COLLABORATIVE RESEARCH & EDUCATION IN AGRICULTURAL TECHNOLOGIES & ENGINEERING

2014 CREATE-IGERT SYMPOSIUM

May 30, 2014
UC Davis

COLLABORATIVE RESEARCH & EDUCATION IN AGRICULTURAL TECHNOLOGIES & ENGINEERING

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(L→R) Elenor Castillo, Hyrum Gillespie, Karen McDonald, Steven Samuels, Marta Bjornson and Mitch Harkenrider ("Open Day" at Teagasc Oak Park, Carlow, Ireland, June 26, 2013)

Collaborative Research and Education in Agricultural Technologies and Engineering (CREATE)

IGERT Symposium and Distinguished Lecture
Genome Center, UC Davis

May 30, 2014

Welcome to the 2013-2014 CREATE-IGERT Distinguished Lecture and Symposium!

The Integrative Graduate Education and Research Traineeship (IGERT) program is a National Science Foundation program that encourages new approaches to interdisciplinary graduate education to prepare students to tackle complex, multifaceted real-world problems. The Collaborative Research and Education in Agricultural Technologies and Engineering (CREATE) IGERT, is a multi-institutional, international educational partnership between UC Davis, Tuskegee University, the National University of Ireland, Galway, the National University of Ireland at Maynooth, University College Dublin and the Teagasc Oak Park Research Centre, in Carlow, Ireland. CREATE integrates training in the plant sciences, molecular biology and engineering, to advance research and catalyze breakthroughs in the sustainable use of plants for production of non-food products ranging from biofuels to vaccines. In addition to the underlying scientific and engineering principles, trainees develop an understanding of the complex interconnected issues (environmental, ecological, sustainability, public/societal concerns, global impact, regulatory, innovation and entrepreneurship, and intellectual property), preparing them as the research, educational, business, and policy leaders of the future.

Thank you for joining us for our last symposium as we honor our trainees, alumni from our program and CREATE-IGERT affiliates (formerly funded trainees and other students working in faculty trainer labs), as well as our Tuskegee partners, faculty trainers, industry affiliates, this year's Distinguished Lecturer, Dr. Yuri Gleba, CEO of Icon Genetics and Nomad Biosciences, Halle, Germany, and International Policy Lecturer, Dr. Shane Morris, Natural Resources, Canada.

I'd especially like to thank Dr. Denneal Jamison-McClung, CREATE-IGERT Program Coordinator and Associate Director of the Biotechnology Program, Marianne Hunter, Assistant Director of the Biotechnology Program, Jacqueline Phillips and Jacqueline Balderama for their hard work in organizing this symposium.

The CREATE program is made possible through funding by the National Science Foundation (DGE-0653984), and support from the UC Davis Office of Research, Office of Graduate Studies, Biotechnology Program and Department of Chemical Engineering & Materials Science.

With warmest regards,

Karen McDonald
Director, CREATE IGERT Program
Faculty Director, UC Davis ADVANCE Program
Professor, Chemical Engineering & Materials Science

CREATE-IGERT Distinguished Lecture and Symposium Schedule
May 30, 2014
Kemper Hall, UC Davis

8:30 - 9:00am	Registration
9:00 – 9:30am	Welcome by Rich Shintaku, Office of Graduate Studies Program Overview by Prof. Karen McDonald, PI NSF CREATE-IGERT
9:30 – 9:40am	Prof. CS Prakash, Tuskegee University, “Science Communication on Agricultural Technologies”
	CREATE-IGERT Alumni Talks – Where are they now?
9:40 – 9:50am	Dr. Ben Lindenmuth, Alumnus
9:50 – 10:00am	Dr. Chris Simmons, Alumnus
10:00 – 10:10am	Dr, LaKisha Odom, Alumna
10:10 – 10:20am	Dr. Lucas Arzola, Alumnus
10:20 – 10:30am	Q/A with Alumni & Discussion of Best Training Practices
	CREATE-IGERT Guest Speakers
10:30 – 10:45am	Dr. Roger Beachy, “The UC Davis World Food Center”
10:45 – 11:00am	Break
11:00am – noon	Distinguished Lecture – Dr. Yuri Gle”ba, “Plant Biotechnology: The Future is in Transient Expression Processes”
Noon – 1:10pm	Lunch and Poster Session
1:10 – 2:00pm	International Policy Lecure – Dr. Shane Morris, “EU GM Crop Regulations and Environmental Risk: A Case of the Emperor’s New Clothes?”

CREATE-IGERT Trainee Presentations

2:00 – 2:10pm	Geoff Benn (Dehesh Lab), “A Key General Stress Response Motif is Regulated Non-uniformly by a Family of Transcription Factors”
2:10 – 2:20pm	Gregory Christopher Bernard (? Lab), “Molecular Fingerprinting Analysis of Transcripts Involved in Host Response to Disease in Developing Sweetpotato Storage Roots.”
2:20 – 2:30pm	Marta Bjornson (Dehesh & Dandekar Labs), “Identifying Novel Players in the Plant Rapid Stress Response”
2:30 – 2:40pm	Hyrum Gillespie (Dandekar Lab), “Influence of X. Fastidiosa LESA & PRTA on Biofilm Formation and the Grape Microbial Community
	Break Time!
3:00 – 3:10pm	Mitch Harkenrider (Ronald Lab), “A Wall-Associated Kinase in Rice Confers Resistance to Bacterial Blight”
3:10 – 3:20pm	Mark Lemos (Dehesh Lab), “Investigating Metabolic Conduits at the Interface of Energy Exchange”
3:20 – 3:30pm	Sonni-Ali Miller (Martinez Lab), “The Immunomodulatory Effect of Synthetic Peptide IMP10 on IL-12 Levels and Associated Lupus-Like Symptoms in NZBWF1 Mice”
3:30 – 3:40pm	Steven Samuels (Egnin Lab), “Engineering Sweetpotato (Ipomoea batatas (L.) Lam) Expressing Synthetic Lytic Peptides for the Potential Inhibition of Human Immunodeficiency Virus Replication”
3:40 – 3:50pm	Steve Zicari (Zhang Lab), “Enzymatic Liquefaction of Sugar Beets as a Versatile Biofuel Feedstock”
3:50 - 4:00pm	Closing Remarks by PI, Prof. Karen McDonald

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IGERT: Collaborative Research and Education in Agricultural Technologies and Engineering (CREATE)

NSF Award DGE-0653984
August 15, 2007 – July 31, 2012
No-cost Extension x2 – July 31, 2014

UC Davis P.I.s & Co P.I.s
Karen McDonald, Principal Investigator – UC Davis
Abhaya Dandekar, Co-Principal Investigator – UC Davis
Martina Newell-McGloughlin, Co-Principal Investigator – UC Davis
Pamela Ronald, Co-Principal Investigator – UC Davis
Jean VanderGheynst, Co-Principal Investigator – UC Davis
Denneal Jamison-McClung, Program Coordinator – UC Davis

Tuskegee University P.I.s & Co P.I.s
Walter Hill, Principal Investigator – Tuskegee University
Jesse Jaynes, Co-Principal Investigator – Tuskegee University
C.S. Prakash, Co-Principal Investigator – Tuskegee University
Deloris Alexander, Program Coordinator – Tuskegee University

In 2007, UC Davis was awarded the multi-institutional IGERT: Collaborative Research and Education in Agricultural Technologies and Engineering (CREATE) grant, under the direction of Karen A. McDonald; Department of Chemical Engineering and Materials Science, with co-PIs: Abhaya M. Dandekar, Department of Plant Sciences; Jean S. VanderGheynst, Department of Biological and Agricultural Engineering; Martina Newell-McGloughlin, International Biotechnology Program; and Pamela C. Ronald, Department of Plant Pathology. UC Davis doctoral students participating in CREATE-IGERT are members of the Designated Emphasis in Biotechnology (DEB) degree program.

Tuskegee University has participated as an official training partner, with both Masters degree and Integrative Biosciences (IBS) doctoral trainees participating program courses, symposia and internships. International training partners offering research sites for student internships and related collaborations include: National University of

Ireland, Galway, Ireland (Dr. Charlie Spillane); National University of Ireland, Maynooth, Ireland (Dr. Phil Dix); Teagasc Oak Park Research Centre, Carlow, Ireland (Dr. Ewen Mullins); and University College Dublin (Dr. James Burke).

The Collaborative Research and Education in Agricultural Technologies and Engineering (CREATE) IGERT program provides structured, well-integrated graduate research and educational training in transgenic plants and *in-vitro* plant systems for the production of industrial non-food products and biopharmaceuticals.

Research focus areas are 1) Plant-Made Products, 2) Biofuels and Biorefineries, and 3) Environmental Sustainability. Across the three broad focus areas, specific attention has been given to the scientific, engineering, environmental, regulatory, economic, intellectual property, societal and global issues associated with plant biotechnology.

Ongoing training objectives for CREATE-IGERT are to:

1. CREATE a framework for interdisciplinary graduate training that will foster an environment for revolutionary breakthroughs at the interface of plant science, biotechnology, and engineering.

2. CREATE new scientific knowledge, engineering technologies, tools, methods, processes, and global understanding to advance the fields of plant science, biotechnology, engineering and areas at the interface of these disciplines, particularly those related to the underlying theme.

3. CREATE and cultivate the integrative skill set in graduate student trainees, faculty trainers, and postdoctoral scholar participants using the underlying theme as the focus.

4. CREATE a training program to attract, retain, and graduate doctoral students from diverse backgrounds who are not only top-rated scientists and engineers but also have the variety of skills and understanding to approach problems from integrated perspectives, allowing them to become the academic, industrial, national laboratory, and/or policy leaders in areas related to the unifying theme.

5. CREATE a joint doctoral training program, with a Masters to PhD Bridge Program option, that strengthens research and graduate training linkages between UC Davis and Tuskegee University in areas related to plant biotechnology.

Designated Emphasis in Biotechnology Program (DEB)

Goals and Mission of the DEB

The Designated Emphasis in Biotechnology (DEB) is an inter-graduate group program that allows Ph.D. students to receive and be credited for training in the area of biotechnology. The DEB provides a nurturing interactive environment to promote integration of multiple disciplinary approaches to the conduct of research and to promote learning in biotechnology. The mission is to prepare well-educated students to approach problems with creativity and flexibility. The program will provide tools for the students to be leaders, visionaries, entrepreneurs, researchers and teachers in the broad area of biomolecular technology.

DEB Mission:

- To provide well-coordinated, cross-disciplinary training of graduate students in critical areas of biomolecular technology research.
- To promote interdisciplinary research environments that integrate basic biological science, engineering and computational disciplines.
- To allow cross-disciplinary training and trainee experience in a biotechnology company or cross-college laboratory.

Students come from a wide array of disciplines: Participating graduate programs currently include 29 programs: Agricultural and Environmental Chemistry; Animal Biology; Applied Science; Biochemistry, Molecular, Cellular & Developmental Biology; Biological Systems Engineering; Biomedical Engineering; Biophysics; Chemical Engineering; Chemistry; Civil and Environmental Engineering; Comparative Pathology; Computer Science; Electrical & Computer Engineering, Entomology; Food Science Technology; Genetics; Horticulture & Agronomy; Immunology; Materials Science & Engineering; Mechanical and Aeronautical Engineering; Microbiology; Molecular, Cellular & Integrative Physiology; Neurosciences; Nutritional Biology; Pharmacology & Toxicology; Plant Biology; Plant Pathology; Soils & Biogeochemistry and Statistics. The DEB program supplements a student's Ph.D. curriculum and those completing the program will obtain an official designation on their diploma & transcript indicating a qualification in biotechnology. Example: Doctoral Degree in Microbiology with a Designated Emphasis in Biotechnology

*CREATE-IGERT Trainees must be enrolled in the DEB

2013 Summer Short Course on Plant Biotechnology Policies & Regulations in Ireland

We began our journey at NUI Galway with hosts and program partners, Prof. Charlie Spillane, Dr. Edna Curley and Dr. Shane Morris.

University College Dublin

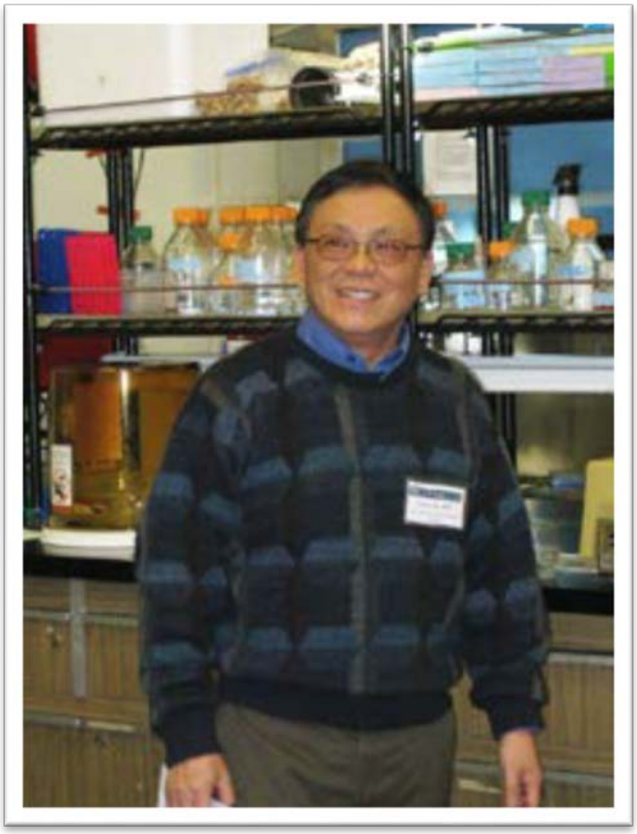
We visited "the other" UCD's Institute of Food and Health with program partner and host Dr. Jim Burke, Chair of Crop Sciences.

Teagasc…
Home of Genetically Modified Blight-Resistant Potatoes!

Dr. Ewen Mullins educates the crowd about the GM potato field trials.

Trainees at the end of a long day of plant biotech education – including a special session on the use of grains in brewing! ;)

Good Times…Summer Short Courses with Dr. Larry Joh!



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2014 NSF CREATE-IGERT Training Program Participants

Trainees

- Benn, Geoff, PhD Student, Dehesh Laboratory, Plant Biology Grad Group, Dept. of Plant Biology, UC Davis
- Bernard, Gregory Christopher, PhD Student, Egnin Laboratory, Integrative Biosciences (IBS) Training Program, Tuskegee University
- Bjornson, Marta, PhD Student, Dandekar and Dehesh Laboratories, Agronomy & Horticulture Grad Program, Dept. of Plant Sciences, UC Davis
- Butterfield, Timothy, PhD Student, Dandekar Laboratory, Plant Biology Grad Group, Dept. of Molecular & Cellular Biology, UC Davis
- Castillo, Elenor, PhD Student, Negre-Zakharov and Dandekar Laboratories, Plant Biology Grad Group, Dept. of Plant Sciences, UC Davis
- Elmore, J. Mitch, PhD Student, Coaker Laboratory, Plant Biology Grad Group, Dept. of Plant Pathology, UC Davis
- Gales, Dominique, PhD Student, Samuel Laboratory, Integrative Biosciences (IBS) Training Program, Tuskegee University
- Gillespie, Hyrum, PhD Student, Dandekar Laboratory, Plant Biology Grad Group, Dept. of Plant Sciences, UC Davis
- Harkenrider, Mitch, PhD Student, Ronald Laboratory, Plant Biology Grad Group, Dept. of Plant Pathology, UC Davis
- Kerwin, Rachel, PhD Student, Kliebenstein Laboratory, Plant Biology Grad Program, Dept. of Plant Sciences, UC Davis
- Lemos, Mark, PhD Student, Dehesh and McDonald Laboratories, Plant Biology Grad Group, Dept. of Plant Biology, UC Davis
- Miller, Sonni-Ali, PhD Student, Martinez Laboratory, Integrative Biosciences (IBS) Training Program, Tuskegee University
- Samuels, Steven, PhD Student, Egnin Laboratory, Integrative Biosciences (IBS) Training Program,Tuskegee University
- Vonasek, Erica, PhD Student, Nitin Laboratory, Biological Systems Engineering Grad Group, Dept. of Biological & Agricultural Engineering, UC Davis
- Worden, Natasha, PhD Student, Drakakaki Laboratory, Plant Biology Grad Group, Dept. of Plant Sciences, UC Davis
- Zicari, Steve, PhD Student, Zhang Laboratory, Biological Systems Engineering Grad Group, Dept. of Biological and Agricultural Engineering, UC Davis

Hyrum Gillespie, Patrick O'Dell, Steven Samuels (2011)
Rachel Kerwin, Dr. Dawn Chiniquy (Degree Awarded 2012) and Elenor Castillo (2009)

