate Research Assistant, Department of Plant Pathology and Physiology, Clemson University; Drs. S. A. Lewis, B. A. Fortnum, and R. A. Dean co-advisors. Thesis title: *Population Dynamics and Species Identification of Root-Knot Nematodes in Tobacco.*

1987 - 1989: Graduate Research Assistant, Institute for Phytopathology, Technical University Munich; Prof. Dr. G. M. Hoffmann and Prof. Dr. J. A. Verreet advisors. Thesis title (translated): *Epidemiology and Control of the Eyespot Disease (Pseudocercosporella herpotrichoides [Fron] Deighton) in a Wheat Monoculture*.

1987: Two-month student internship at the BASF Experiment Station Limburgerhof, Germany.

1985 - 1986: Year-long internship at two farms (field crops and livestock) in southern Germany.

Stature – Recognition – Service

Membership in Professional Societies

American Phytopathological Society (APS)

Society of Nematologists (SON)

International Society of Plant-Microbe Interactions (IS-MPMI)

Deutsche Phytomedizinische Gesellschaft (DPG)

Honors and Awards

2020 Accepted as Visiting Fellow, Clare Hall College, University of Cambridge

2019 Member of Cohort 15 of the Food Systems Leadership Institute (FSLI.org)

2018 *Intermediate-Globe Silver Award* of the international World Media Festival for the film "Soybean Rust: The Life Cycle of *Phakopsora pachyrhizi*"

2017 *Charles F. Curtiss Distinguished Professor* for exemplary performance in research as reflected by a national or international reputation.

2017 *Fellow* of the American Phytopathological Society

2015 *Noel Keen Award* of the American Phytopathological Society for research excellence in molecular plant pathology

2015 *Fellow* of the Society of Nematologists

2006 *Ruth Allen Award* of the American Phytopathological Society for research that changed a field of plant pathology

2004 *Magna Mater* top award at the 21st International Film Festival AGROFILM as the best and most valuable work for the film "The Beet Cyst Nematode *Heterodera schachtii*"

2003 *Syngenta Crop Protection Award* of the Society of Nematologists (SON) in recognition for excellence in research in the field of Nematology.

2002 *Julius-Kühn-Award* of the German Phytopathological Society (DPG) for outstanding contributions to the field of Phytopathology.

First Place Winner, Student Paper Competition, APS Southern Division Annual Meeting, Tulsa, OK, 1993.

First Place Winner, Annual Student Paper Competition, Department of Plant Pathology and Physiology, Clemson University, 1992.

Second Place Winner, Student Paper Competition, SON Annual Meeting, Vancouver, Canada, 1992.

Recipient of the R. C. Edwards Fellowship, Clemson University, 1992.

Selected Invited Workshop, Symposium and Congress Presentations

"Molecular Dissection of *Heterodera* Cyst Nematode Parasitism" Kiel Week Lecture, Kiel Plant Center; originally planned for June 23, 2020 at the University of Kiel, Germany. Currently postponed to June 2021.

"Soybean Cyst Nematode Genomics" at the annual meeting of the British Society for Parasitology. Originally planned for May 2020. Currently postponed.

"Genome and Effector Biology of the Soybean Cyst Nematode" Molecular and Cellular Biology of Helminth Parasites XI; September 2-7, 2018 in Hydra, Greece.

"Genomic Resources for the Soybean Cyst Nematode" Soybean Cyst Nematode Conference: Adapting to an Evolving Pathogen 2016, sponsored by the American Phytopathological Society (APS); Miami, FL, December 13 – 15, 2016

Nematode Transformation Workshop at the 32nd European Society of Nematologists (ESN) Symposium in Braga, Portugal, August 28 – September 1, 2016

"Mechanisms of Host Manipulations by *Heterodera* Cyst Nematodes" XVII International Congress on Molecular Plant-Microbe Interactions (XVII IS-MPMI 2016); Portland, Oregon on July 17-21, 2016 (session organizer)

"Cyst Nematode Effector Proteins: Emerging Paradigms of Parasitism" International Plant Molecular Biology Congress; Iguazú Falls, Brazil, October 25th - 30th, 2015

"Cyst nematode effectors modulating plant defense mechanisms for successful parasitism" XVI International Congress on Molecular Plant-Microbe Interactions, Rhodes, Greece, July 6-11th, 2014

"Cellular mechanisms in plants infected by cyst nematodes". 6th International Congress of Nematology, Cape Town, South Africa, May 4-9, 2014

"Novel Cyst Nematode Effectors and their Cellular Mechanisms". Annual meeting of the Organization of Nematologists of Tropical America (ONTA), La Serena Chile, October 20-25, 2013. Co-chair of "Plant Defense and Nematode Effectors" symposium session

"Molecular Mechanisms of Infection by Sedentary Plant-Parasitic Nematodes". British Society for Parasitology (BSP) Spring Meeting, April 10, 2013; Bristol, UK

"Cyst Nematode Effectors and their Targets". Annual Meeting of the American Phytopathological Society (APS); August 8, 2012; Providence, Rhode Island

"Transcription, Post-Transcription and Post-Translation Events in Cyst Nematode Parasitism". 30th International Symposium of the European Society of Nematologists; Vienna September 19-23, 2010

"Cyst Nematode Parasitism: *Three Glands – Many Effectors -Big Effects".* Annual Meeting of the American Phytopathological Society (APS); July 28 - August 1, 2007; San Diego, Califormia

"A Look Through the Stylet: *deciphering the mechanisms of nematode parasitism" XIII* International Congress on Molecular Plant-Microbe Interactions (MPMI); July 21-27, 2007; Sorrento, Italy

"Molekulargenetische Untersuchungen des Zystennematodenbefalls" at the symposium to celebrate the retirement of Prof. Dr. Urs Wyss at the University of Kiel, Germany, July 7, 2004.

"The Biology of the Soybean Cyst Nematode" at the 2004 Soybean Breeders/Plant Pathologists Workshop, St. Louis, MO, February 16-18, 2004.

"The Parasitome of the Soybean Cyst Nematode" at the Second Annual Midwest Rhizosphere Research Symposium, Donald Danforth Plant Science Center, St. Louis, MO, September 19-20, 2003.

"Secrets in Secretions: analysis of the parasitome of *Heterodera glycines"* at the 11th International Congress of Molecular Plant-Microbe Interactions in St. Petersburg, Russia, July 18-25, 2003.

"Molekulargenetische Untersuchungen an Mechanismen des Zystennematoden-befalls" at the 53rd German Phytopathology Meeting *(Deutsche Pflanzenschutztagung)* in Bonn, September 16-19, 2002.

"The Nematode and its Life with the Soybean" at the National Soybean Cyst Nematode Conference in St. Louis, MO, July 16-17, 2002.

"Parasitism Gene Discovery in Sedentary Phytonematodes" at the Fourth International Congress of Nematology (FICN) in Tenerife, Spain, June 3-13, 2002.

"Large-Scale Identification of Parasitism Genes of the Soybean Cyst Nematode" at the l0th International Congress of Molecular Plant-Microbe Interactions in Madison, WI, July 10-14, 2001.

"Nematode Secretions: the Makings of a Plant Parasite" at the annual meeting of the American Phytopathological Society in Salt Lake City, UT, August 25-29, 2001.

"Advances in Cyst and Root-Knot Nematode Biology through Molecular Approaches" at the World Soybean Research Conference VI, in Chicago, IL, August 4-7, 1999.

"Penetration, Migration and Feeding: the Roles of SCN Secretions" at the National Soybean Cyst Nematode Conference in Orlando, FL, January 7-8, 1999.

Selected Invited (and accepted) Seminar Presentations

"Cyst Nematode Effectors: Unraveling Parasitism One Protein at a Time" Department of Plant Pathology, University of Wisconsin, February 9, 2016

"Cyst Nematode Effector Proteins: Emerging Paradigms of Parasitism" Embrapa Soja Londrina, PR, Brazil; October 23, 2015

"Unexpected Findings when Mining for Novel Cyst Nematode Effectors" University of Tennessee, Plant Research Center Colloquium; Knoxville, TN; March 27, 2014

"Plant-Parasitic Cyst Nematode Effectors: *Identification, Targets and Effects"* TU Munich, Germany; Oct. 2, 2012

"Transcription, Post-Transcription and Post-Translation Events in Cyst Nematode Parasitism". Bonn University, Germany, May 21, 2012.

"From Ligand Mimicry to Aberrant Nuclear Uptake: *exploring nematode parasitism to understand and manipulate plant cell biology".* Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben, Germany October 2007

"Cyst Nematode Parasitism: *square facts from round worms". University* Halle, Germany; July 2007.

"Molecular Dissection of Cyst Nematode Parasitism". ARS Station Sidney, Montana; August 2006

"Molecular Dissection of Cyst Nematode Parasitism" Plant Science Group, Life Science Center, University of Missouri, February 20, 2006.

"Molecular dissection of cyst nematode parasitism: *you can't fit a roundworm into a square hole"* BASF Plant Sciences, Raleigh, NC, October 2005

"Parasitism Proteins of the Soybean Cyst Nematode" at the Institute of Plant Pathology, University Kiel, Germany, June 21, 2005.

"Cyst Nematodes: the deeper you dig the more you find" at the Department of Plant Pathology, Iowa State University, October 18, 2005.

"Molecular and Genetic Dissection of Cyst Nematode Parasitism". Department of Plant Pathology, Cornell University, November 2003.

"Life Sciences Opportunities" at Alabama A&M University, April 2003

"Parasitism Genes of the Soybean Cyst Nematode" at the Department of Botany and Plant Pathology, Purdue University, October 23, 2002.

"Nematode Parasitism Genes: opening the tool box" at the Department of Plant Pathology, Iowa State University, March 25, 2003.

"A Functional Genomics Approach to Understanding Cyst Nematode Parasitism" at the Department of Microbiology, Iowa State University, September 13, 2001.

"Molecular and Genetic Dissection of the Compatible Cyst Nematode-Plant Interaction" at the Max-Planck Institute for Plant Breeding in Cologne, Germany, December 20, 2000.