Recent Program Graduates

- Arzola, Lucas, PhD, McDonald Laboratory, Chemical Engineering Grad Group, Dept of Chemical Engineering & Materials Science, UC Davis – Degree Awarded 2012
- Chiniquy, Dawn, PhD, Ronald Laboratory, Plant Biology Grad Group, Dept. of Plant Pathology, UC Davis – Degree Awarded 2012
- Gales, Dominique, MS, Yates Laboratory, Tuskegee University – Degree Awarded 2012, *(Continuing with IBS Doctoral Program)*
- Glavan, Tiffany, PhD, S. Dandekar Laboratory, Microbiology Grad Group, Dept. of Medical Microbiology & Immunology, UC Davis – Degree Awarded 2012
- Lateef, Dalya, PhD, Bovell-Benjamin Laboratory, IBS Program, Tuskegee University – Degree Awarded 2011
- Lindenmuth, Ben, PhD, McDonald Laboratory, Chem Engineering Grad Group, Dept of Chemical Engineering & Materials Science, UC Davis – Degree Awarded 2011
- O'Dell, Patrick, MS, Jeoh Laboratory, Biological Systems Engineering Grad Group, Dept. of Biological and Agricultural Engineering UC Davis – Degree Awarded 2013
- Odom, Lakisha, PhD, Jaynes and Ankumah Laboratories, Integrative Biosciences (IBS) Program, Tuskegee University – Degree Awarded 2011
- Samuels, Steven, MS, Jaynes and Egnin Laboratories, Tuskegee University – Degree Awarded 2011, *(Continuing with IBS Doctoral Program)*
- Shange, Raymon, PhD, Ankumah and Zabawa Laboratories, Integrative Biosciences (IBS) Program, Tuskegee University – Degree Awarded 2011
- Simmons, Chris, PhD, VanderGheynst Laboratory, Biological Systems Engineering Program Graduate, Dept. of Biological &Agricultural Engineering, UC Davis – Degree Awarded 2011
- Wolf, Mark, MS, Parales Laboratory, Biochemistry & Molecular Biology Grad Group, Dept. of Microbiology, UC Davis – Degree Awarded 2010
- Zeng, Tracy, PhD Student, Liu Laboratory, Plant Biology Grad Group, Dept. of Plant Biology, UC Davis – Degree Awarded 2013

Dr. Ben Lindenmuth (Degree Awarded 2011), Prof. Karen McDonald and Dr. Lucas Arzola (Degree Awarded 2012)

Faculty & Senior Personnel

- Alexander, Deloris, Professor & Director, IBS Program, Tuskegee University
- Ankumah, Ramble, Professor, IBS Program, Tuskegee University
- Beckles, Diane, Professor, Dept. of Plant Sciences, UC Davis
- Blumwald, Eduardo, Professor, Dept. of Plant Sciences, UC Davis
- Bovell-Benjamin, Adelia, Professor, IBS Program, Tuskegee University
- Coaker, Gitta, Professor, Dept. of Plant Pathology, UC Davis
- Dandekar, Abhaya, Professor, Dept. of Plant Sciences, UC Davis & Co-PI, CREATE-IGERT
- Dandekar, Satya, Professor, Dept. of Med Microbiology & Immunology, UC Davis
- Dehesh, Katayoon, Professor, Dept. of Plant Biology, UC Davis
- Drakakaki, Georgia, Professor, Dept. of Plant Sciences, UC Davis
- Egnin, Marceline, Professor, IBS Program, Tuskegee University
- Fan, Zhiliang (Julia), Professor, Dept. of Bio & Agricultural Engineering, UC Davis
- Franz, Annaliese, Professor, Dept. of Chemistry, UC Davis
- German, Bruce, Professor, Dept. of Food Science & Technology, UC Davis
- Gibeling, Jeffery, Dean, Office of Graduate Studies & Professor, Dept. of Chemical Engineering & Materials Science, UC Davis
- Guohao, He, Professor, IBS Program, Tuskegee University
- Hill, Walter, Professor, IBS Program, Tuskegee University
- Jamison-McClung, Denneal, PhD; Assoc. Director, UC Davis Biotechnology Program; PC, CREATE-IGERT; & PC, UC Davis ADVANCE
- Jaynes, Jesse, Professor, IBS Program, Tuskegee University; & Co-PI, CREATE-IGERT
- Jenkins, Bryan, Professor, Dept. of Biological & Agricultural Engineering, UC Davis
- Jeoh, Tina, Assistant Professor, Dept. of Bio & Agricultural Engineering, UC Davis
- Joh, Larry, PhD, Dept. of Chemical Engineering & Materials Science, CREATE-IGERT Program Engineer & Short Course Instructor
- Kjelstrom, Judy, PhD; Director, UC Davis Biotechnology Program & Senior Personnel, CREATE-IGERT
- Kliebenstein, Daniel, Professor, Dept. of Plant Sciences, UC Davis
- Labavitch, John, Professor, Dept. of Plant Sciences, UC Davis
- Lagarias, J. Clark, Professor, Dept. of Molecular and Cellular Biology, UC Davis
- Lebrilla, Carlito, Professor, Dept. of Chemistry, UC Davis
- Liu, Bo, Professor, Dept. of Plant Biology, UC Davis
- Martinez, Marcia, Professor, IBS Program, Tuskegee University
- McDonald, Karen, Professor, Dept. of Chemical Engineering &Materials Science; PI, CREATE-IGERT; & Faculty Director, UC Davis ADVANCE
- Michelmore, Richard, Director, UC Davis Genome Center & Bioinformatics Program; Professor, Dept. Plant Sciences; College of Agriculture and Environmental Sciences; Professor, Dept. Molecular and Cellular Biology, College of Biological Sciences; Professor, Dept. Med Microbiology and Immunology, School of Medicine
- Neale, David, Professor, Dept. of Plant Sciences, UC Davis
- Negre-Zakharov, Florence, Professor, Dept. of Plant Sciences, UC Davis
- Newell-McGloughlin, Martina, PhD; Director, International Biotechnology Program; Advisor, UC Davis World Food Center; & Co-PI, CREATE-IGERT
- Nashar, Toufic, Professor, IBS Program, Tuskegee University
- Nitin, Nitin, Professor, Dept. of Food Science & Technology, UC Davis
- Parales, Becky, Professor, Dept. of Microbiology, UC Davis

- Prakash, CS, Professor, IBS Program, Tuskegee University; & Co-PI, CREATE-IGERT
- Ronald, Pamela, Professor, Dept. of Plant Pathology, UC Davis & Co-PI, CREATE-IGERT
- Samuel, Temesgen, Professor, IBS Program, Tuskegee University
- Savageau, Michael, Professor, Dept. of Biomedical Engineering, UC Davis
- Shoemaker, Sharon, Executive Director, California Institute Food & Agricultural Research (CIFAR), UC Davis
- Theg, Steven, Professor, Dept. of Plant Biology, UC Davis
- Tricoli, David, Manager, Ralph M. Parsons Foundation Plant Transformation Facility, UC Davis & Senior Personnel, CREATE-IGERT
- VanderGheynst, Jean, Professor, Dept. of Bio & Agricultural Engineering; Assoc. Dean of Grad Studies & Research, College of Engineering; UC Davis; & Co-PI, CREATE-IGERT
- Witola, William, Professor, IBS Program, Tuskegee University
- Williams, Luther, Professor, IBS Program, Tuskegee University
- Yates, Clayton, Professor, IBS Program, Tuskegee University
- Yilma, Tilahun, Distinguished Professor, Dept. of Pathology, Microbiology & Immunology, School of Veterinary Medicine, UC Davis
- Yoder, John, Professor, Dept. of Plant Sciences, UC Davis
- Zabawa, Robert, Professor, IBS Program, Tuskegee University
- Zhang, Ruihong, Professor, Dept. of Bio and Agricultural Engineering, UC Davis

(L→R) Dr. Raymon Shange (Degree Awarded 2011), Dr. Lakisha Odom (Degree Awarded 2011), Prof. Karen McDonald, Prof. Tilahun Yilma, Dominique Gales (MS Degree Awarded 2012), and Prof. Judy Kjelstrom (2011 Distinguished Lecture by Dr. Roger Beachy, Director USDA NIFA)

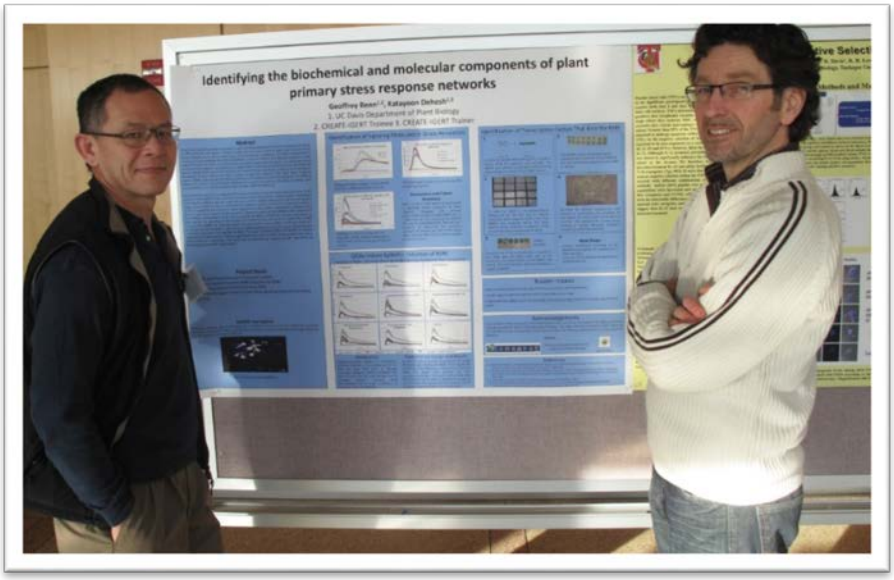
International Partners

- Spillane, Charlie, Professor, National University of Ireland, Galway (NUIG)
- Mullins, Ewen, Research Director, Teagasc, Ireland
- Dix, Phil, Professor, National University of Ireland, Maynooth
    - Burke, Jim, Professor & Chair, Crop Sciences, University College Dublin

NSF CREATE-IGERT External Advisory Board Members

- Aglan, Heshmat, Professor & Associate Dean, College of Engineering & Physical Sciences, Tuskegee University
- Castle, Linda, (Past) Research Director Trait Discovery Pioneer Hi-Bred, Verdia Campus
- Cuevas, Hector, Director of Outreach, Recruitment & Retention, UC Davis Office of Graduate Studies
- Hamann, Bernd, Professor, Dept. Computer Science, College of Engineering
- Huang, Ning, Vice President of Research & Development, Ventria Bioscience
- Roberts, Susan, Associate Professor, Dept. Chemical Engineering, & Director, UMass Institute for Cellular Engineering
- von Boxtel, Jos, Principal Scientist, GHG Reduction Program, Arcadia Biosciences, Inc.
- Yaver, Debbie, Director, Novozymes, Inc.
- Yu, Lloyd, Director of Process Development, Planet Biotechnology

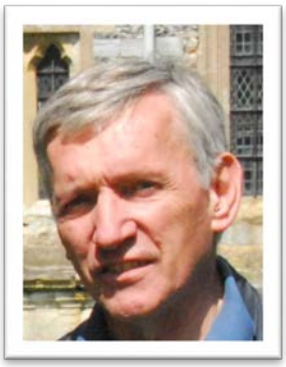
Many thanks to the current and former members of the EAB for providing their professional expertise in plant biotechnology and/or graduate education, reviewing and evaluating the CREATE-IGERT training program.



Dr. Lloyd Yu (Planet Biotechnology) and Dr. Jos van Boxtel (Arcadia Biosciences) CREATE-IGERT Symposium & EAB Meeting 2012

Distinguished Lecture

Dr. Yuri Gleba,
CEO Icon Genetics & Nomad Bioscience



International Policy Lecture

Dr. Shane Morris,
Director, Policy Leadership and Reporting,
Major Projects Management Office,
Natural Resources Canada

NSF CREATE-IGERT
2013-2014 Distinguished Lecturer

Dr. Yuri Gleba

CEO, Icon Genetics and Nomad Bioscience

"Plant Biotechnology: the Future is in Transient Expression Processes"

Friday, May 30, 2014
1065 Kemper Hall, UC Davis
11:00am -12:00pm

For our final Distinguished Lecture, NSF CREATE-IGERT is honored to host Dr. Yuri Gleba, CEO of Icon Genetics and Nomad Bioscience. Dr. Gleba has over 30 years of research and management experience in plant genetics and biotechnology, with over 200 research papers, numerous books and over 30 patent families to his credit.

For this lecture Dr. Gleba will elaborate on the transient expression technologies, such as magnICON®, developed by Icon Genetics. These new generation processes for biopharmaceutical and biomaterial production are simple and indefinitely scalable protocols for heterologous protein expression in plants, not relying on stable genetic transformation of a plant, but instead using transient amplification of viral vectors delivered to multiple areas of a plant body (systemic delivery) by *Agrobacterium*. These eclectic technologies they effectively address most of the major shortcomings of earlier plant-based technologies, have been brought to a GMP-compliant level, and are currently being used to manufacture materials for clinical trials by Icon Genetics, KBP, Fraunhofer USA, IBio, Caliber and others.

Transient technologies are also applicable for generating novel agronomic traits and biomaterials. The core process in development today at Nomad Bioscience allows rapid, transient reprogramming of plant metabolism using agrobacteria sprays, generating valuable bio-based materials. Because of its speed and versatility, this agrospray technology has the potential to become a disruptive new process that will redefine agriculture business as we know it. In particular, the time to market for traits delivered by transient processes will be significantly shorter, the repertoire of traits and crops is expected to be much broader, and the genes encoding traits do not have to be built into the plant variety's genome, thus allowing for 'germplasm-independent' business models, like those of agrochemical manufacturers.

NSF CREATE-IGERT
2013 - 2014 International Policy Lecture

Dr. Shane Morris
Director, Policy Leadership and Reporting,
Major Projects Management Office,
Natural Resources Canada.

"EU GM Crop Regulations and Environmental Risk: A Case of the Emperor's New Clothes?"

Friday, May 30, 2014
1065 Kemper Hall, UC Davis
1:10pm - 2:00pm

NSF CREATE-IGERT is honored to host **Dr. Shane Morris, Director, Policy Leadership and Reporting, from the Major Projects Management Office, which is part of Natural Resources Canada** within the Canadian federal government. In this role he leads a team of policy experts working to improve the Canadian regulatory framework for major natural resource projects. Dr. Morris has over 10 years of experience at the science-policy interface working on high profile risk issues within the Canadian public service. Dr. Morris holds a **doctoral degree at the National University of Ireland, Galway in the area of plant biotechnology risk management** and has published widely in the area of plant biotechnology regulation, risk and policy.

In this lecture Dr. Morris will **explore the European Union's (EU) regulatory framework for GM crops** and provide a critical analysis of its functioning and evolution. As a key element of the biotechnology value chain, regulatory frameworks play a critical role in determining the success or failure of the commercialization of biotechnology products. However, over the last 20 years the EU has largely failed to create a stable and predictable regulatory and policy environment regarding GM crops. As a result, use of GM technology in the EU is limited to animal feed and food use, while other modern plant biotechnologies that carry equal or more risk are permitted for field use. Understanding the factors that have shaped plant biotechnology risk management policy in Europe provides important lessons to the science community and the political establishment in regards to the development of regulatory oversight models pertaining to emerging innovative technologies.

Oral Presentations

(Alphabetical by Presenter Surname)

A KEY GENERAL STRESS RESPONSE MOTIF IS REGULATED NON-UNIFORMLY BY A FAMILY OF TRANSCRIPTION FACTORS

Geoffrey Benn*, Chanquan Wang, Derrick Hicks, Jeffrey Stein, Cade Guthrie, and Katayoon Dehesh

Department of Plant Biology, University of California, Davis, CA

Due to their sessile growth habits, it is particularly important for plants to have the ability to rapidly perceive and respond to environmental stresses, such as insect attack, temperature extremes, or infection by pathogens. A key component of this response is the rapid reprogramming of gene expression. This reprogramming can be mediated by proteins called transcription factors (TFs), which bind specific DNA sequences, called *cis*-elements, which act as regulatory switches for adjacent genes. Previous work in our lab identified a *cis*-element, called the Rapid Stress Response Element, which can confer a rapid transcriptional response to diverse stresses. Here, we examine the role of 4 members of a family of TFs that were previously shown to bind the RSRE. We demonstrate that these TFs function independently and coordinately to regulate responses of the RSRE to stresses. This work adds to our understanding of how plants rapidly reprogram their transcriptomes in response to stress and suggests potential targets for modifying that response.

*** CREATE-IGERT Trainee**

MOLECULAR FINGERPRINTING ANALYSIS OF TRANSCRIPTS INVOLVED IN HOST RESPONSE TO DISEASE IN DEVELOPING SWEETPOTATO STORAGE ROOTS

Gregory C. Bernard* [1], Marceline Egnin [1], **Steven Samuels* [1],** Desmond Mortley[1], William Witola[1], Kathy Lawrence [2]and Conrad Bonsi[1]

Department of Agriculture and Environmental Sciences, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee Alabama, 36088.
[2]Department of Entomology and Plant Pathology, College of Agriculture, Auburn University, Auburn, Alabama 36830.

Sustainable sweetpotato production is constrained by the presence of disease resulting in decreased crop yields and overall quality. The deployment of newly developed resistant cultivars is a viable option in integrated pest management tactics, and requires effective molecular screening analysis before the release of commercial lines. In this study, a preliminary molecular fingerprinting analysis was conducted using putative resistant and susceptible sweetpotato cultivars to investigate differential expression patterns of molecular markers involved in the host response to disease. Increased expression of a disease resistance like transcript LRP was shown in the putative resistant cultivar CR in comparison to the putative susceptible cultivar WL. Elevated levels of gene expression in transcripts involved in universal stress, transcriptional regulation and pathogenesis related was demonstrated in the susceptible variety in comparison to the resistant at the time of harvest, which may indicate a lack of early gene expression in the susceptible cultivar. Differential expression patterns in transcript derived fragments were demonstrated between cultivars under field conditions and in genotypes inoculated with the root knot nematode *Meloidogyne incognita*. Our results confirm gene expression differences indicative of specific genotype responses to pathogen infection.

***CREATE-IGERT Trainee**

IDENTIFYING NOVEL PLAYERS IN THE PLANT RAPID STRESS RESPONSE

Marta Bjornson*, Luca Comai, Annaliese Franz, Georgia Drakakaki, and Katayoon Dehesh

Department of Plant Biology and Plant Sciences, University of California, Davis, CA

Stress perception and response is of fundamental importance for plant survival in the constantly-changing environment. In addition to a multitude of long-term stress-specific transcriptional regimes, plants engage in a rapid and transient general stress response (GSR), mediated in part by the Rapid Stress Response Element (RSRE) *cis* element. To investigate the GSR in plants, we used *4xRSRE:LUC* reporter plants in complementary approaches of forward genetic and chemical genetic screens. In these screens we have isolated several mutants, both in genes known to be involved in rapid stress responses and in previously unidentified stress response regulators. Concurrently, through chemical genetics we have confirmed the importance of several of these genes, as well as identifying other processes interacting with the stress response. The results of this complementary screening unveil the underlying components of GSR network, and further define their distinct roles in regulating this key biological process.

***CREATE-IGERT Trainee**

INFLUENCE OF *X. FASTIDIOSA* LESA & PRTA ON BIOFILM FORMATION AND THE GRAPE MICROBIAL COMMUNITY

Hyrum Gillespie*, Hossein F. Gouran, and Abhaya M. Dandekar

Department of Plant Sciences, University of California, Davis

In California, the $2.7 billion dollar wine, table grape, and raisin industry is threatened by Pierce's Disease (PD), a vector-transmitted disease which causes a scorched leaf phenotype and eventual vine death. From 1994-2000 over 1000 acres of grape were destroyed due to Pierce's Disease, and current control costs are estimated to be approximately $110 million annually. The causative agent of Pierce's Disease is Xylella fastidiosa, with subspecies known to cause diseases in a variety of economically important crops including citrus, alfalfa, peach, plum, almond, coffee, and pear. Pierce's Disease researchers have known for several years that X. fastidiosa abundance and symptom severity are not colocalized in the leaf. The Dandekar lab have recently identified several proteins secreted by X. fastidiosa which we have associated with Pierce's Disease symptoms. We hypothesize that these proteins, LesA & PrtA, are involved in the self-regulation of X. fastidiosa biofilm and may be used by the bacterium to regulate and control biofilm in its surrounding microbial community. We propose that these proteins will be useful in combating Pierce's Disease and may prove useful in the control of diverse microbial biofilms.

***CREATE-IGERT Trainee**

A WALL-ASSOCIATED KINASE IN RICE CONFERS RESISTANCE TO BACTERICAL BLIGHT

Mitchell Harkenrider* and Pamela C. Ronald

Department of Plant Pathology, University of California, Davis, CA

In a protein-protein interaction study, the wall-associated kinase, WAK25, emerged as a candidate regulator of biotic stress responses in rice. When overexpressed, WAK25 increases plant defense response and confers enhanced resistance against the bacterial pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*). The WAK25-overexpressed rice lines show decreased disease symptoms when infected with *Xoo* in comparison to the wild-type control. Furthermore, qPCR-based data shows enhanced expression of NH1, the rice homolog of NPR1, the salycilic acid (SA) regulator in *Arabidopsis*. In addition, these lines have increased transcript of other key defense genes including PR10, PAL, and PBZ1.

The initial protein-protein interaction screens that identified WAK25 as a key stress regulator also uncovered a strong interaction between WAK25 and a protein phosphatase, XB15. Double overexpression of both XB15 and WAK25 in the same plant compromises the strong resistance phenotype of WAK25 overexpression alone when challenged with Xoo. Correspondingly, defense gene expression is decreased in the double overexpression line suggesting a negative regulatory role for XB15 in WAK25-mediated immunity.

***CREATE-IGERT Trainee**

INVESTIGATING METABOLIC CONDUITS AT THE INTERFACE OF ENERGY EXCHANGE

Mark Lemos*, S Khoshhal, and Katayoon Dehesh

Department of Plant Biology, University of California, Davis, CA

Currently, the demand for plant oil has grown to over 125 million tonnes per year – a figure projected to double by 2030. Plant oils, which consist almost entirely of triacylglycerols (TAG), are one of the most energy rich and abundant forms of reduced carbon in nature. The similarity in chemical structure between TAGs and fossil fuels establishes them as an attractive and feasible bio-based alternative to petroleum-based fuel. Seeds are the primary source of plant oils but represent a relatively small portion of the total biomass. The long-term goal of this project is engineer high levels of TAG into the vegetative tissue of a high biomass crop in order to provide an economically viable source of plant oils.

Towards this goal, our lab previously used two closely related oat cultivars (**high oil** and **low oil** seeds) to identify a number of candidate genes involved in rechanneling starch to oil production. Among the candidates, I chose to focus on a robustly upregulated **chimeric** candidate gene putatively encoding a member of voltage dependent anion channel (VDAC) fused to a heat shock protein, two members of genes conserved among eukaryotes. Although the role of chimeric transcript is not yet clear, previous reports have demonstrated physical interaction between heat shock proteins and VDAC isoforms that in one report modulated the conductivity of the channel. Using a yeast two hybrid system, we were able confirm an interaction between heat shock domain and VDAC domains of the chimeric VDAC. Additionally, we have also established the functionality of the chimera by complementation assay in a yeast VDAC mutant. To understand the biological function of the chimeric VDAC and domains in plants, I have generated the transgenic lines in *Arabidopsis* to determine 1) the subcellular localization, 2) potential role in plant stress responses by the virtue of its postulated function in exchange of energy currency between mitochondrion and cytosol and 3) impact on potential diversion of starch to oil when combined with the appropriate oil biosynthesis enzyme.

***CREATE-IGERT Trainee**

THE IMMUNOMODULATORY EFFECT OF SYNTHETIC PEPTIDE IMP10 ON IL-12 LEVELS AND ASSOCIATED LUPUS-LIKE SYMPTOMS IN NZBWF1 MICE.

Sonni-Ali Miller*, Manelisi.V. Nhliziyo, Sheryce C. Henley, F. R. Davis, H. Lopez, Jesse M. Jaynes and Maria T. Martinez

Department of Biology, Tuskegee University, Tuskegee, AL

Systemic lupus erythematosus (SLE) is a chronic, inflammatory, multisystem disorder of the immune system characterized by a protean syndrome and caused by an aberrant immune response. SLE pathogenesis is complex resulting in a disease with heterogeneous manifestations. Cytokines often play direct roles in SLE pathogenesis, with abnormal levels of multiple cytokines present in the sera of SLE patients. An example of this is the pro-inflammatory cytokine, interleukin 12 (IL-12). Elevations in IL-12 levels are reported in individuals with active SLE and are associated with increases in renal and pulmonary damage. Thus, modulation of cytokine levels provides a viable target for SLE treatments. One promising avenue for development of potential treatments for SLE is the use of synthetic peptides as immunomodulatory agents. Membrane lytic peptides are small proteins that are major components of the antimicrobial defense systems of numerous organisms. Several of these peptides are reported to have immunomodulatory and anti-inflammatory effects in vivo. IMP10 is a potentially immunomodulatory derivative of the synthetic lytic peptide D2A21. In previous studies, administration of this peptide in pulmonary fibrosis models created a 10-fold reduction in IL-12 levels. Thus, using NZBWF1 as a mouse model of SLE, we hypothesize that administration of 10N will reduce pro-inflammatory cytokine levels and alleviate symptoms of SLE in the mice. To determine this 24 female NZBWF1 mice were separated into two groups (pre- and post-diseased). Half of the animals of each group were treated with 154µM 10N peptide suspended in 100 µl of sterile saline. The other half (controls) were injected only with 100 µl of sterile saline. Pre-diseased animals were treated at age 10 wks whereas post-diseased animals were treated at age 18 weeks. All treatments were delivered subcutaneously. Blood was collected bi-weekly for 14 weeks and the sera analyzed for the presence of IL-12 and antiDNA antibodies. Animals were humanely euthanized, and the kidneys, lungs, hearts, brains and spleens collected for histopathological analyses. We predict that there will be a significant reduction in the presence of IL-12 and a corresponding reduction in organ damage in animals receiving 10N peptide treatments when compared with animals in control groups.

***CREATE-IGERT Trainee**

ENGINEERING SWEETPOTATO (IPOMOEA BATATAS (L.) LAM*J* EXPRESSING SYNTHETIC LYTIC PEPTIDES FOR THE POTENTIAL INHIBITION OF HUMAN I.MMUNODEFICIENCY VIRUS REPLICATION

Steven Samuels*, Marceline Egnin and Toufic Nashar

Department of Plant and Soil Sciences, Tuskegee University, Tuskegee, AL

The development of plants to produce therapeutic compounds can be used to supply low-cost drugs and vaccines for major diseases such as HIV to the developing world. Treatments of infectious diseases in humans and animals have traditionally been targeted by chemically synthesized drugs, with the majority of the burden of cost falling on the individual in need of treatment. With the new revolution of producing therapeutic compounds, such as peptides in plant based systems, the cost of production is dramatically decreased. The action of most antimicrobial peptides induces membrane defects such as phase separation or membrane thinning, pore formation, and bilayer disruption. Antimicrobial peptides have also been found to target intracellular molecules, such as DNA/RNA or enzymes. Synthetic lytic peptides *jc41n* and *jc41nd,* capable of inhibiting the progression of HIV have been developed at Tuskegee University and expressed in sweetpotato. Seven transgenic plantlets were PCR positive using primers specific for the JC genes, and primers targeting the 35S promoter and NOS terminator. The presence of the JC protein from plant extracts are currently being detected by Western blot using antibodies derived from injection of peptide protein in mice. To test efficacy and toxicity, crude and purified sweetpotato extracts showed minimal peptide cytotoxicity in dosing trials using Jurket cells in 4, 8, 12, and 18 hr treatments; prior to downstream dosing tests in mice. Further analysis using Southern blot on genomic DNA from PCR positive transformants, parental non transformed control, and JC plasmids will confirm stable integration of the transgene and gene insertion number by qPCR. Following verification of efficacy and dosing regiments for extracted proteins, confined field trials will test agronomic evaluation and performance to demonstrate plant merit. Successful development and approval of sweetpotato expressing this novel therapeutic compound can be both a powerful tool in treatment of the HIV epidemic, as well as a road map for future treatment of viral mediated diseases.

***CREATE-IGERT Trainee**

ENZYMATIC LIQUEFACTION OF SUGAR BEETS AS A VERSATILE BIOFUEL FEEDSTOCK

Steven Zicari*, Natthiporn Aramrueang, and Ruihong Zhang

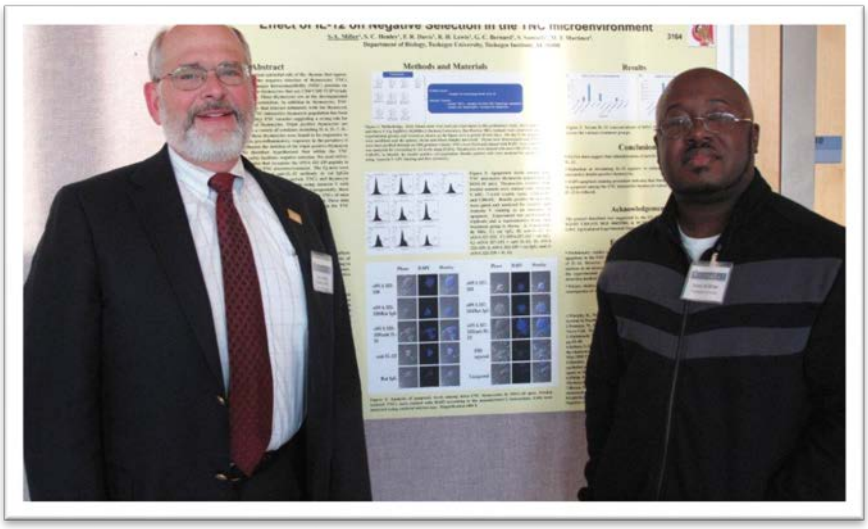
Department of Biological and Agricultural Engineering, University of California, Davis, CA

Sugar beets are an extremely efficient, high sugar yielding industrial crop and show potential for further yield increases when considered for non-food applications. However, special attention must be paid to efficient production and processing means to ensure favorable economic, environmental, and food security aims can be achieved. Under investigation is a process whereby sugar beet is ground and enzymatically liquefied to enable high solids (approximately 20% total solids) fermentation. This process is compatible with conventional downstream fermentation infrastructure, reduces the need for a hot water diffusion step and can increase fermentable sugar content by 10% over traditional methods. The effect of commercial cellulase and pectinase loadings and selection and pretreatment temperatures were evaluated for their impact on viscosity profiles to aid industrial scale-up efforts, which include plant design efforts by a California based sugar beet to ethanol development group under construction and with a planned demo-plant startup date for Fall 2014.

***CREATE-IGERT Trainee**

Poster Session

(Alphabetical by Presenter Surname)



UC Davis Vice-Provost & Dean of Graduate Studies, Prof. Jeff Gibeling with Sonni-Ali Miller (2012)

Mitch Harkenrider, Elenor Castillo, Dawn Chiniquy & Rachel Kerwin (2011)

CREATE-IGERT TRAINEE: Gregory C. Bernard

MOLECULAR FINGERPRINTING ANALYSIS OF TRANSCRIPTS INVOLVED IN HOST RESPONSE TO DISEASE IN DEVELOPING SWEETPOTATO STORAGE ROOTS.

Presenter:	Gregory C. Bernard
Authors:	**Gregory C. Bernard***, Marceline Egnin[1], **Steven Samuels*[1,]** Desmond Mortley[1], William Witola[1], Kathy Lawrence [2] and Conrad Bonsi[1]
Affiliations:	Department of Agriculture and Environmental Sciences, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL; [2]Department of Entomology and Plant Pathology, College of Agriculture, Auburn University, Auburn, AL
Preceptors:	Dr. Marceline Egnin and Dr. William Witola

Sustainable sweetpotato production is constrained by the presence of disease resulting in decreased crop yields and overall quality. The deployment of newly developed resistant cultivars is a viable option in integrated pest management tactics, and requires effective molecular screening analysis before the release of commercial lines. In this study, a preliminary molecular fingerprinting analysis was conducted using putative resistant and susceptible sweetpotato cultivars to investigate differential expression patterns of molecular markers involved in the host response to disease. Increased expression of a disease resistance like transcript LRP was shown in the putative resistant cultivar CR in comparison to the putative susceptible cultivar WL. Elevated levels of gene expression in transcripts involved in universal stress, transcriptional regulation and pathogenesis related was demonstrated in the susceptible variety in comparison to the resistant at the time of harvest, which may indicate a lack of early gene expression in the susceptible cultivar. Differential expression patterns in transcript derived fragments were demonstrated between cultivars under field conditions and in genotypes inoculated with the root knot nematode *Meloidogyne incognita*. Our results confirm gene expression differences indicative of specific genotype responses to pathogen infection.