"Molekulargenetische Interaktionen zwischen Heterodera Zystennematoden und Wirtspflanzen" at the Institute of Plant Pathology, University of Kiel, Germany, December 18, 2000.

"Working to Understand *Heterodera* Parasitism or How to Open a Can of Worms" at the· Department of Plant Pathology and Physiology, Clemson University, South Carolina, October 25, 2000.

"From'A'ttraction to 'Z'yst: the ABC of *Heterodera* Parasitism" at the Department of Plant Pathology and Microbiology, Texas A & M University, September 27, 2000.

"Worming around in *Heterodera* Parasitism" at Pioneer Hi- Bred in Johnston, IA, April 28, 2000.

"Understanding *Heterodera* Parasitism" at the Department of Plant Pathology, North Carolina State University, March 20, 2000.

"Of Worms and Plants" at Mendel Biotech Inc., San Francisco, CA, February 11, 2000. "Exploring the Compatible Cyst Nematode- Plant Interaction" at Exelixis Pharmaceuticals Inc., South San Francisco, CA, March 15, 1999.

"Molecular Interactions Between Cyst Nematodes and their Plant Hosts" at the Department of Plant Pathology, Iowa State University, September 28, 1999.

"The Compatible Cyst Nematode- Plant Interaction" at the Department of Biochemistry, Biophysics and Molecular Biology, Iowa State University, March 4, 1998.

"Cyst Nematode Meets Plant: What does it take to be compatible?" in the Interdepartmental Genetics Seminar Series, Iowa State University, September 24, 1998.

"Plantibodies: A Novel Approach to Engineering Plant Resistance to Nematodes" at the Department of Entomology and Nematology, University of Florida, November 1996.

Selected Examples of Service Assignments

Department of Plant Pathology and Microbiology Seminar Committee starting in AY 2021.

Hatch project coordinator for the department starting AY 2021.

Postdoctoral Scholar Coordinator for the Department of Plant Pathology and Microbiology since spring 2021.

Member of the University Distinguished Professor Selection Committee since 2018.

Advanced Research and Teaching Building Supervisor from 2018 to 2020.

Coordinator of a multi-institute North Central Soybean Research Project (NCSRP) project on the soybean cyst nematode from 2015 - 2018.

Member of the Iowa Soybean Research Center (ISRC) Management Team from 2014 to 2020.

Member of the Biosciences Initiative Planning Committee responsible for planning and designing the Advanced Teaching and Research Building (ATRB) at Iowa State University from 2013 to 2019.

Host lab for the NSF-sponsored High School Teacher internships 2005 to 2016.

College of Agriculture and Life Sciences Cabinet from 2005 to 2020.

Member of the Iowa State University Chairs Cabinet from 2014 to 2020

Hosting of alumnus and donor Art Engelhard for a departmental function in collaboration with the ISU Foundation.

Founding member of the Academic Unit Leaders Forum (AULF) of the American Phytopathological Society from 2013 to 2020.

Welcome address during the announcement of the ISU Biosciences gift of alumnus Dr. G. Whitehurst, March 29, 2016.

Iowa Soybean Research Center (ISRC) Think Tank Meeting in 2016.

ADVANCE PLPM project review with ISU's Mary Schenkenfelder and Cornell University's Adam Bogdanove; March 21, 2016

Founding chair of the Academic Unit Leaders Forum (AULF) of the American Phytopathological Society; responsible for the organization of this group, including the writing of the governance document and organizing and programming of the annual meeting (2013-2014).

Associate Chair/Chair of the State Agricultural Experiment Stations North Central Advisory Committee 14 (NCAC14 Plant Pathology) responsible for the organization, record keeping and programming of the annual meeting (2013-2014).

Member of the State Agricultural Experiment Stations North Central Advisory Committee 14 (NCAC14 Plant Pathology) from 2006 to 2020.

ISU Delegation to the Biosecurity Research Institute at Kansas State University to explore collaborative opportunities (2013).

Review Panel for ISU Plant Sciences Institute Team Enabling Grants (2013).

External Review Team for the North Carolina State University Department of Plant Pathology graduate program (2012).

USDA-ARS Office of Scientific Quality Review team (2012).

Search committee for the ISU Equity and Diversity Coordinator in the office of the Associate Provost for Academic Personnel (2011).

ISU ADVANCE Team (2007 to 2011); attended the Big XII ADVANCE Workshop on Faculty Recruitment, Retention and Leadership at the University of Oklahoma in January 2008 as ISU's ADVANCE team member.

Chair of the Department of Plant Pathology (and Microbiology) from 2005 to 2020.

Interim Director, Center for Plant Responses to Environmental Stresses (CPRES) of the Plant Sciences Institute (PSI), Iowa State University (2004 – 2007).

Chair, Interdepartmental Genetics Major, Iowa State University (2002 – 2004).

Plant Sciences Institute Council at ISU (2004-2007).

Search Committee Chair for the Department of Plant Pathology Fungal Biologist (2004/2005).

Search Committee for the Department of Plant Pathology Computational Biologist (ARS Position) (2004).

Biotechnology Council (2003-2006).