***CREATE-IGERT Trainee**

CREATE-IGERT TRAINEE: Marta Bjornson

FORWARD GENETICS AND CHEMICAL GENETICS DECIPHER THE PLANT RAPID STRESS RESPONSE

Presenter: Marta Bjornson
Authors: **Marta Bjornson*,** Xingshun Song, Natasha Worden, Georgia Drakakaki, Katayoon Dehesh
Affiliations: Department of Plant Biology, Department of Plant Sciences,Horticulture and Agronomy Graduate Group, Designated Emphasis in Biotechnology Program
Preceptor: Dr. Katie Dehesh and Dr. Abhaya Dandekar

As sessile organisms, plants are unable to escape biotic and abiotic stresses in their environment. The elaborate chemical and physical responses plants have evolved for each individual stress have been extensively studied, but the initial steps of stress perception and rapid response are less well characterized. Dehesh lab studies a *cis* element, the Rapid Stress Response Element (RSRE), present in promoters of genes upregulated rapidly and transiently in response to wounding. The RSRE is sufficient to confer transcription following many different biotic and abiotic stresses. In order to better understand the perception and signaling events leading to this transcription, I am performing a forward genetic screen for mutants with altered expression of the reporter enzyme firefly luciferase under the control of a synthetic RSRE-containing promoter (*4xRSRE::LUC*). Mutant and parent plants are further tested for altered *4xRSRE::LUC* expression following application of a library of chemicals known to exert a biological function, as evidenced by their ability to inhibit pollen tube germination. I have thus far identified several mutant plants with constitutive *4xRSRE::LUC* expression, and several with altered degree of expression following wounding. The identities of the mutated genes suggest previously unknown players in RSRE regulation. Additionally, I have identified several chemicals able to induce *4xRSRE::LUC* expression or to suppress *4xRSRE::LUC* expression in a constitutive mutant. The structures and known activities of these chemicals suggest interactions between known plant signaling pathways and RSRE signaling. These results present multiple avenues to pursue in decoding the events in early plant stress perception and signaling.

***CREATE-IGERT Trainee**

CREATE-IGERT TRAINEE: Dominique N. Gales

DOCETAXEL EFFECTS ON HUMAN PROSTATE STROMAL AND CANCER CELL LINES

Presenter: Dominique N. Gales

Authors: **Dominique Gales*,** Khalda Fadlalla, Upender Manne, Clayton Yates, and Temesgen Samuel

Affiliations: Department of Pathobiology, Veterinary Medicine, Nursing and Allied Health, Tuskegee University, Tuskegee, AL; Department of Pathology, University of Alabama at Birmingham, Birmingham, AL

Preceptor: Dr. Temesgen Samuel

Docetaxel (D) is a clinically used front-line chemotherapeutic agent for castration resistant advanced prostate cancer (Pca). However, its long-term benefits are limited**,** with most patients eventually progressing because of inherent or acquired drug resistance. The treatment of advanced Pca is a significant challenge and there are no effective treatments that stably suppress the disease. The mechanisms behind the resistance to Docetaxel are not fully understood. It is well accepted that tumor microenvironment is essential for tumor cells survival, cancer progression and metastasis. However, the mechanisms by which tumor cells interact with their surrounding at different stages of cancer development or during chemotherapy are largely unidentified. The central goal is to identify the cellular and biochemical responses of stromal cells in tumor microenvironment with which prostate cancer cells interact. Specifically, the interaction of prostate cancer cells with stromal cells of the prostate or the bone microenvironment in the presence of clinically used cancer therapeutics will be examined. Key regulators of these interactions will also be identified. Such regulators include cytokines, growth factors, proteins, and their receptors. By identifying these regulators and their contribution to tumor drug response, novel therapeutics targeted to the microenvironment can be developed. Therefore, we hypothesize that the response of prostate stromal cells exposed to chemotherapeutic agents could modify drug response or therapeutic outcome of prostate cancer. Cellular proliferation was analyzed by MTT assay. The IC_{50} of Docetaxel for WPMY-1 (normal stromal), LNCaP (androgen dependent), DU-145 (androgen independent), and HS27A (bone stromal) showed inhibitory effects between 2-10nM. Cell cycle profiles were assessed by flow cytometry. The analysis showed that Docetaxel (2-50nM) induced prominent G2-M arrest in prostate and stromal cells within 24 hours. Gene expression profiling of prostate cancer and stromal cells lines were evaluated. To obtain the expression profiles, we conducted a human cytokines and chemokines array, which consisted of 84 specific genes. Analysis of the prostate cancer and stromal cells treated with Docetaxel revealed differential expression patterns. These results suggest Docetaxel exhibits strong anti-proliferative effects and analysis of the gene array suggest regulation of genes associated with, cell growth, survival, proliferation, metastasis, angiogenesis, and apoptosis**.**

***CREATE-IGERT Trainee**

CREATE-IGERT TRAINEE: Mitchell Harkenrider

OVER-EXPRESSION OF A WALL-ASSOCIATED KINASE IN RICE CONFERS RESISTANCE TO XANTHAMONAS ORYZAE

Presenter: Mitchell Harkenrider
Authors: **Mitchell Harkenrider***, Rita Sharma, and Pamela Ronald
Affiliations: Department of Plant Pathology, Plant Biology Graduate Group, Designated Emphasis in Biotechnology Program
Preceptor: Dr. Pam Ronald

In a protein-protein interaction study, the wall-associated kinase, WAK25, emerged as a candidate regulator of biotic stress responses in rice. When overexpressed, WAK25 increases plant defense response and confers enhanced resistance against the bacterial pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*). The WAK25-overexpressed rice lines show decreased disease symptoms when infected with *Xoo* in comparison to the wild-type control. Furthermore, qPCR-based data shows enhanced expression of NH1, the rice homolog of NPR1, the salycilic acid (SA) regulator in *Arabidopsis*. In addition, these lines have increased transcript of other key defense genes including PR10, PAL, and PBZ1.

The initial protein-protein interaction screens that identified WAK25 as a key stress regulator also uncovered a strong interaction between WAK25 and a protein phosphatase, XB15. Double overexpression of both XB15 and WAK25 in the same plant compromises the strong resistance phenotype of WAK25 overexpression alone when challenged with Xoo. Correspondingly, defense gene expression is decreased in the double overexpression line suggesting a negative regulatory role for XB15 in WAK25-mediated immunity.

***CREATE-IGERT Trainee**

EXPRESSION OF RECOMBINANT HUMAN BUTYRYLCHOLINESTERASE IN NICOTIANA BENTHAMIANA AND ITS PRODUCTION IN-VITRO GLYCOSYLATION MODIFICATION

Presenter: Salem Al-Kanaimsh, Bryce Hashimoto
Authors: **Salem Al-Kanaimsh**[1], Somen Nandi[2], Min Sook Hwang[3], Andrés Guerrero[4], Yanhong Li[4], Lucas Arzola[1], Bryce Hashimoto[1], Aye Tu[5], My Phu[5], Abhaya M. Dandekar[5], Bryce W. Falk[3], Xi Chen[4], Carlito Lebrilla[4], Raymond Rodriguez[2] and Karen A McDonald[1]
Affiliations: (1)Chemical Engineering and Materials Science, (2)Molecular & Cellular Biology, (3)Plant Pathology, (4)Department of Chemistry, (5)Plant Science

Human butyrylcholinesterase (hBChE EC 3.1.1.8) is a 574 amino acid cholinesterase-hydrolyzing enzyme. Organophosphates (OP) are highly toxic inhibitors of the acetylcholine-hydrolyzing enzymes like hBChE. The resulting accumulation of acetylcholine can lead to respiratory collapse and death. Current therapies are based on elevating the serum levels of OP bioscavengers like BChE. The major limitation of this therapy is high cost, with plasma-derived hBChE costing more than $10,000/treatment. Limitations like cost and availability necessitate an alternative expression platform capable of large scale, low-cost production of a fully active and efficacious recombinant hBuChE (rhBChE). The development of an effective rhBChE is a pressing national security concern in terms of protecting the nation's warfighters and civilian population from the threat of attack with OP agents.

We describe the use of viral amplicon-based gene expression systems based on either *Tobacco mosaic virus* (TMV) and *Cucumber mosaic virus* (CMV) to express functional rhBChE in *Nicotiana benthamiana* using transient agroinfiltration. Because hBChE is a glycoprotein with nine potential N-glycosylation sites, the glycan structures of the plant-made rhBChE were also characterized. For each expression system, two constructs were made to target the protein to the apoplastic compartment (Apo) of the plant cell or to retain the protein at the endoplasmic reticulum (ER). As expected the variation in subcellular localization resulted in different glycosylation patterns of the recovered butyrylcholinesterase. Retaining the protein at the ER yields a high mannose N-glycans structure, while targeting the protein to the apoplastic compartment yields a complex N-glycan structure. In each of the four different constructs (Apo-TMV, ER-TMV, Apo-CMV and ER-CMV), a 3X FLAG tag is used at N-terminal of the protein for protein identification and purification. Here, we report the expression level of the four different expression systems and the N-glycan structure of the ER retained and apoplast targeted proteins.

Six days post infiltration, the expression level of functional rhBChE using the ER-TRBO, Apo-TRBO, ER-CMVar and Apo-CMVar expression systems are 14.6, 6.6, 0.74 and 2.9 mg/kg FW respectively. The glycan structure of purified ER-retained butyrylcholinesterase reveals almost all the N-glycan having a high mannose structure with insignificant amount of paucimannosidic-type N-glycan. While, the glycan structure of Apo targeted protein reveals a mixture of N-glycans consisting mainly of complex N-glycans (80%), high mannose structure (10%), and paucimannosidic-type N-glycan (10%). We found all nine sites occupied by typical plant glycans.

It is also known that plants are incapable of sialylating glycoproteins naturally and that sialylation is essential for the normal serum half-life of proteins. To increase the number of sialic acid residues per rhBChE molecule, we systematically added GlcNAC, galactose and sialic acid to branch-termini of plant N-glycans using multistep enzymatic reactions (i.e., *in vitro* sialylation). While preliminary results are encouraging, more characterization of ER-retained and apoplast-targeted rBuChE is needed. Because 30% of all commercial biopharmaceuticals are glycoproteins, these results could make plant-made pharmaceuticals a viable alternative to mammalian or insect expression systems.

CO-EXPRESSION OF ENDOGLUCANASE AND XYLANASE IN *NICOTIANA BENTHAMIANA* PLANTS USING RECOMBINANT *CUCUMBER MOSAIC VIRUS*

Min Sook Hwang[1], Elizabeth A. Anthony[2], Karen A. McDonald[2], Bryce W. Falk[1]
[1]Department of Plant Pathology, University of California, Davis
[2]Department of Chemical Engineering and Materials Science, University of California, Davis
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Plant cell wall degrading enzymes, endoglucanase and xylanase, degrade cellulose. These enzymes are used in various applications including the pulp, paper, food, textile, detergent and bioconversion industries. Lignocellulosic biomass is an abundant, renewable source of carbohydrates and can be used to produce biofuels such as ethanol. To make a cellulosic biofuel, lignocellulose must first undergo processing that may include pretreatment, saccharification and/or liquefaction. However, pretreatment processes and cellulase production needed for efficient lignocellulose degradation can be quite expensive.

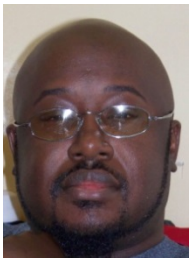
Previously, we reported a *Cucumber mosaic virus* (CMV)-based protein production system; the tripartite, autonomously replicating CMV (*CMVar*, CMV-based advanced replicating) and used it to produce full-length *Acidothermous cellulyticus* endoglucanase 1 (E1) in *N. benthamiana* plants at as much as 0.4% TSP. Because efficient plant cell wall degradation requires mixtures of enzymes, co-expression of these in the same cell, or at least in the same plant is very desirable. If transient expression using plant viral amplicons could be used for this, it would save the time and labor needed to generate a transgenic plant, and could be more cost-effective.

The tripartite *CMVar* system has some advantages for simultaneous expression of two proteins, even in the same cell. We expressed desirable proteins in plants by inserting genes in place of the CP gene on CMV RNA 3. We reasoned that it might be possible to mix different recombinant CMV RNA 3 constructs and obtain expression of both upon infection. Moreover, the MP, also encoded on RNA 3, is not essential for the *CMVar* replication, and a gene of interest could be inserted in place of the MP gene and another into the CP coding region, thus yielding a form of RNA 3 recombinant for two separate genes expressed within the same cell.

For this purpose, we developed here a co-expression *CMVar* system expressing GFP (green fluorescent protein) and RFP (red fluorescent protein) simultaneously in same cell. In addition, two cell wall degrading enzymes, E1 and xylanase, were produced simultaneously in a single plant using this transient expression system.

CREATE-IGERT TRAINEE: Sonni-Ali Miller

THE EFFECTS OF IL-12 ON THYMOCYTE APOPTOSIS IN THE TNC MICROENVIRONMENT



Presenter: Sonni-Ali Miller

Authors: **S-A. Miller*,** S. C. Henley[1], F. R. Davis[1], R. H. Lewis[1], S. Mills[1], J. Wheeler, A. Walker and M. T. Martinez

Affiliations: Department of Biology, CAS, Tuskegee University

Preceptor: Dr. Maria T. Martinez

Autoimmune diseases result from a dysfunction of the immune system in which the body attacks its own organs, tissues, and cells. Some autoimmune diseases, such as systemic lupus erythematosus (SLE) present far more frequently in women of African, Hispanic or Asian descent, often with greater involvement of vital organs. SLE results from a loss of tolerance to multiple self-antigens, and is characterized by autoantibody production and inflammatory cell infiltration in target organs, such as the kidneys and brain. Understanding of the mechanisms associated with this loss of tolerance may lead to more effective therapies and treatments for autoimmune disorders. Thymic nurse cells (TNCs) are cortical epithelial cells of the thymus that appear to play a significant role in central tolerance of T-cells. TNCs specifically interact with and internalize $CD4^{+}CD8^{+}TCR^{lo}$ double positive (DP) thymocytes. These thymocytes are undergoing MHC restriction, a process where the cells learn to recognize self MHCs. Additionally, DP thymocytes are reported to be non-responsive to a variety of cytokines, yet responsive to IL-12. Although IL-12 promotes pro-inflammatory responses in the periphery, it influences the deletion of the DP thymocytes in the thymus. Therefore, we hypothesize that IL-12 must play some role in the interaction between TNCs and DP thymocytes. Using a combination of *in vivo* studies in DO11.10 mice and *in vitro* TNC/thymocyte co-culture studies we analyzed the effects of IL-12 depletion and supplementation, respectively. The number of apoptotic thymocytes associated with the membrane region of the TNCs was less in animals injected with cOVA peptide and anti-IL-12 antibody than in animals injected with the cOVA peptide alone. Furthermore, apoptosis was found to be severely reduced among DP thymocytes in all co-cultures containing TNCs. Thymocyte rescue from apoptosis observed in cultures that included recombinant IL-12 was found to be greater than observed in cultures which did not include the cytokine. These results lead us to conclude that TNCs, through membrane-level interaction rescue DP thymocytes from apoptosis.

***CREATE-IGERT Trainee**

CREATE-IGERT TRAINEE: Steven Samuels

ENGINEERING SWEETPOTATO [*IPOMOEA BATATAS (L.) LAM*] EXPRESSING SYNTHETIC LYTIC PEPTIDE FOR THE POTENTIAL INHIBITION OF HUMAN IMMUNODEFICIENCY VIRUS REPLICATION

Presenter: Steven Samuels
Authors: **Steven Samuels***, Marceline Egnin and Toufic Nashar
Affiliations: Department of Plant and Soil Sciences, Tuskegee University
Preceptor: Dr. Marceline Egnin

The development of plants to produce therapeutic compounds can be used to supply low-cost drugs and vaccines for major diseases such as HIV to the developing world. Treatments of infectious diseases in humans and animals have traditionally been targeted by chemically synthesized drugs, with the majority of the burden of cost falling on the individual in need of treatment. With the new revolution of producing therapeutic compounds, such as peptides in plant based systems, the cost of production is dramatically decreased. The action of most antimicrobial peptides induces membrane defects such as phase separation or membrane thinning, pore formation, and bilayer disruption. Antimicrobial peptides have also been found to target intracellular molecules, such as DNA/RNA or enzymes. Synthetic lytic peptides *jc41n* and *jc41nd,* capable of inhibiting the progression of HIV have been developed at Tuskegee University and expressed in sweetpotato. Seven transgenic plantlets were PCR positive using primers specific for the JC genes, and primers targeting the 35S promoter and NOS terminator. The presence of the JC protein from plant extracts are currently being detected by Western blot using antibodies derived from injection of peptide protein in mice. To test efficacy and toxicity, crude and purified sweetpotato extracts showed minimal peptide cytotoxicity in dosing trials using Jurket cells in 4, 8, 12, and 18 hr treatments; prior to downstream dosing tests in mice. Further analysis using Southern blot on genomic DNA from PCR positive transformants, parental non transformed control, and JC plasmids will confirm stable integration of the transgene and gene insertion number by qPCR. Following verification of efficacy and dosing regiments for extracted proteins, confined field trials will test agronomic evaluation and performance to demonstrate plant merit. Successful development and approval of sweetpotato expressing this novel therapeutic compound can be both a powerful tool in treatment of the HIV epidemic, as well as a road map for future treatment of viral mediated diseases.

***CREATE-IGERT Trainee**

CREATE-IGERT TRAINEE: Erica Vonasek

INTEGRATING BACTERIOPHAGES AND EDIBLE PACKING FOR ANTIMICROBIAL FOOD COATINGS

Presenter: Erica Vonasek
Authors: **Erica Vonasek***, Juan Sanchez, Dr. Nitin Nitin
Affiliations: Department of Biological and Agricultural Engineering
Department of Food Science & Technology, Designated Emphasis in Biotechnology
Preceptor: Dr. Nitin Nitin

Controlling and eliminating common bacterial pathogens like E. coli 0157:H7 and Salmonella enterica in fresh produce is a significant challenge. This study aims to develop food grade formulations for encapsulation and controlled release of bacteriophages (phages) on fresh fruits and vegetables. Phage treatment takes advantage of phages' extreme host specificity, ability to replicate and generate more phages, and natural ability to mutate to defeat host defense mechanisms. This research is unique as it demonstrates the integration of phages with edible coatings to form a bacterial pathogen specific antimicrobial packaging material. In order to encapsulate and control release rate of phages, two formulations of films and dip coatings using the food by-product whey protein were developed. For phages encapsulated in edible film formulations, results show that phages remain stable for over 7 weeks in ambient conditions and show a burst release pattern over 3 to 5 hours in water. Controlled release measurements also show that encapsulated phages can be released upon contact with food material and maintain activity for an extended period of time. Antimicrobial testing of the films show an approximate 2log reduction in target microbes as compared to the control after 24 hours. Confocal imaging of the edible films reveals that the phages are homogenously dispersed throughout the polymer matrix. In comparing edible films and dip coatings on fresh apples and melons, both formulations exhibit different surface recoverable phage loading, with dip coatings delivering a higher concentration of phages as compared to the edible. Both formulations show similar stability on the surface with a 2log PFU loss over 1 week. The current results show that using edible films and dip coatings can store and release phage to food surfaces and control pathogen growth.

***CREATE-IGERT Trainee**

GENOMIC INTERROGATION OF THE PUTATIVE ETIOLOGIC AGENT OF EPIZOOTIC BOVINE ABORTION

Bryan Welly and Alison Van Eenennaam
Department of Animal Science, University of California, Davis, CA 95616

Epizootic bovine abortion (EBA), commonly known as "foothill abortion", is the leading cause of beef cattle abortion in California, responsible for the loss of an estimated 45,000 to 90,000 calves per year. Disease incidences for EBA have been reported in California, Nevada, and Oregon. In the 1970's, the soft-shelled tick *Ornithodoros coriaceus*, or "pajaroello" tick, was confirmed as the vector that transmits the disease. In 2005, a novel deltaproteobacterium was discovered as the etiologic agent of EBA (aoEBA). It is not possible to grow this organism in culture using traditional microbiological techniques; rather it can only be grown in experimentally-infected immunodeficient mice. This led to the development of a live bacterial vaccine consisting of a quantifiable number of aoEBA-infected mouse spleen cells. Difficulties and costs associated with production of this live bacterial vaccine motivated our investigation into the development of a recombinant vaccine as an alternative approach to help prevent EBA. The experimental objectives of this study were to assemble a reference genome for the novel aoEBA deltaproteobacterium, and identify highly transcribed bacterial genes encoding potential antigenic proteins as candidates for the development of a recombinant vaccine. DNA and RNA were extracted from spleen tissue collected from experimentally-infected immunodeficient mice 68 days following their exposure to the aoEBA deltaproteobacterium. This combination of mouse and bacterial DNA were sequenced and aligned to the mouse genome. Mouse sequences were then subtracted from the aoEBA genome and the remaining sequences were de novo assembled at 50X coverage into a 1.82 Mbp complete closed circular deltaproteobacterial genome, containing 2,250 putative protein coding sequences. The most closely related pathogen to aoEBA, *Lawsonia intracellularis*, contains 1.72 Mbp of genomic DNA. This suggests that the 1.82 Mbp of assembled aoEBA DNA is likely to represent the entire deltaproteobacterial genome. RNA was reverse transcribed and likewise sequenced and aligned to the murine genome. Sequences remaining after removal of the murine data represent genes in the aoEBA genome that are being expressed during infection. Highly expressed protein coding sequences, discovered through whole transcriptome shotgun sequencing, represent potential antigenic candidates for the development of a recombinant vaccine. The assembly of the complete circular aoEBA genome and discovery of highly expressed proteins through RNA sequencing provides the basic background information required to further the development of a recombinant vaccine for California's leading cause of abortion in beef cattle.

CREATE-IGERT TRAINEE: Natasha Worden

INVESTIGATING THE ENDOMEMBRANE TRAFFICKING PROCESSES INVOLVED IN CELL WALL DEPOSITION AND REGULATION

Presenters: Victor Esteva Esteve, Vikram Singh, McKenzie Winter
Authors: **Natasha Worden***, Victor Esteva Esteve, McKenzie Winter, Shawn Higdon, and Georgia Drakakaki
Affiliations: Department of Plant Sciences, Plant Biology Graduate Group, Designated Emphasis in Biotechnology Program
Preceptor: Dr. Georgia Drakakaki

In order to better understand and manipulate plant cell wall deposition, we need to investigate the endomembrane trafficking processes involved, because of their critical regulatory role on the cell wall. To investigate these processes, we are using chemical genomic screens, a revolutionary approach that involves the use of small molecules, rather than mutations to inactivate proteins. This is particularly useful when studying both subcellular trafficking and cell wall development because both processes often lead to lethal mutants and are difficult to be studied by traditional genetics. We are using a library of cell permeable molecules that disrupt endomembrane trafficking (Drakakaki, 2011) to elicit changes in the cell wall in *Arabidopsis thaliana.* As a result of this screen we have found a probe which selectively mislocalizes cellulose synthase (CESA) complexes and causes growth defects in *Arabidopsis* seedlings. When tested in etiolated hypocotyls, this small molecule induces the CESA complexes to aggregate into small bodies, with the complexes leaving their active localization at the plasma membrane, where they associate with microtubules. This probe also disrupts selected microtubule associated markers with previous unknown association with CESA, but not the microtubules themselves. This chemical is a potentially useful tool to investigate the movement of CESA complexes and their association with other proteins in *Arabidopsis* cells.

In parallel, we are investigating the role of proteins of previously unknown function found in the proteome of vesicles containing SYP61 for potential cell wall involvement. SYP61 (Syntaxin of Plants 61) is a SNARE protein involved in vesicle fusion, found mainly in the trans-Golgi network. SYP61-marked vesicles were extracted by affinity purification and proteomics analyses conducted on their contents (Drakakaki et al 2011). The proteome contained a high proportion of cell wall related proteins, implying a role in cell wall polysaccharide deposition. We have been screening mutants and RNAi lines for cell wall related growth defects and confirming localization of these proteins of unknown function to choose candidates for further studies.

***CREATE-IGERT Trainee**

CREATE-IGERT TRAINEE: Steven Zicari

INTEGRATED PROCESSING OF SUGAR BEETS AT THE LAB AND PILOT SCALE FOR BIOETHANOL AND BIOGAS PRODUCTION

Presenter: Steven Zicari

Authors: **Steven Zicari***, Natthiporn Aramrueang, Caitlin Asato, Chang Chen, and Ruihong Zhang

Affiliations: Department of Biological and Agricultural Engineering, Biosystems Engineering Graduate Group, Designated Emphasis in Biotechnology Program

Preceptor: Dr. Ruihong Zhang

As an extremely efficient, high-yielding industrial crop, sugar beets have the potential to supplement growing demands for renewable and advanced biofuels in the very near term. A non-traditional approach employing enzymatic liquefaction and fermentation of whole sugar beets for bioethanol combined with anaerobic digestion of stillage was developed and tested in the lab at 1-5 L bioreactor scales. A pilot demonstration of this process was conducted at the UC Davis Biogas Energy Project facility using approximately 40 tons of beets grown and harvested on campus. To achieve rapid scale-up objectives, low severity pretreatment, readily available process equipment, commercial enzymes, industrial unmodified *S. cerevisiea* and minimal fermentation controls were employed. Triplicate 5-ton batch SSF fermentations averaged 0.36 gram-ethanol per gram-initial total solids, which was approximately 90% of that achieved in the lab under similar conditions. Biogas production from stillage at both lab and pilot operations indicate specific biogas production rates over 350ml CH4/gVS are achievable and could be sufficient to offset a majority of facility fuel requirements at industrial scale. These results indicate the new beet to ethanol and biogas conversion system is simple and robust and encourage continuing research into process refinements and evaluation of economic and environmental parameters at the demonstration and commercial scale.

***CREATE-IGERT Trainee**

CREATE-IGERT

Alumni & Trainee Biosketches

(L→R) Tracy Zeng, Steven Samuels, Hyrum Gillespie, Patrick O'Dell, Dr. Larry Joh, Sonni-Ali Miller and Mark Lemos (Plant Transformation Course, 2011)

Lucas Arzola
Professor Karen McDonald Laboratory
Department of Chemical Engineering & Materials Science,
Chemical Engineering Graduate Program, UC Davis
larzola@ucdavis.edu

Education & Experience:
Lucas received his PhD. in Chemical Engineering with a Designated Emphasis in Biotechnology from UC Davis in 2012. He also graduated from University of Puerto Rico, Mayaguez with a B.S. in Industrial Biotechnology in 2007. Lucas is currently Director of Engineering Student Startup Center at University of California-Davis, President and Founder at BetaVersity, CEO and Founder at Inserogen.

Research Interests:
Lucas' graduate research focused on the constant threat of bioterrorism and the recent H1N1 flu pandemic which highlighted the importance of developing the rapid, scalable, and cost-effective production of therapeutic agents. Recent advances in the field of plant biotechnology have made possible the use of plants as cost-effective biofactories of therapeutic proteins. Lucas continues to focus on the development of a plant based transient expression system in tobacco plants, for the production of an anthrax receptor decoy protein that can mitigate the effects of anthrax.

Publications:
Arzola, L., Chen, J., Rattanaporn, K., Maclean, J. M., & McDonald, K. A. (2011). Transient co-expression of post-transcriptional gene silencing suppressors for increased in planta expression of a recombinant anthrax receptor fusion protein. *International journal of molecular sciences*, *12*(8), 4975-499

Honors and Awards:
Winner of 2010 Big Bang! Business Plan Competition at UC Davis
Founder, Engineering and Technology Entrepreneurship Club (E-TEC) at UC Davis 2012-13
President, ISPE at UC Davis Student Chapter 2009-10
Treasurer, ISPE at UC Davis Student Chapter 2008-09
UC Davis Chancellor's Ambassador, 2011-12
Member, Chancellor's Graduate & Professional Student Advisory Board 2010-11
Graduate Student Rep, Chancellor's Blue Ribbon Committee on Research 2009-10
NSF CREATE-IGERT Fellow 2009-11
CAMP Bridge to the Doctorate Fellow 2007-09
UC Davis AGEP Scholar Summer 2007

Websites & Social Media Links:
BetaVersity: http://betaversity.com/
Linkedin: http://www.linkedin.com/in/lucasarzola
Twitter: @LucasArzolaPhd and @BetaVersity

Geoffrey Benn
Plant Biology, Katayoon Dehesh Laboratory
gkbenn@ucdavis.edu

Education & Experience: Geoff earned his B.S. in Crop Sciences from the University of Illinois at Urbana-Champaign in 2008. After graduating from Illinois, he worked for Pioneer Hi-Bred as an intern in corn breeding and trait discovery. He is currently completing his 5th year in the Plant Biology graduate group and is working in Katie Dehesh's lab. Geoff is passionate about teaching and outreach, having assisted the DEB with its picnic day display, numerous lab tours, and e-mentoring of high school students. He has served as a TA for PLB 111 (Plant Physiology) and BIS2C (Biodiversity and the Tree of Life). He is currently the head TA of BIS2C.

Research Interests:
In contrast to animals, plants cannot flee harmful situations – instead they must rapidly percieve the situation and mount an appropriate response. The first stage of this process involves the activation of stress response genes. These genes encode proteins that can help mitigate cellular damage caused by a harmful situation, such as attack by an insect, freezing temperatures, or infection by a fungus. Plants regulate the activation of these genes via short pieces of DNA, called *cis*-elements, which are located next to each stress response gene. These *cis*-elements act as a signal to cellular machinery that a particular gene should be activated if the cell is stressed. Geoff's research is focused on one such *cis*-element, called the *Rapid Stress Response Element* (RSRE). This element was initially discovered in the model plant *Arabidopsis* thaliana and has subsequently been shown to be present in many other plants. Geoff's work aims to identify components of the *Arabidopsis* cellular machinery that recognize and activate the RSRE when the plant is stressed. His first major project demonstrated that the RSRE is regulated by calcium signaling and a family of proteins called *CALMODULIN-BINDING TRANSCRIPTIONAL ACTIVATORS*, or *CAMTAs*. His other work involves using mutant lines and computational approaches to identify other components of the RSRE-regulatory machinery.

Publications
Benn, G., Wang, C., Hicks, D., Stein, J., Guthrie, C., & Dehesh K. A key general stress response motif is regulated non-uniformly by CAMTA transcription factors. In submission 2014.

Honors and Awards:
UCD College of Biological Sciences (CBS) Dean's Mentorship Award (2013)
American Society of Plant Biologists Travel Award (2012)
UCD CBS Monsanto Endowed Fund in Agricultural Biotechnology Award (2011)
UCD CREATE-IGERT Fellowship (2010)

Websites and Social Media Links:
LinkedIn - www.linkedin.com/pub/geoffrey-benn/26/295/404/
Twitter - https://twitter.com/GeoffreyBenn
Blog - http://prospectiveprof.com/

Gregory Christopher Bernard
Integrative Biosciences PhD Program
Plant Molecular and Cellular Genetics Lab, Professor Marceline Egnin
Parasitology Lab, Dr. William Witola
gbernard4673@mytu.tuskegee.edu

Education and Experience: Mr. Gregory C. Bernard earned a Masters of Science in Animal Health (N. C. A&T S U) and Masters of Plant Pathology (NCSU). He is currently a 4th year PhD Candidate and also serves as President of the Department of Agricultural and Environmental Sciences Graduate Student Association. Gregory has been awarded the 2014 George Washington Carver Summer Internship at Iowa State Univeristy where he will study plant-nematode interactions under the auspices of Dr. Thomas Baum. He was recently awarded an travel award for the International Agriculture and Rural Development program at Cornell University where he had the privilege of directly addressing concerns in sustainable agriculture with local producers. Gregory has served as a teaching assistant for Plant Breeding and Genetics and Animal Biotechnology courses and has mentored high school and undergraduate students in summer research programs since the start of his PhD program.

Research Interests: Gregory has a great interest in the elucidation of the discreet and dynamic phenotypic and molecular interactions between plant hosts and pathogens. He is currently analyzing phenotypic variation between sweetpotato genotypes under root knot nematode challenge and developing a molecular catalog of expressed sequences in sweetpotato storage roots in response to infection.

Dissertation Title: Phenotypic and Molecular Evaluation of the Host Response to Root Knot Nematode Infection in Developing Sweetpotato Storage Roots

Publications:

Jesse M Jaynes, and Gregory C. Bernard (2011).Structure /Function Link Between Cytokine Domains and Natural and Designed Lytic Peptides: The Medical Promise. *ACS Books* Accepted with Revision 10/11

Abstract published. Poster Presentation. Bernard, Gregory, C., Mitchell, TK, Marui, Junichiro, Dean, Ralph. (2008). “Virulence of *M. oryzae* is regulated through specific transcription factors”. at International Plant-Microbe Interaction Congress in Quebec City, Canada.

Bernard, Gregory C., Worku, Mulumebet., Ahmedna, Mohammed. (2009). The Effects of *Diatomaceous* Earth on Parasite Infected Goats. *BULLETIN OF THE GEORGIAN NATIONAL ACADEMY OF SCIENCES***,** vol. 3**,** no. 1.

2008 APS Meeting , Abstract published, 2008 presented poster Bernard, Gregory, C. , Mitchell, TK, Marui, Junichiro, Dean, Ralph. (2008). “Functional Characterization of 3 transcription factors involved in virulence in *M. oryzae*

Wu, Miazong, Aihua Wang, Bernard, Gregory C., Hall, John B., Beal, William E., Akers, Micheal R., Boisclair, Yves R., Jiang, Honglin. (2008.) Increased degradation of insulin-like growth factor –I in serum from feed-deprived steers. *Domestic Animal Endocrinology* 35 (2008) 343–351.