Search Committee for a plant-biotic interactions faculty member in the Genetics, Development, and Cellular Biology Department, Iowa State University (2005).

Search Committee for the chairperson of the Genetics, Development, and Cellular Biology Department, Iowa State University (2003/2004).

Search Committee Chair for the Department of Plant Pathology Field Crops Pathologist (2003/2004).

Curriculum Committee Department of Plant Pathology (1999-2000; 2003-2005).

Planning Advisory Committee Department of Plant Pathology, charged with strategic planning and the departmental review preparation (2003-2004).

ISU DNA Facility User Committee (2001-2004).

Search Committee for the Department of Plant Pathology chairperson (2001/2002).

ISU Faculty Review Committee to evaluate SPRIGs (Special Research Initiation Grants) and URGs (University Research Grants) (2000-2003).

Bessey Hall Growth Chamber Committee (2000/2002; chair since 2001).

Seminar Committee Chair, Department of Plant Pathology (2000/2001).

Search Committee for a Plant-Microbe Interaction faculty position, Department of Plant Pathology (1999-2000).

Graduate Recruitment Committee, Department of Plant Pathology (1999-2000).

Social Committee, Department of Plant Pathology (1999-2000).

Bessey Hall 4th Floor Facilities Committee (1998-2000).

Planning Committee Chair for Graduate Education Programs of the Department of Plant Pathology for departmental review (1997-1998).

Social Committee Chair, Department of Plant Pathology (1996-1998).

Planning Committee to revise the Department of Plant Pathology Governance Document (1996/1997).

Graduate Admissions Committee Chair; Department of Plant Pathology (1995-1998).

Society of Nematologists Membership Committee (1991-1998); Molecular Biology Committee (1994-97).

Editorial Appointments

Member of the Editorial Committee of the *Annual Review of Phytopathology*, January 1, 2017 – December 31, 2021

Senior Editor *Phytopathology* (2012-2015)

Editor *Journal of Plant Diseases and Protection* (2006-2010)

Editor *IS-MPMI Reporter* of the International Society for Molecular Plant-Microbe Interactions (2003-2006)

Topic Editor, Diseases/Nematodes in Encyclopedia of Plant and Crop Sciences. R. M. Goodman, Editor. Marcel Dekker, Inc. New York, NY (2004)

Editorial Assistant for the English translations of the movie series *The Biology of Fungal Pathogens* produced by Prof. Dr. J.-A. Verreet, University Kiel, Germany (2002-2003)

Teaching Activities

PL P 506 Plant-Pathogen Interactions (2 credits); taught half of this class every spring from 1998 to 2013 except in 2004 and 2012 when not offered due to low enrollment.

PL P 574 Plant Nematology (3 credits); currently offered every other summer. While department chair, Baum used his discretionary funds to hire a temporary lecturer to teach this class. In 2013, the class was for the first time offered on-line as a distance education option.

PLP 597 Plant Pathology Laboratory Methods (1 credit); offered every spring. Co-teaches with Greg Tylka 2 laboratory sessions on nematological techniques.

PL P 694 Colloquium in Plant Pathology (2 credits); Spring 2003 “Introduction to Molecular Biology Techniques used in Plant Pathology”.

PL P 698: Plant Pathology Seminar (1 credit); professor-in-charge in the Fall of 2000 and the Spring of 2001.

Genet 591: Workshop in Genetics (1 credit); hosted speakers and conducted teaching sessions in 2001 and 2012.

Advising & Mentorship

Major Professor for Graduate Students

Stacey Barnes (2013 – 2018) *PhD* student in the Genetics program; research program was the functional characterization of cyst nematode effectors and the elucidation of exosome functions during nematode parasitism. Currently employed in a permanent research position at Iowa State University.

Jason Noon (2011 – 2016) *PhD* student in the Genetics program; research program is the molecular characterization of cyst nematode parasitome and the functions of soybean microRNAs during nematode infection. Currently employed as a staff scientist in the pharmaceutical industry in the Boston area.

Will Rutter (2009 – 2013) *Ph.D.*-student in the Genetics program; research program was the molecular characterization of cyst nematode parasitism proteins and the bioinformatic and molecular characterization of the root-knot nematode parasitome. Currently a Plant Geneticist with the USDA ARS unit in Charleston, SC.

Peter Howe (2006 – 2011) *Ph.D.*-student in the Genetics program; research program was the molecular characterization of cyst nematode parasitism proteins and the corresponding plant cellular response. Employed in a managerial role with Corteva/Pioneer Hi-Bred.

Jing Jin (2005 – 2010) *Ph.D.*-student in the MCDB program; research program was the molecular characterization of host plant genes during cyst nematode parasitism. Jing most was a postdoctoral researcher at the University of Nebraska in Lincoln and now is a faculty member at a Bay Area community college.

Axel Elling (2001 –2006) *Ph.D.*-student in the Genetics program; research program was the molecular characterization of cyst nematode secretion genes and a genomic analyses of cyst nematode gene expression. Axel became a researcher in the Department of Molecular, Cellular and Developmental Biology at Yale University followed by Assistant Professor in the Department of Plant Pathology at Washington State University. Currently in a managerial role with Bayer Crop Sciences.

Martin J. E. Wubben (1998 – 2004) *Ph.D.*-student in the Genetics program; research project was the genetic analyses of the Arabidopsis – cyst nematode interaction.

Martin currently is a Research Molecular Geneticist at the USDA/ARS Crop Science Research Laboratory and Adjunct Professor at Mississippi State University.

Hong Su (1996 – 2000) *M.S.*-student in the Interdepartmental Genetics program; research project was screening of *Arabidopsis thaliana* mutants for altered susceptibility to *Heterodera schachtii* and characterization of the *rhd1* mutant. In March 2000, she changed majors and completed an *M.S.* in Statistics at ISU.

Keith A. Hardy (1996 – 1998) *M.S.*-student in Plant Pathology; thesis title: '*Arabidopsis thaliana* mutants with altered susceptibility to *Heterodera schachtii*'. Currently employed with Novartis Seed Company in Idaho.

Mentor for Postdoctoral/Staff Scientists

Dr. Joffrey Mejias (2021 – present) Mechanisms of defense suppression by cyst nematode effectors.

Dr. Rick Masonbrink (2016 – present) Bioinformatic and genome analyses of the soybean cyst nematode.

Dr. Vijayapalani Paramasivan (2013 – 2019) Cyst nematode-triggered plant chromatin reorganizations.

Dr. Mingsheng Qi (2011 – 2018) Characterization of rust fungus effectors.

Dr. Parijat Juvale (2008 – present) VIGS and RNAi approaches to study cyst nematode parasitism.

Dr. Gennady Pogorelko (2013 – 2018) Root-knot nematode influenced plant cell cycle modifications. Now industry scientist.

Dr. Tobias Link (2009 – 2011) Haustorial gene expression analyses of rust fungi. Now Assistant Professor at the University of Hohenheim, Germany

Dr. Jiqing Peng (2009 – 2010) RNAi approaches to control cyst nematodes and isolation of nematode gland cells. Now staff scientist at ISU

Dr. Tarek Hewezi (2005 – 2013) Molecular analyses of cyst nematode parasitism and involvement of small RNAs in nematode infection. Now Associate Professor at the University of Tennessee

Dr. Anoop Sindhu (2005 – 2008) Use of RNAi to target cyst nematodes; molecular analyses of cyst nematode parasitism. Now staff industry scientist in Canada.

Dr. Martijn van de Mortel (2008-2011) Molecular analyses of Asian Soybean Rust infection. Now staff scientist at Monsanto

Dr. Martin Wubben (2005) Genetic analyses of cyst nematode parasitism. Now ARS Geneticist and adjunct faculty member at Mississippi State University

Dr. Mitra Mazarei (1997 –2007) Characterization of soybean and *Arabidopsis* genes involved in cyst nematode parasitism. Now staff scientist at the University of Tennessee

Dr. Kristen Lennon (2000 – 2002) Histochemical analyses of cyst nematode-plant interactions. Now faculty member at Frostburg State University

Dr. David Puthoff (2000 – 2002) Expression profile analyses of cyst nematode-plant interactions. Now faculty member at Frostburg State University

Dr. Jan de Boer (1996 – 2001) Characterization of *Heterodera glycines* secretion genes. Now staff scientist at Wageningen University, Netherlands

Dr. Axel Schwekendiek (1999) Identification and characterization of cyst nematode secretions and their genes. Now faculty member at the University of Northern Iowa

Dr. Jennifer Hart (1998 – 1999) Characterization of *Arabidopsis thaliana* genes by *in situ* hybridization in cyst nematode-infected roots. Employment unknown

Dr. Marina Byzova (1997 – 1998) Characterization of *Arabidopsis thaliana* genes involved in cyst nematode parasitism. Now staff scientist with Plant Genetic Systems, Ghent, Belgium

Dr. Dennis Byrne (1996 – 1998) Identification of differentially regulated *Heterodera glycines* genes; retired as ISU staff scientist.

Dr. Dieter Hermsmeier (1995 – 1997) Molecular analyses of the *Glycine max*-*Heterodera glycines* interaction; last known employment with Minot State University, ND.

Successful Grant Applications

"Use of the PBS1 decoy system to engineer resistance to plant-parasitic nematodes" as Co-PD with Roger Innes, Indiana University, as PD. Funded by the ***Plant-Biotic Interactions NSF-USDA*** program with $900,000 for the period of August 1, 2020 through July 31, 2024.

"Mechanisms of defense suppression by cyst nematode effectors" as PD; funded by the ***Iowa Soybean Research Center*** in the amount of $116,000 for the period of October 1, 2020 to September 30, 2022.

"An integrated approach to enhance durability of SCN resistance for long-term strategic SCN management" Co-PD with Melissa Mitchum (University of Missouri) as PD; funded by the ***North Central Soybean Research Program*** with ca. $1.9 Million for the period of October 1, 2018 to September 30, 2021.

"Explore the genotypic variability of effector arsenals of multiple SCN populations differing in virulence" PD with Melissa Mitchum and Dmitry Korkin (Co-PDs) funded by

USDA NIFA AFRI with $485,000 for the period of October 1, 2015 to September 30, 2018.