2007. Abstract published 4th IRBC- Rice Blast Conference 2007, Changsha, China. Presented Poster, Bernard, Gregory, C., Mitchell, TK, Marui, Junichiro, Dean, Ralph. (2008). "Functional characterization of a transcription factor putatively involved in the pathogenecity of *Magnaporthe grisea*

Presentations:
2014 Presented poster at the George Washington Carver Symposium, Iowa state University, Ames, Iowa. Entitled *MOLECULAR FINGERPRINTING ANALYSIS OF TRANSCRIPTS INVOLVED IN HOST RESPONSE TO DISEASE IN DEVELOPING SWEETPOTATO STORAGE ROOTS*.

2013 *Semi quantitative expression analysis of molecular markers involved in host defense to disease in developing sweetpotato storage roots.* Gregory C. Bernard,
Marceline Egnin, Steven Samuels, Desmond Mortley, William Witola, and Conrad Bonsi

2013 Presented poster at the 17th Biennial Research Symposium. Association of 1890 Research Directors. Entitled *Endpoint cDNA expression analysis of molecular markers involved in host defense to disease in developing sweetpotato storage roots.* Gregory C. Bernard, Marceline Egnin, Steven Samuels, Desmond Mortley, William Witola, and Conrad Bonsi

Honors &Awards:
2014 Recipient of the George Washington Carver Summer Internship Program, Iowa State University, Ames Iowa
2013 Awarded Travel Scholarship to India (International Agriculture and Rural Development, Cornell University)
2013 Awarded Travel to attend International Agricultural Conference, Cornell University
2013 Inductee into Golden Key Honor Society
2012 Eminent Scholar Gamma Sigma Delta National Agricultural Honor Society, Inductee

Websites & Social Media Links:
PhD Program Website –Integrative Biosciences PhD Program
http://www.tuskegee.edu/phd_program_in_integrative_biosciences.aspx

Marta Bjornson
Horticulture and Agronomy, Prof. Katie Dehesh and Prof. Abhaya Dandekar Laboratories
mlbjornson@ucdavis.edu

Education & Experience: Marta Bjornson earned a BS in Bioengineering from Rice University in 2009, after which she continued on to enter the PhD program in Horticulture and Agronomy with a Designated Emphasis in Biotechnology at UC Davis. She is now in her fifth year, hoping to complete her thesis on regulation of the rapid stress response in plants in late 2015. In her time at UC Davis, Marta has served as TA for classes such as Intro to Plant Biotechnology and Plant Physiology, and acted as an E-mentor to several high school students and as a research mentor for several undergraduate students. She also founded and coordinates the Horticulture and Agronomy journal club.

Research Interests: Just like people, plants experience stresses like being too hot or too cold, or having too much or too little water, or getting diseases. Unlike people, plants can't escape from any of these stresses, and instead have marvelously complicated stress adaptation techniques. In fact, plants change what proteins they are making within just minutes of percieving a stress. Although long-term stress adaptation can vary a lot, these early changes are shared among many different stimuli, making a **general stress response**. Marta is working on understanding that general stress response – how are the stresses percieved? How does that perception lead to the changes in proteins? Are there any known signaling pathways or compounds, like plant hormones, that affect this process?

To do that, she's using reporter plants. When these plants start up their general stress response, they also make an extra protein – luciferase, the enzyme that makes fireflys glow. By interfering with plant signaling, and then looking to see if the reporter plants glow in the same or different ways, Marta can identify previously unknown signals regulating the general stress response in plants.

Publications:

Bjornson, M., Wang, C., Franz, A., Comai, L., Drakakaki, G., & Dehesh, K. (2014). Distinct roles for MAPK signaling and CAMTA3 in the timing and amplitude of the plant general stress response. In preparation 2014

Selected Presentations:

Bjornson, M., Dandekar, A.M., & Dehesh, K. (2012 November) The Plant Rapid Stress Response. NAIST International Student Workshop, Nara, Japan

Bjornson, M., Dandekar, A.M., & Dehesh, K. (2012 April) Arachidonic Acid and the Plant Stress Response Horticulture and Agronomy student seminar series, Davis, CA

Bjornson, M., Dandekar, AM., & Dehesh, K. (2011 May) Arachidonic Acid and the Plant Stress Response. UC Davis Celebration of Plant Biology, Davis, CA *as Elsie Taylor Stocking Memorial Fellowship Recipient*

Honors & Awards:
John F. Steindler Fellowship (2012-2013)
ASPB travel grant (2012)
Elsie Taylor Stocking Memorial Fellowship (2011)
Henry A. Jastro Research Award (2010)
Bert and Nell Krantz International Agriculture Fellowship (2009)
Tau Beta Pi and Phi Beta Kappa honor societies (2009)

Websites & Social Media Links:
PhD Program Website - UC Davis Horticulture and Agronomy Graduate Group
http://ggha.ucdavis.edu/
Lab Website – Dehesh lab: http://www-plb.ucdavis.edu/labs/dehesh/
LinkedIn - https://www.linkedin.com/pub/marta-bjornson/27/b91/2ab

Timothy Butterfield
Professor Abhaya Dandekar Laboratory
tsbutterfield@ucdavis.edu

Education & Experience: Timothy is a former NSF CREATE-IGERT Trainee and PhD candidate in Plant Biology with a Designated Emphasis in Biotechnology (DEB). The title of his dissertation is 'Regulation of the hydrolysable tannin pathway in walnut, and the activities of hydrolysable tannins as defense compounds'. He received his Bachelor of Science from the University of Texas, Austin in Biology; Plant Biology in 2004 and Master of Arts from The University of Texas, Austin in Molecular, Cell & Developmental Biology; Plant Biology in 2007. Timothy has served as a TA as master's student and during his doctoral studies; in addition, he has participated in several Biotechnology Program outreach events. He also served on the Plant Biology Graduate Student Assembly as a GSA Representative, Selection Committee member, Student Representative and President.

Research Interests: Tim is pursuing research that will lead to new strategies for agronomic crop improvement in walnut and alfalfa with applications impacting visual appeal and taste as well as insect control. Specifically, he is exploring the biosynthesis and utility of phenylpropanoids, in particular a class of phenylpropanoids known as the hydrolysable tannins. To pursue these studies, Tim is working with a collection of walnut cultivars presenting distinct pellicle coloration – a trait determined by phenylpropanoid accumulation, the Lepidopteran Beet Armworm – which exhibits a distinct sensitivity to ingestion of hydrolysable tannins but not their constituents and alfalfa plants expressing walnut-derived phenylpropanoid biosynthesis genes – to enable accumulation of novel phenylpropanoid metabolites.

He is using these transgenic plants to study both the regulatory relationships between the shikimic acid and phenylpropanoid pathways in walnut and to understand the role of hydrolysable tannins as natural defense compounds against common agricultural pests. This knowledge has the potential to be leveraged as pest control alternatives, potentially reducing pesticide applications in California agricultural fields, thereby improving farm worker safety, safeguarding water supplies, and reducing the death of non-target insect species.

Publications: Butterfield, T., (2007). The Effects of Extracellular ATP on Growth in Arabidopsis thaliana. Master's Thesis. Plant Biology Program. School of Biological Science. The University of Texas at Austin.

Wu J, Steinebrunner I, Sun Y, Butterfield T, Torres T, Arnold D, Gonzalez A, Jacob F, Reichler S, and Roux S. (2006). Apyrases (Nucleoside Triphosphate-Diphosphohydrolases) Play a Key Role in Growth Control in Arabidopsis. Plant Physiology 144 (2): 961-975.

Roux S, Song C, and Jeter C. (2006). Regulation of plant growth and development by extracellular nucleotides. In: Communication in Plants (Baluska F., Mancuso S., and Volkmann D. eds.), Springer, New York, pp. 221-234. (Contributed a figure; acknowledged).

Song CJ, Steinebrunner I, Wang XZ, Stout SC, Roux SJ. (2006). Extracellular ATP induces the accumulation of superoxide via NADPH oxidases in Arabidopsis. Plant Physiology 140 (4): 1222-1232. (Contributed a figure; acknowledged).

Clark G, Cantero-Garia A, Butterfield T, Dauwalder M, and Roux S. 2005. Secretion as a Key Component of Gravitropic Growth: Implications for Annexin Involvement in Differential Growth. Gravitational and Space Biology Bulletin 18 (2): 113-114.

Presentations:

2013 "Identification and Mapping of Pellicle Color Determinants in Walnut." Talk. California Walnut Board Research Committee Meeting. Bodega Bay, CA.

2012 "Enhancing Pest Resistance and Repellence via Synthesis of Novel Metabolites." Talk. Hanoi University of Agriculture. Hanoi, Vietnam.

2012 "Expression of polyphenol biosynthetic enzymes in M. sativa Plants for the Inhibition of protein
Degradation." Plant Biology Graduate Group Seminar. Davis, CA.

2012 "Structural and Functional Analysis of Walnut Phenolics." Talk. California Walnut Board Research
Committee Meeting. Bodega Bay, CA.

2011 UC Davis CREATE-IGERT Symposium, Poster Title: "*Utilizing a Polyphenol Oxidase as an Antibiosis agent in Medicago sativa Pest Management*", Davis, CA

2009 November 20. UC Davis CREATE-IGERT Symposium, Talk Title: "Uncovering and Manipulating Biochemical and Regulatory Details of Phytochrome-Mediated Signaling in Plants", Davis, CA.

2009 November 20. UC Davis CREATE-IGERT Symposium, Poster Title: "Inducing phytochrome B signaling without activation of other phytochromes", Davis, CA.

2009 September 11. UC Davis Plant Cell Biology Training Grant Retreat, Talk Title: "Molecular Mechanisms of Phytochrome Signaling", Asilomar CA.

2009 July 30. 9th Annual International Conference on Tetrapyrrole Photoreceptors of Photosynthetic Organisms, Poster Title: "Inducing phytochrome B signaling without activation of other phytochromes", July 26-31 2009; Asilomar CA.

2009 April 4. UC Davis Biotechnology Training Retreat, Poster Title: "Manipulation of phytochrome-mediated signaling in transgenic plants", April 4 2009, Napa CA.

2008 October 16. CREATE-IGERT Symposium, Talk Title: "Manipulation of Phytochrome-Mediated Signaling in Transgenic Plants", Davis CA.

2008 September 16. UC Davis Plant Biology Graduate Group Colloquium, Talk Title: "Into the Light: Information, Signal Transduction & Response Regulation", Davis CA.

2007 March 4. American Society of Plant Biologists, Southern Section Meeting, Talk Title: “Search for a plasma membrane receptor of ATP, an exogenous regulator of growth”, Mobile AL.

2006 May 18. Pan-American Plant Membrane Biology Workshop, Poster Title: “Growth effects of extracellular ATP: mediation by ethylene and the search for plasma membrane receptor(s)", South Padre Island, TX.

Honors & Awards:

2014	Graduate Student Research Support, 1 Quarter. UCD Plant Biology Graduate Group
2013	Graduate Student Research Support, 1 Quarter. UCD Plant Biology Graduate Group
2012	Jastro Shields Research Support Award, UC Davis Plant Biology Graduate Group
2008-2010	NSF CREATE-IGERT Trainee Fellowship
2001	Mickey Leland Environmental Internship, TX Commission on Environmental Quality
1998-2000	Dean’s List, LeTourneau University
1996	Eagle Scout, Boy Scouts of America

Websites & Social Media Links:

LinkedIn:
https://www.linkedin.com/profile/view?id=82087454&authType=NAME_SEARCH&authToken=n7y7&locale=en_US&srchid=14548752140134795539 5&srchindex=1&srchtotal=40&trk=vsrp_people_res_name&trkInfo=VSRPsearchId%3A145487521401347955395%2CVSRPtargetId%3A82087454%2CVSRPcmpt%3Aprimary
PhD Program Website - UC Davis Biotechnology Program http://www.biotech.ucdavis.edu/

Elenor Castillo
Professor Florence Negre-Zakharov & Professor Abhaya Dandekar Laboratories
elecastillo@ucdavis.edu

Education & Experience: Elenor is currently a PhD graduate student in Plant Biology with a Designated Emphasis in Biotechnology. She also received an AA from Chabot College, Hayward in 2005 and B.S. from Mills College, Oakland in 2008.

Research Interests: Elenor's research project focuses on elucidating the metabolic pathways that underlie production of aromatic volatiles in fruits, which has direct commercial application in extending fruit shelf-life. On a broader scale, understanding the role of volatile chemical signals within and between plants in field populations may also play a part in increasing crop yields/biomass, engineering insect and pathogen resistance, and fine-tuning other agronomic and quality-related crop traits

Publications:

Rockwell, NC., Njuguna, SL., Roberts, L., Castillo, E., Parson, VL., Dwojak, S., Lagarias, JC., Spiller, SC. "A second conserved GAF domain cysteine is required for the blue/green photoreversibility of cyanobacteriochrome Tlr0924 from Thermosynechococcus elongates" Biochemistry. 2008, Jul 8; 47(27).

Presentations:

"Biotechnological Tools for Crop Pathogen Vectors", CREATE-IGERT Symposium, 2013, Davis CA, Abstract and Poster Presentation

Panel Presentation 1st Place Recipients, University of California, 2012 Davis Interdisciplinary Graduate and Professional Symposium: Voices of Commonality Across the Disciplines: "Women of Color from STEM to Social Sciences Doctoral Programs at the UC"

"Biotechnological Tools for Plant Pathogen Vectors", Gordon Research Conference for Plant Volatiles, Ventura, CA, January 31, 2012; Abstract and Poster presentation

"Sulfur Volatile Compounds: An Alternative to Pesticides for the Citrus Disease Huanglongbing" CREATE-IGERT Symposium, UC Davis, 2009, Abstract and Oral Presentation

Hampel D, Hjelmeland AK, Negre-Zakharov F, Ebeler SE (2009, May). Carotenoid Cleavage Dioxygenases in Grapes. Poster presented at the 1st Annual Grape RCN Conference, CA.

Wang M, Boo KH, Negre-Zakharov F (2009, June). Investigation of Branched-Chain Amino Acid Metabolism Involved in Aroma Formation in Melon. Poster presented at the Gordon Research Conference on Plant Metabolic Engineering, NH

"Cyanobacteriochromes: A Second Conserved Cysteine is required for blue/green photoreversibility", Center for Biophotonics Science and Technology Annual Retreat, South Lake Tahoe, June, 2008, Abstract and Oral Presentation

Cyanobacteriochromes: A Second Conserved Cysteine is required for blue/green photoreversibility, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference, Kansas City, MO, 2007, Abstract and Poster

Honors & Awards:

2013	Jastro Shields Graduate Research Scholarship, UC Davis
June 2012	Center for Biophotonics Science and Technology, "Outstanding Achievement in Education", CBST Conference Retreat
2010	Briick Agricultural Scholarship, UC Davis
2009	Bill and Jane Fischer Vegetative Management Scholarship, UC Davis
2008 – 2010	Traineeship, NSF CREATE-IGERT Training Grant, UC Davis
2008 "	Above and Beyond" Award for Baccalaureate Research and Outstanding Achievement in Education, The NSF Center for Biophotonics Science and Technology (CBST), UC Davis
2007, 2008	Jill Barrett Research Scholar, Mills College
2008-2009	AGEP program (Alliance for Graduate Education and the Professoriate
2007	Kaiser Foundation Medical Scholarship
2005, 2006	Mills Dean's Scholarship
2005	Chabot College Deans List, Fall
2005	Cal State, Hayward School of Science Summer Scholarship

Websites & Social Media Links:

Winning Video-NSF IGERT & Video Competition: http://posterhall.org/igert2013/posters/358
LinkedIn: www.linkedin.com/pub/**elenor**-**castillo**/b/373/326

Dawn Chiniquy
Ronald Laboratory & Joint BioEnergy Institute (JBEI)
Department of Plant Pathology, Plant Biology Graduate Group, UC Davis

Education & Experience:
Bachelors of Arts, University of California, Berkeley, Integrative Biology, 2004
Ph.D. Candidate, University of California, Davis, Plant Biology, 2012

Dawn earned a PhD in Plant Biology with a Designated Emphasis in Biotechnology and is now a post-doctoral scholar in the Somerville lab at UC Berkeley. She is continutin her work on energy crops.

Graduate School Research Interests:
Dawn's research was on gaining a greater understanding of the enzymes that build the plant cell wall may lead to improved feedstocks that make a cheaper, more efficient biofuel. Dawn focuses on characterizing genes in rice that build the cell wall and whether these genes could be altered for an improved feedstock for biofuels.