"An integrated approach to enhance durability of SCN resistance for long-term strategic SCN management" PD with Greg Tylka, Melissa Mitchum, and Brian Diers (Co-PDs); funded by the ***North Central Soybean Research Program*** with ca. $1.8 Million for the period of October 1, 2015 to September 30, 2018.

"Development of novel breeding lines for resistance to plant pathogens" Co-PD with Steve Whitham (PD) funded by the ***Iowa Soybean Association*** with ca. $400,000 for the period of October 1, 2015 to September 30, 2017

"Functional characterization of SCN effectors" PD funded by the ***Iowa Soybean Association*** with ca. $160,000 for the period of October 1, 2015 to September 30, 2017.

"A Toolkit to Explore Soybean Cyst Nematode Genomic Diversity" PD with Andrew Severin (Co-PD) funded by the ***National Science Foundation I/UCRC***, the Center for Arthropod Management Technologies with $155,000 for the period of January 1, 2014 to December 31, 2016.

"RNA-based approaches for resistance to nematode and fungal pathogens of soybean" Co-PD with S. Whitham (PD); funded by the ***Iowa Soybean Association*** and the ***Iowa Soybean Research Center*** with ca. $312,000 for the period of October 1, 2013 to September 30, 2017.

"Exosomes: A Novel Pathway for Secretion of Small RNAs by Plant Pathogens for Host Cell Modifications" PD with S. A. Whitham and M. Kimber (Co-PDs); funded as a ***Plant Sciences Institute*** Innovative Research Grant with $52,372 for the period of July 1, 2013 to June 30, 2014.

"Dissecting the Network of Plant Targets for Nematode Effector Proteins" PD T. J. Baum with E. L. Davis and M. G. Mitchum as Co-PDs; funded by ***USDA-NIFA-AFRI*** with $466,000 for April 1, 2012 to March 31, 2014.

"Functional Roles of Small RNAs in Plant – Cyst Nematode Interactions" PI T. J. Baum with T. Hewezi as Co-PI, funded by ***NSF-IOS*** with $607,875 for May 2012 to April 30, 2017.

"Development of a high throughput DNA-based gene silencing technology for soybean" Co-PD with John Hill (PD) and 5 other Co-PDs; funded by the ***United Soybean Board/North Central Soybean Research Program*** with $938,282 for October 1, 2011 to September 30, 2014.

"RNA-Based Approaches for Protecting Against Yield Loss Due to Soybean Diseases, PD with S. Whitham (Co-PD); funded by the ***Iowa Soybean Association*** with ca. $312,000 for the period of October 1, 2010 to September 30, 2013.

"Application of Biotechnology to Control of the Soybean Cyst Nematode: Parasitism Genes" PD with two subcontracts; funded by the ***United Soybean Board*** with $780,000 for October 1, 2010 to September 30, 2013.

"Application of Biotechnology to Control of the Soybean Cyst Nematode: Parasitism Genes" PD with two subcontracts; funded by the ***United Soybean Board*** with $272,000 for October 1, 2009 to September 30, 2010.

"TRMS: High-Throughput Functional Analysis of Soybean Defense Pathways by Virus-Induced Gene Silencing" with Steve Whitham, PI, and T. J. Baum, J. H. Hill, Melissa G. Mitchum as Co-PIs, funded by the ***NSF Plant Genome Research Program*** with $2,112,160 for September 1, 2008 to August 31, 2014.

"Functional Genomics of Cyst Nematode Parasitism of Plants" PD with D. Nettleton, E. Davis, and M. Goellner Mitchum as Co-PDs, funded by ***USDA-NRICGP*** with $750,000 for April 1, 2008 to March 31, 2012.

"Characterization of the soybean rust infection process in susceptible and resistant soybean interactions: Laying a foundation toward soybean rust control" with S. Whitham (PD), and Reid Frederick (Co-PD); funded by the ***Iowa Soybean Promotion Board*** with ca. $285,222 for the period of September 1, 2006 to August 31, 2009

"Application of Biotechnology to Control of the Soybean Cyst Nematode: Parasitism Genes" PD with two subcontracts; funded by the ***United Soybean Board*** with $680,000 for October 1, 2006 to September 30, 2009.

"Functional Genomics of Soybean Response to Cyst Nematode Parasitism Proteins", PD with D. Nettleton, E. Davis, and M. Goellner Mitchum as Co-PDs, funded by ***USDA-NRICGP*** with $900,000 for April 1, 2005 to March 31, 2008.

"Application of Biotechnology to Control of the Soybean Cyst Nematode" PD with 10 subcontracts; funded by the ***United Soybean Board*** with $1.6 Million for October 1, 2004 to September 30, 2006.

"Controlling Yield-reducing Pathogen Stress in Soybean: Short and long-term benefits to stable production" with J. Hill (PD), S. Whitham (Co-PD), and R. Shoemaker (Co-PD); funded by the ***Iowa Soybean Promotion Board*** with $659,000 for the period of September 1, 2004 to August 31, 2008.

"Molecular Genetics of Cyst Nematode – Arabidopsis Interactions", PI with Co-PI S. R. Rodermel (Botany), funded by ***USDA-NRICGP*** with $175,000 for September 2003 to August 2005.

"The Use of Gene Silencing to Generate Cyst Nematode-Resistant Soybean Plants", PI, funded as a ***Bailey Research Career Development Award*** with $150,000 for July 1, 2003 to June 30, 2006.

"The Roles of Salicylic Acid and Camalexin in the Arabidopsis Defense Response against a Root-Parasitic Cyst Nematode", PI, ***Plant Sciences Institute*** Iowa State University, $50,000, July 2002 to June 2004.

"Increasing Soybean Profitability through Soybean Disease Biotechnology"; with Co-PIs John Hill (Plant Pathology), Steve Whitham (Plant Pathology), and Randy Shoemaker

(Agronomy); funded by the ***Iowa Soybean Promotion Board*** with $564,000 for the period of September 1, 2001 to August 31, 2004.

"Application of Biotechnology to the Control of the Soybean Cyst Nematode", funded as a multi-institutional proposal to the ***United Soybean Board***; the subcontract for my laboratory is $142,500 for the period of October 2002 to September 2004.

"Soybean Cyst Nematode Target Identification through Stage- and Organ-Specific EST Analyses", PI, ***Carver Trust Grant***, $25,000, July 2001 - June 2002, PI.

"Testing of Transgenic Plant Material for Soybean Cyst Nematode Resistance", ***Pioneer Hi-Bred***, $100,000, November 1999 - October 2001, PI.

"Application of Biotechnology to the Control of the Soybean Cyst Nematode", ***United Soybean Board***, funded as a multi-investigator program; funds for my laboratory were $140,000, October 2000 - September 2002, Co-PI.

"Mutants and Signal Transduction: Two Keys to Understanding *Heterodera* Parasitism", ***USDA-NRICGP***, $200,000, November 1999 - October 2002, PI with Co-PI S. R. Rodermel, Department of Botany, Iowa State University.

"Molecular Characterization of the Compatible Soybean Cyst Nematode-Soybean Interaction", ***Iowa Soybean Promotion Board***, $293,000, April 1998 - March 2001, PI.

"Molecular Analysis of Interactions between *Heterodera schachtii* and *Arabidopsis thaliana*", ***USDA-NRICGP***, $85,000, October 1997 - September 1999, PI with Co-PI S. R. Rodermel, Department of Botany, Iowa State University.

"Application of Biotechnology to the Control of the Soybean Cyst Nematode", ***United Soybean Board***, funded as a multi-investigator program; funds for my laboratory were $226,000, October 1996 - September 2000.

"Molecular Characterization of the Compatible Soybean Cyst Nematode-Soybean Interaction", ***Iowa Soybean Promotion Board***, $317,000, April 1995 - March 1998, PI.

"Identification of Arabidopsis thaliana Mutants with Altered Susceptibility to the Sugar Beet Cyst Nematode", ***Carver Trust Grant***, $20,000, July 1996 - June 1997; PI with Co-PI S. R. Rodermel, Department of Botany, Iowa State University.

"Preliminary Experiments to Establishing a Transformation System for the Soybean Cyst Nematode", ***University Research Grant***, $12,000, July 1996 - June 1997; PI.

Videos/Reviews/Refereed Publications

Google Scholar Profile:
http://scholar.google.com/citations?user=A22zAGsAAAAJ&hl=en

Current Citation Indices (February 2021):

- Citations 12,320

- h-index 60
- i10-index 107

ISU Digital Repository:

https://works.bepress.com/thomas-baum/

Teaching Videos and Modules

'Trouble at Grainly Farms' (http://site.iptv.org/grainly-farms/home), an interrupted teaching module accompanied by five high-quality teaching videos:

- *Plants Get Sick*
- *Diagnosing Disease in Soybean Plants*
- *What is a Nematode?*
- *Evolution and Adaptation of Plant and Pest Populations*
- *Managing Plant Pathogens using Integrated Pest Management (IPM)*

Produced by Iowa State University, Ames High School, and University of Tennessee personnel in collaboration with Iowa Public Television (IPTV); currently hosted on IPTV's YouTube channel and on PBS Learning Media: http://iptv.pbslearningmedia.org/resource/b8b62335-1df6-41ca-a0b4-0cb72af34e7c/trouble-at-grainly-farms/

'Asian Soybean Rust", multilingual DVD; T. J. Baum, S. A. Whitham, D. S. Mueller in collaboration with Prof. Dr. J.-A. Verreet, Kiel University, Germany, and Stumm Film company; published through APS-Press in 2017; ISBN 978-0-89054-594-2

'The Beet Cyst Nematode *Heterodera schachtii*", multilingual DVD prepared in collaboration with Prof. Dr. J.-A. Verreet, Kiel University, Germany, and Stumm Film company; published through APS-Press 2004; ISBN 0-89054-325-9

Invited Refereed Review Articles and Book Chapters

Siddique, S., Grundler, F., Williamson, V., **Baum, T.J.** 2022. Recognition and Response in Plant-nematode Interaction. ***Annual Review of Phytopathology*** (in preparation)