Publications:
Bartley, L. E., Peck, M. L., Kim, S. R., Ebert, B., Manisseri, C., **Chiniquy, D. M.**, & Ronald, P. C. (2013). Overexpression of a BAHD acyltransferase, OsAt10, alters rice cell wall hydroxycinnamic acid content and saccharification.*Plant physiology*, *161*(4), 1615-1633.

The ParA resolvase catalyzes site-specific excision of a transgene from the *Arabidopsis* genome. James G. Thomson, Yuan-Yeu Yau, Robert Blanvillain, **Dawn Chiniquy**, Roger Thilmony, and David W. Ow. Transgenic Research, Transgenic Research (2009) 18: 237-248

Pgpro1, a novel binary vector for monocot promoter characterization. Thilmony, R.L., Guttman, M.E., **Chiniquy, D**., Blechl, A.E. Plant Molecular Biology Reporter (2006) 24:1-13

Presentations:
"Characterizing Glycosyltransferases to Improve Cellulosic Conversion to Biofuels", Talk presented at the CREATE-IGERT Distinguished Lecture and Symposium; October 16th 2008, Davis CA.

Poster Presentations:
Analysis of Putative Feruloyltransferase Transcript Levels and Cell Wall Composition during Rice Development. **Dawn Chiniquy**, Laura Bartley, Jesper Harholt, Brian Conlin, Chithra Manisseri, Peijian Cao, Henrik Vibe Scheller, and Pamela Ronald. Cell Wall Biosynthesis and American Congress on Plants and Bioenergy, 2008

Identification Of Novel Promoters Useful For Crop Biotechnology Roger Thilmony, Mara E. Guttman, **Dawn Chiniquy** and Ann E. Blechl Plant & Animal Genomes XIV Conference, Jan 2006

Conferences & Workshops:
NSF Rice Research to Production Course, May 16th-June 4th, 2010, International Rice Research Institute, Los Banos, Philippines
American Society of Plant Biologists, July 2008, Merida, Mexico
American Congress on Plants and Bioenergy, July 2008, Merida, Mexico
Cell Wall Biosynthesis Conference, June 2008, Pacific Grove, CA

Research Experience:

- **Ph.D.**, Ronald Lab, UC Davis and Joint BioEnergy Institute (JBEI), 2007-2012
    - Thesis: Characterizing glycosyltransferases involved in rice cell wall biosynthesis.
    - Teaching Assistant, BIS 101 Genetics, Fall 2008
    - Designated Emphasis in Biotechnology
    - Student representative on board of UC Davis Consortium for Women and Research 2008-2009
    - Art-Science Bioenergy in the Schools student teacher, Caesar Chavez Elementary School, Davis, CA, Winter 2009
    - Edited 3 papers, trained 1 student

- **Laboratory Technician**, Transgenic Crop Risk Mitigation Unit, USDA, Albany, CA May 2005-August 2007
    - Characterized 10 tissue specific promoters in rice.
    - Characterized efficiency of novel recombinase enzymes in *Arabidopsis*.
    - Performed standard molecular biology laboratory techniques, including gel electrophoresis, Southern blots, DNA sequencing and analysis, PCR, bacterial transformation, DNA extraction, restriction digest, tissue culture, primer design, and fluorescent microscopy. Additionally, performed rice, *Arabidopsis*, and wheat transformation.

- **Laboratory Assistant**, Purcell Lab, Berkeley, CA, May 2003-Dec 2004
    - Studied competition between two strains of *Xylella* in the mouthparts of the Blue-green sharpshooter.
    - Studied which California weeds were potential hosts for *Xylella*
    - Studied the correlation of grapevine vessel length and bacterial infection levels.

Honors & Awards:
William G. and Kathleen Golden International Agricultural Fellowship 2010-2011
UC Davis Humanities Graduate Research Fellowship 2010-2011
National Science Foundation CREATE-IGERT Fellowship recipient 2007-2010
UC Berkeley Biology Fellows Award, 2004

Websites & Social Media Links:
Somerville Laboratory, UC Berkeley: http://pmb.berkeley.edu/profile/dchiniquy
LinkedIn: www.linkedin.com/pub/**dawn**-**chiniquy**/66/537/883

Mitch Elmore
Professor Gitta Coaker Laboratory
jmelmore@ucdavis.edu

Education & Experience: Mitch grew up in the corn and soybean fields of Southern Illinois where he developed a deep appreciation for plant biology and agriculture. He received his Bachelor of Science from St. Louis University in 2005 and worked for two years at the Donald Danforth Plant Science Center in St. Louis, MO. Mitch is currently a PhD candidate in Plant Biology with a Designated Emphasis in Biotechnology (DEB) and will graduate in June 2014. The title of his dissertation is 'Quantitative Proteomics Analyses of Plant Immune Responses at the Plasma Membrane'. Mitch was a CREATE-IGERT trainee during 2009-2012.

Research Interests: Mitch is researching innovative strategies for sustainable disease control in agriculture with a focus on the molecular mechanisms underlying plant-pathogen interactions. Mitch's research uses quantitative proteomics to identify novel components of plant immune responses with the ultimate goal of engineering plants to be more resistant to pathogens.

Publications:

Elmore J.M., Yadeta K.A., Creason A., Franco J., Di Y., Phinney B., Chang J., and Coaker G. (2014). Deep profiling of the Arabidopsis plasma membrane proteome and transcriptome after flagellin perception reveals novel immune regulators. *under review*.

Li W., Yadeta K.A., Elmore J.M., Coaker G. (2013). The Pseudomonas effector HopQ1 promotes bacterial virulence and interacts with tomato 14-3-3 proteins in a phosphorylation dependent manner. Plant Physiology. 161: 2062-2074.

Yadeta K.A.*, Elmore J.M.*, and Coaker G. (2012). Advancements in the Analysis of the Arabidopsis Plasma Membrane Proteome. Frontiers in Plant Science. 4: 10.3389/fpls.2013.00086. *co-first authors

Elmore, J.M., Liu, J., Smith, B., Phinney, B., & Coaker, G. (2012). Quantitative Proteomics Reveals Dynamic Changes in the Plasma Membrane During *Arabidopsis* Immune Signaling. Molecular and Cellular Proteomics. 11: M111.014555. [front cover article]

Elmore, J.M.*, Lin, Z.D.*, & Coaker, G. (2011). Plant NB-LRRs: Upstreams and Downstreams. Current Opinion in Plant Biology. 14, 365-371. *co-first authors

Liu, J., Elmore, J.M., Lin, Z.D., & Coaker, G. (2011). A Receptor-like Cytoplasmic Kinase Phosphorylates the Host Target RIN4, Leading to the Activation of a Plant Innate Immune Receptor. Cell Host & Microbe. 9, 137-146.

Elmore, J.M., & Coaker, G. (2011). The Role of the Plasma Membrane H+-ATPase in Plant-Microbe Interactions. Molecular Plant. 4, 416-427.

Elmore, J.M., & Coaker, G. (2011). Biochemical Purification of Native Immune Protein Complexes. Methods in Molecular Biology: Plant Immunity. Humana Press, Inc. 712: 31-44.

Liu, J., Elmore, J.M., & Coaker, G. (2010). Proteomic Analysis of Plant Innate Immunity: Identification of the RIN4 complex and investigating dynamic changes in the plasma membrane proteome. Biology of Plant-Microbe Interactions. 7, 45-55.

Wilton, M., Subramaniam, R., Elmore, J.M., Felsensteiner, C., Coaker, G., & Desveaux, D. (2010). The type III effector HopF2Pto targets Arabidopsis RIN4 protein to promote Pseudomonas syringae virulence. Proceedings of the National Academy of Sciences. 107, 2349-2354.

Liu, J.*, Elmore, J.M.*, & Coaker, G. (2009). Investigating the functions of the RIN4 protein complex during plant innate immune responses. Plant Signaling & Behavior. 4, 1107-1112. *co-first authors

Liu, J., Elmore, J.M., Fuglsang, A.J., Palmgren, M.G., Staskawicz, B.J., & Coaker, G. (2009) RIN4 functions with plasma membrane H+-ATPases to regulate stomatal apertures during pathogen attack. PLoS Biology. 7, e1000139.

Govindarajulu, M., Elmore, J.M., Fester, T., & Taylor, C.G. (2008). Evaluation of constitutive viral promoters in transgenic soybean roots and nodules. Molecular Plant-Microbe Interactions. 21, 1027-1035 [front cover article].

Presentations:

2013 August, UC Davis Proteomics Short Course. Sponsored by the UCD Biotechnology Program. Oral presentation title: *"Quantitative Proteomics Analysis of Plant Immune Responses".* Davis, CA

2013 February, NSF CREATE-IGERT Research Symposium. Oral presentation title: *"Quantitative proteomics identifies novel proteins that control plant disease resistance".* Davis, CA.

2012 September, 30th New Phytologist Symposium: Immunomodulation by Plant-associated Organisms. Poster Title: *"Quantitative proteomics reveals dynamic changes at the plasma membrane during plant immune signaling".* Fallen Leaf Lake, CA.

2012 August, XV Congress of the International Society of Molecular Plant-Microbe Interactions. Poster Title: *"Quantitative proteomics reveals dynamic changes at the plasma membrane during plant immune signaling".* Kyoto, Japan.

2012 March, International Symposium of the Association of Biomolecular Resource Facilities. Poster Title: *"Quantitative Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling".* Orlando, FL.

2012 February, United States-Israel Binational Research & Development Fund Workshop: Microbial Virulence Determinants & Plant Innate Immunity. Oral Presentation Title: *"Quantitative*

Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling". Tel Aviv, Israel.

2012 February, NSF CREATE-IGERT Research Symposium. Poster Title: *"Quantitative Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling".* Davis, CA.

2011 June, 22nd International Conference on *Arabidopsis* Research. Poster Title: *"Quantitative Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling"*. Madison, WI.

2011 January, NSF CREATE-IGERT Research Symposium. Oral Presentation Title: *"Quantitative Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling".* Davis, CA.

2010 March, Bay Area Microbial Pathogenesis Symposium XIII. Poster Title: *"Multiple Effectors from Phytopathogenic Bacteria Interact with Host Cyclophilins".* San Francisco, CA.

2009 July, XIV Congress of the International Society of Molecular Plant-Microbe Interactions. Poster Title: *"Identification and characterization of bacterial effectors that interact with the plant protein folding catalyst cyclophilin*". Quebec City, Quebec, Canada.

Honors & Awards:

2013 Henry A. Jastro Research Scholarship Award, UC Davis
2012 Henry A. Jastro Research Scholarship Award, UC Davis
2012 30th New Phytologist Symposium Travel Award, New Phytologist Trust
2012 Graduate Student Travel Award, UC Davis
2012 IS-MPMI XV Congress Student Travel Award, Kyoto, Japan
2012 "One Core-One Student" Award, ABRF 2012 Meeting, Orlando, FL
2011 Summer Graduate Student Researcher Award, UC Davis
2009 NSF CREATE-IGERT Research Traineeship (DGE-0653984)

Websites & Social Media Links:

Winning Video-NSF IGERT & Video Competition: http://posterhall.org/igert2013/posters/358
Lab Website - http://www.coakerlab.org/

Dominique Nicole Cathleen Gales, M.S.
Graduate Group/PhD Program, PI: Integrative Biosciences, Temesgen Samuel, PhD, and Clayton Yates, PhD Laboratory
Email: Dgales8709@mytu.tuskegee.edu

Education & Experience: Dominique N. Gales is a native of Newark, New Jersery. As a child, she imagined that escaping the poverty would eventually lead to a good education, adequate health services, and a society with plenty of careers to choose from. With those goals in mind she took the first steps in pursing her education. Dominique is a third year Ph.D. fellow at Tuskegee University in the Integrative Bioscienes Ph.D. Program (IBS). Her B.S. and M.S. were also obtained at Tuskegee in the field of Biology. In the summer of 2014, Dominique will attend the National Cancer Insitute, where she will participate as a summer intern in Radiation Cancer Therapy. As a doctoral student of the IBS, she is involved in many outreach/mentoring programs and professional organizations. She also serves as a teaching assistant in the Biology Department. She recently served as a student coordinator for the *"Understanding and Broading Intervention Program"* for the promotion of STEM diversity in the minority communities. Dominique is expected to complete her Ph.D. degree in 2016.

Research Interests: As an Ph.D. fellow, Dominique wanted to devote herself to investigating cancer biology with an emphasis on health disparities. For the past four years, she has had the opportunity to investigate many research projects that focus on the molecular mechanism that contribute to aggressive cancers. Dominique primary motives are to contribute to the fields of oncology. Her specific interest lies in investigating the stromal response to cancer therapy, to determine the molecular mechanisms of the response and to identify therapeutic strategies that involve stromal-tumor interactions. Furthermore, she would like to engage in post-doctoral training in a laboratory that integrates molecular biology and health disparities. After the completion of her post-doctoral training, she plans on working alongside with others to eliminate ethnic and racial disparities regarding cancer, open her own health clinic to provide services underinsured, and mentor students on the possibilities in the STEM world.

Presentations:

Gales, D. (2014). *JARS Annual Meeting*. Oral Presentation conducted from Tuskegee University, Tuskegee, AL

Gales, D. (2014). *AACR Sixth Annual Conference on Science on Cancer Health Disparities*. Poster Presentation conducted from AACR, Atlanta, GA

Gales, D. (2013). *Annual Biomedical Research Conference for Minority Students*. Poster presentation conducted From AMBCRMS, Nashville, TN

Gales, D. (2013). *14th Annual Biomedical Symposium*. Oral Presentation conducted from Tuskegee University,Tuskegee, AL

Gales, D. (2013). *UAB/MSM/TU Summer Internship Program Summer Institute.* Poster presentation conducted from Morehouse School of Medicine, Atlanta, GA

Samuel, T., Fadlalla,K., **Gales,D**., Balandanda, DK P., Manne, U. " Variable NF-kappa B pathway responses in colon cancer cells treated with chemotherapeutic drugs." BMC Cancer, (Under Review)

Gales, D., Clark, C., Manne, U., and Samuel, T. " The Chemokine CXCL8 in Carcinogenesis and Drug Response." ISRN Oncology. 2013

Honors & Awards:

6th Understanding Interventions That Broaden Participation in Research Careers Travel Award. Spring 2014
Baltimore, Maryland

Joint Annual Research Symposium Oral Presentation: 3rd Place. Spring 2014
Tuskegee University, Tuskegee AL

14th Annual Biomedical Research Symposium Oral Presentation: 1st Place. Fall 2013
Tuskegee University, Tuskegee AL

U54 Summer Cancer Research Training Program (SCRTP), Awarded June 2013- August 2013

Scientific Professional Organizations:
Gamma Sigma Delta, Tuskegee University
Sigma Xi, Tuskegee University
American Association for Cancer Research (AACR). Associate Member
Beta Kappa Chi Scientific Honor Society

Websites & Social Media Links:
LinkedIn: www.linkedin.com/pub/**dominique**-**gales**/53/1b7/987

Hyrum Gillespie
Genetics, Prof. Abhaya M. Dandekar Laboratory
hgillespie@ucdavis.edu

Education & Experience: BS Crop Science & Biotechnology—Hyrum Gillespie graduated with Honors from Utah State University magna cum laude with a BS in Crop Science & Biotechnology and minors in Mathematics and Portuguese. He is currently a Genetics PhD student in the Department of Plant Sciences and is a member of the American Society for Microbiology. He is a member of UC Davis FIC (Finance and Investment Club), a PowerHouse Science Communication Fellow, and has received specific training in biotech policy in Ireland. He has enjoyed his opportunities to TA and guest lecture for Principles of Plant Biotechnology (BIT 160) at UC Davis.

Research Interests: Hyrum's dissertation work focuses on *X. fastidiosa*, a bacterium responsible for Pierce's Disease in grapevine. This bacterium is also responsible for diseases which appear initially as a browning or scorching of the leaves in several agriculturally important crops like orange, plum, peach, and alfalfa. Hyrum is particularly interested in how *X. fastidiosa* commmunicates (quorum sensing) and what interactions it may have with other microorganisms in its environment.

Presentations:
Control of Virulence in *Xylella fastidiosa*, Causative Agent of Pierce's Disease, 2013 CREATE-IGERT Symposium, oral presentation; Davis, CA February 2013

High-Throughput Screen for Anti-Quorum Sensing Compounds with Application in the Prevention of Citrus Greening Disease, 21st Annual Biotechnology Retreat, poster presentation, Napa, CA. April 2012

Identifying Small Molecule Therapeutics to Combat High Risk Plant Disease, Distinguished Lecture and Symposium, oral presentation, Davis, CA. Feb. 2012

Mediation of Huanglongbing and Citrus Variegated Chlorosis using Chimeric Antimicrobial Proteins, Distinguished Lecture and Symposium & 20th Annual Biotechnology Retreat, poster presentations; Davis & Napa, CA. January & April 2011.