Baum, T. J. and Eves-van der Akker, S. 2022. Comparative genomics among cyst nematode species. ***Trends in Parasitology*** (*invited*)

Juvale, P. and **T. J. Baum** 2018. "Cyst-tained" research into *Heterodera* parasitism. ***PLoS Pathogens***: 14(2): e1006791. https://doi.org/10.1371/journal.ppat.1006791

Hewezi, T., and **T. J. Baum** 2016. Communication of Sedentary Plant-Parasitic Nematodes with their Host Plants. *in* ***Advances in Botanical Research*** Vol. 74. Jean-Pierre Jacquot and Pierre Gadal, series eds.; Guillaume Becard, ed. Elsevier – Academic Press. http://dx.doi.org/10.1016/bs.abr.2016.11.004

Hewezi, T., and **T. J. Baum** 2015. Gene Silencing in Nematode Feeding Sites. Chapter 9, pgs. 221-235 *in* ***Advances in Botanical Research*** Vol. 73. Jean-Pierre Jacquot and Pierre Gadal, series eds.; Carolina Escobar and Carmen Fenoll, eds. Elsevier – Academic Press; ISBN: 978-0-12-417161-9

Hewezi, T., and **T. J. Baum** 2013. Manipulation of Plant Cells by Cyst and Root-Knot Nematode Effectors. ***Mol. Plant Microbe Interact***. 26(1): 9-16.

Mitchum, M. G., R. S. Hussey, **T. J. Baum,** X. Wang, A. Elling, M. Wubben, and E. L. Davis 2013. Tansley Review: Nematode effector proteins: an emerging paradigm of parasitism. ***New Phytologist*** 199:879-894.

Quentin, M**.**, T. Hewezi, I. Damiani, P. Abad, **T. Baum** and B. Favery 2012. How pathogens affect root structure (Chapter 11). In: ***Roots and their Soil Interactions***: What we can learn from genomics. 189-210, Blackwell Publishing Ltd., 2012.

Rosso, M.-N., R. S. Hussey, E. L. Davis, G. Smant, **T. J. Baum**, P. Abad, M. G. Mitchum 2011. Nematode effector proteins: targets and functions in plant parasitism. Chapter 13 (pp 329-356) in: ***Effectors in Plant-Microbe Interactions***; 444 pgs. Francis Martin & Sophien Kamoun, eds. Wiley-Blackwell Press.

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Davis E. L., R. S. Hussey , and **T. J. Baum** 2009. Parasitism Genes: What They Reveal about Parasitism. Pp 15-44 in ***Cell Biology of Plant Nematode Parasitism***. Eds. R. H. Berg and C. G. Taylor. 273pp. Springer-Verlag Berlin. e-ISBN: 978-3-540-85215-5.

Davis E. L., R. S. Hussey, M. G. Mitchum, and **T. J. Baum** 2008. Parasitism proteins in nematode-plant interactions. ***Current Opinion in Plant Biology*** 11:360-366.

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Hewezi, T., A. Sindhu, P. Howe, A. A. Elling, M. G. Mitchum, E. L. Davis, R. S. Hussey and **T. J. Baum** 2008. "A look through the stylet: deciphering the mechanisms of nematode parasitism". In ***Biology of Plant-Microbe Interactions*** (Vol. 7), IS-MPMI, St. Paul, MN, USA.

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Hussey, R. S., E. L. Davis, and **T. J. Baum** 2002. Secrets in secretions: genes that control nematode parasitism of plants. ***Brazilian Journal of Plant Physiology*** 14:123-135.

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<u>Peer-reviewed Journal Articles</u>

2021

In advanced preparation

Juvale, P. S., Pogorelko, G., Song, X., Mitchum, M. G., Hewezi, T., Walley, J., and **Baum, T. J.** An animal stress response kinase cascade is functionally conserved in plants where it is targeted by a parasite effector to suppress plant defenses.

Clouse, S., Maier, T. R., Masonbrink, R. E., and **Baum, T. J.** From anemone predation to plant parasitism: what are the roles of ShKT domains?

Masonbrink, R. E., Maier, T. R., Severin, A., and **Baum, T. J.** Genome, methylome, and transcriptome comparisons between male and female soybean cyst nematodes.

Masonbrink, R. E., Maier, T. R., Severin, A., and **Baum, T. J.** Genome snp analyses of 15 populations of the soybean cyst nematode with varying virulence phenotypes.

Masonbrink, R. E., Maier, T. R., Severin, A., and **Baum, T. J.** Gene Expansion in the Tylenchomorpha: Detecting Genes Involved in Plant Host Rewiring.

Under review

Masonbrink, R. E., Maier, T.R., Hudson, M., Severin, A., **Baum, T.J.** A chromosomal assembly of the soybean cyst nematode genome. ***Molecular Ecology Resources***

Maier, T.R., Masonbrink, R. E., Vijayapalani, P., Gardner, M., Howland, A., Mitchum, M.G., and **Baum, T.J.** Esophageal gland RNA-seq of a virulent and an avirulent population of the soybean cyst nematode, *Heterodera glycines.* ***MPMI***

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