Determination of *Escherichia coli* K12 Lifespan, American Society for Microbiology Intermountain Branch Annual Meeting, poster presentation; Provo, UT. April 2010

Inhibition and SOS Expression of *Escherichia coli* K12 by Nalidixic Acid, Utah State University Student Showcase, oral presentation; Logan, UT. March 2010

Developing Tools for Gene Function Analysis in Crops, uCIBR, poster presentation; Logan, UT. Dec. 2008
Characterization of Laccase Mutants, Regional Conference of the American Society of Plant Biologists, poster presentation; Orem, UT. March 2008

Publications:
Lemon Balm in the Garden, *Home Garden* (Utah State University), February 2008
Lifespan of Prokaryote Model Organism *Escherichia coli* K-12 (Manuscript in preparation)
Blue Elderberry in the Garden (Manuscript in preparation)

Honors & Awards:
Team Leader for CREATE-IGERT UC Davis, *NSF IGERT Video & Poster Competition*, "Community Choice Award," May 2013
Monsanto Student Award in Agricultural Biotechnology, University of California-Davis, 2012
Henry A. Jastro Graduate Research Award, UC Davis, 2011-2012
4 Year GSR Award, Department of Plant Science, UC Davis, 2010

Websites & Social Media Links:
Winning Video-NSF IGERT & Video Competition: http://posterhall.org/igert2013/posters/358
LinkedIn: www.linkedin.com/in/hyrumgillespie

Tiffany Glavan
Dandekar Laboratory
Department of Medical Microbiology & Immunology, Microbiology Graduate Group
wglavan@ucdavis.edu

Education & Experience:
2001 BA Biology, Tufts University
2006 MS Microbiology, California Polytechnic State University
2012 PhD Microbiology with a DEB, UC Davis

Tiffany currently holds the position of Lead Scientist at IntelligentMDx, in Waltham, Massachusetts.

Research Interests: Tiffany designs and develops real-time PCR based clinical diagnostic assays to detect infectious disease for partner companies such as Abbott Molecular and QIAGEN. She has already aided in the development of two assays that have achieved both CE-mark and FDA-clearance. She loves her job!

Tiffany credits the Designated Emphasis in Biotechnology (DEB) for providing great mentorship and for opening her eyes to the biotechnology industry through a productive seminar series and an industry internship at Novozymes. She credits NSF CREATE-IGERT for helping her develop good communication and collaboration skills, and for introducing her to a more extensive range of molecular techniques that have helped her develop as a scientist.

In grad school, Tiffany's project was focused on the development of plant-derived therapeutic proteins to treat gastrointestinal dysfunction through the regeneration and renewal of the epithelial layer of the gut mucosa. She collaborated with multiple groups on campus in an effort to express the protein in *N.benthamiana* and evaluate its activity in epithelial cell culture.

Theses:
Glavan, T. W. (2012). *Investigating the Role of Gut Immunopathology in HIV/SIV Disease Progression* (Doctoral dissertation, UNIVERSITY OF CALIFORNIA, DAVIS).

Glavan, T. W. (2011). *Molecular Analysis Reveals Unique Microbiome in Ileal Pouch During Pouchitis Compared to Healthy Pouches in Ulcerative Colitis and Familial Adenomatous Polyposis* (Masters Thesis, California Polytechnic State University).

Publications:
Zella, G. C., Hait, E. J., Glavan, T., Gevers, D., Ward, D. V., Kitts, C. L., & Korzenik, J. R. (2011). Distinct microbiome in pouchitis compared to healthy pouches in ulcerative colitis and familial adenomatous polyposis. *Inflammatory bowel diseases*, *17*(5), 1092-1100.

George, M. D., Verhoeven, D., Sankaran, S., Glavan, T., Reay, E., & Dandekar, S. (2009). Heightened cytotoxic responses and impaired biogenesis contribute to early pathogenesis in the oral mucosa of

simian immunodeficiency virus-infected rhesus macaques. *Clinical and Vaccine Immunology*, *16*(2), 277-281.

Dandekar, S., Sankaran, S., & Glavan, T. (2008). HIV and the mucosa: no safe haven. In *Immunity Against Mucosal Pathogens* (pp. 459-481). Springer Netherlands.

Honors & Awards:
National Science Foundation CREATE-IGERT Fellowship recipient 2007-2010

Websites & Social Media Links:
LinkedIn:

Mitchell Harkenrider
Plant Biology Graduate Group, Pamela Ronald
mharkenrider@ucdavis.edu

Education & Experience: Mitch is currently a fourth year graduate student in Plant Biology with a Designated Emphasis in Biotechnology. Additionally, he is working in the UC Davis Office of Corporate Relations as a Partnership Positioning Extern. In this role, he develops and nurtures partnering opportunities with key companies in the biopharmaceutical and agriculture industries.

Mitch obtained his BA in Political Science from Purdue University in 2005 with minors in Nuclear Engineering and Asian Studies. Following a year teaching English in China, Mitch spent four years as a business development professional in large, corporate law firms.

Research Interests: As a researcher, his work deepens the understanding of the cell wall and related signaling components related to both stress response and biosynthesis for the enhancement of biofuel crops. His projects include the identification and characterization of cellose synthase and cellulose synthase-like genes in switchgrass and the characterization of a wall-associated kinase in rice.

Publications:
2014, M.K. Sharma, R. Sharma, P. Cao, **M. Harkenrider**, J. Jenkins, L. E. Bartley, J. Grimwood, J. Schmutz, D. Rokhsar and P. C. Ronald. "Identification and comparative genomic analysis of cell wall-related genes in switchgrass." (Manuscript)

Presentations:
2013, September 27, Plant Biology Graduate Group Colloquium, Presentation Title: "A Wall-associated Kinase in Rice Regulates Resistance to Bacterial Blight." Davis, CA

2013, June 20, Plant Biosciences Policy and Regulatory Affairs Workshop, Presentation Title: "Engineering Biotic Stress Resistance in Bioenergy Crops." Galway, Ireland

2013, August 28, HM.Clause International Corporate Business Convention, Poster Title: "Over-expression of a Wall-associated Kinase in Rice Confers Resistance to Bacterial Blight." Davis, CA

2013, July 20-24, American Society for Plant Biologists Annual Meeting, Poster Title: "A Wall-associated Kinase in Rice Regulates Responses to Pathogens." Providence, RI

2013, February 22, CREATE-IGERT Symposium, Presentation Title: "Identification and Comparative Genomic Analysis of Glycosyltransferase 2 Gene Family in Switchgrass," Davis, CA

2012 March 24, Biotechnology Training Retreat, Poster Title: *"*Identification of Genes Controlling Disease Resistance to Mitigate Disease Pressure of Bioenergy Crops*"*, Napa, CA

2012 February 3, CREATE-IGERT Symposium, Presentation Title: “Identifying the Genetic Basis of Stress Response in Rice.” Davis, CA

Honors & Awards:
NSF CREATE-IGERT Trainee
William G. and Kathleen Golden International Agricultural Fellowship
Phi Sigma Honors Society
UCD & Humanities Graduate Research Award
Jastro Shields Graduate Research Award

Rachel Kerwin
Professor Dan Kliebenstein Laboratory
Department of Plant Sciences, Plant Biology Graduate Group, UC Davis
rekerwin@ucdavis.edu

Education & Experience: Rachel is completing her fourth year of her PhD in Plant Biology with a Designated Emphasis in Biotechnology at UC Davis. She also received her B.S. in Biochemistry and Biology, minor in Chemistry with Biotechnology emphasis from Virgingia Tech, VA in 2007.

Research Interests: Rachel is interested in natural intraspecific phenotypic variation, how the underlying genetic variation contributes to the phenotypes we see, why variation exists and how it is adaptive to a given species in different environments. Specifically, she is studying natural variation in the glucosinolate pathway in *Arabidopsis thaliana*. Glucosinolates are a class of plant-made defensive compounds produced in the order Brassicales, which includes Arabidopsis. There is significant glucosinolate variation among Arabidopsis accessions isolated from different environments. She is generating an *Arabidopsis thaliana* accession Col-0 population that duplicates all the glucosinolate variation observed in nature with a common genetic background. She will then perform field trials in both CA and WY, measuring a suite of traits to determine if the different genotypes are more or less adaptive in the different environments.

Publications:

Kerwin, R.E., Jimenez-Gomez, J.M., Fulop, D., Harmer, S.L., Maloof, J.N., and Kliebenstein D.J. (2011) "Network Quantitative Trait Loci Mapping of Circadian Clock Outputs Identifies Metabolic Pathway-to-Clock Linkages in *Arabidopsis*" *The Plant Cell* Online.

Donahue, J.L., Alford, S.R., Torabinejad, J. Kerwin, R.E., Nourbakhsh, A., Ray, W.K., Hernick, M., Huang, X., Lyons, B.M., Hein, P.P., and Gillaspy G.E. (2010) "The Arabidopsis thaliana Myo-Inositol 1-Phosphate Synthase1 Gene Is Required for Myo-inositol Synthesis and Suppression of Cell Death." *The Plant Cell* 22(3):888-903.

Hansen, B.G., Kerwin, R.E., Ober, J.A., Lambrix, V.M., Mitchell-Olds, T., Gershenzon, J., Halkier, B.A. and D.J. Kliebenstein. (2008) "A novel 2-oxoacid dependent dioxygenases involved in the formation of the goiterogenic 2-hydroxybut-3-enyl glucosinolate and generalist insect resistance in *Arabidopsis thaliana*." *Plant Physiology* 148(4):2096-2108.

Posters and Presentations:

Presentation: December 8, 2011 Investigating the Importance of Natural Variation in the Glucosinolate Pathway using *Arabidopsis thaliana. SBES Post-Graduate Seminar Day 2011.* Dublin, Ireland

Presentation: January 12, 2011, Investigating the Importance of Natural Variation in the Glucosinolate Pathway using *Arabidopsis thaliana. CREATE-IGERT Research Symposium 2011.* Davis, CA

Presentation: August 5, 2010, Roundup Ready Alfalfa: A Journey in Plant Biotechnology. *UC Davis CREATE-REU summer research program.* Davis, CA

Presentation: November 21, 2009, Investigating the Importance of Natural Variation in the Glucosinolate Pathway using *Arabidopsis thaliana. CREATE-IGERT Research Symposium 2009.* Davis, CA

Honors & Awards:
National Science Foundation CREATE-IGERT Fellowship recipient 2008-2011

Websites & Social Media Links:
LinkedIn: www.linkedin.com/pub/**rachel**-**kerwin**/11/760/240

Dalya Lateef
IBS Program, Bovell-Benjamin Laboratory
College of Agricultural, Environmental, and Natural Sciences
College of Veterinary Medicine and Allied Health, Tuskegee University

Education & Experience:
BS Biology, Tuskegee University
2011 PhD Integrative Biosciences, Tuskegee University

Dissertation: "Role of the Enteric Nervous System in the Short-Term Control of Food intake by Cholecystokinin"

In 2008, Dalya founded the Revolutionary Scholars Foundation, a 501(c)(3) tax-exempt organization for mentoring and financial support of students from financially disadvantaged backgrounds. She currently serves as the President of the organization.

Research Interests: Dalya is currently working as a post-doctoral Scholar – National Institute of Health/NIDDK, investigating the neural, hormonal and molecular mechanisms in the regulation of energy metabolism by the bombesin receptor subtype-3 (BRS-3) receptor.

During her graduate work at Tuskegee, she looked at the role of the enteric nervous system in the short term control of food intake by cholecystokinin. Past projects included the investigation of candidate genes in the development of holoprosencephaly (HPE). HPE is a brain malformation that is caused by incomplete cleavage of the prosencephalon. She completed an internship at the National Institute of Health/NHGRI while working on her PhD.

Publications:
Lateef, D. M., Abreu-Vieira, G., Xiao, C., & Reitman, M. L. (2014). Regulation of body temperature and brown adipose tissue thermogenesis by bombesin receptor subtype-3. *American journal of physiology. Endocrinology and metabolism*.

Lateef, D. M., Washington, M. C., Raboin, S. J., Roberson, A. E., Mansour, M. M., Williams, C. S., & Sayegh, A. I. (2012). Duodenal myotomy blocks reduction of meal size and prolongation of intermeal interval by cholecystokinin. *Physiology & behavior*, *105*(3), 829-834.

Lateef, D. M., Washington, M. C., & Sayegh, A. I. (2011). The short term satiety peptide cholecystokinin reduces meal size and prolongs intermeal interval. *Peptides*, *32*(6), 1289-1295.

Websites & Social Media Links:
Revolutionary Scholars Foundation http://www.revolutionaryscholars.org/
LinkedIn: www.linkedin.com/pub/**dalya**-**lateef**/38/2b2/18

Mark Lemos
Prof. Katayoon Dehesh Laboratory
mselmos@ucdavis.edu

Education & Experience: Mark received a combined BS/MS in Biotechnology from the University of Nevada Reno (UNR) where he worked on algal-based biofuels. Upon completing his degree at UNR, Mark came to UC Davis to study Plant Biology with a Designated Emphasis in Biotechnology. Mark is currently in his fourth year, studying plant metabolism and stress signaling with hopes of completing his thesis by spring of 2016.

Research Interests: Broadly his research interests include how to use plants as scalable photosynthetic production platforms for biomass, biofuels, food, chemical feedstocks, and higher value products (nutraceuticals and pharmaceuticals).

Publications:

Samburova V., **Lemos M.**, Hiibel S., Hoekman K., Cushman J., and Zielinska B. (2012) Analysis of Triacylglycerols and Free Fatty Acids in Algae Using Ultra-Performance Liquid Chromatography Mass Spectrometry. *Journal of the American Oil Chemists' Society*

Alkayal F., Albion R., Tillett R., Hathwaik L., **Lemos M.,** and Cushman J. (2010) Expressed sequence tag (EST) profiling in hyper saline shocked *Dunaliella salina* reveals high expression of protein synthetic apparatus components. *Plant Science*

Liu W-S., Yasue H., Eyer K., Hiraiwa H., Shimogiri T., Roelofs B., Landrito E., Ekstrand J., Treat M., Paes N., **Lemos M.**, Griffith A., Davis M., Meyers S., Yerle M., Milan D., Beever J., Schook L., and Beattie C. (2008) High-resolution comprehensive radiation hybrid maps of the porcine chromosomes 2p and 9p compared with the human chromosome 11. *Cytogenet Genome Res*

Select oral presentations

Lemos M., and Dehesh K. (2013, October) *Post-translational modifications and stress response*. Plant Cell Biology Retreat. Asilomar, CA

Arzola L., and Lemos M. (2012, February) *Entrepreneurship opportunities for CREATE students and faculty*. 2012 CREATE-IGERT Symposium. University of California Davis Genome Center. Davis, CA

Select poster presentations

Lemos M. (2014, May) *Science Family Night*. Oak Ridge Elementary School. Sacramento, CA

Lemos M. (2014, April) *Meet a Scientist*. The Discovery Museum Space and Science Center. Sacramento, CA

Honors & Awards:

2014 Powerhouse Science Center Science Communication Fellow
2011 National Collegiate Inventors and Innovators Alliance (NCIIA) awardee

2011 NSF Graduate Research Fellowship (NSF-GRFP)
2010 NSF CREATE-IGERT
2010 NSF Alliance for Graduate Education and the Professoriate (AGEP)

Websites & Social Media Links:
PhD Program Website - UC Davis Plant Biology Graduate Group
http://biosci3.ucdavis.edu/GradGroups/PB/
Lab Website - **http://www-plb.ucdavis.edu/labs/dehesh/**
LinkedIn - **http://www.linkedin.com/in/marklemos**
Google Scholar - **http://scholar.google.com/citations?user=9DMRDccAAAAJ&hl=en**

Ben Lindenmuth, Ph.D.
Chemical Engineering, Professor Karen McDonald
ben.lindenmuth@gmail.com

Education & Experience: Dr. Lindenmuth earned his Ph.D. in Chemical Engineering with a Designated Emphasis in Biotechnology from UC Davis. Prior to his graduate work at UC Davis, he earned his B.S. in Chemical Engineering from Penn State University and worked at Merck Research Laboratories. While at UC Davis, he was a member of the first cohort of CREATE-IGERT trainees. His dissertation focused on production of thermostable enzymes in plant tissue. He is currently employed as a process development engineer at Bayer HealthCare in Berkeley, CA.

Research Interests: Protein separation technologies and analytical techniques, biopharmaceutical process design and analysis, promoting scientific literacy through adult learning and mentoring of junior staff.

Publications:

Jung, S. K., Lindenmuth, B. E., McDonald, K. A., Hwang, M. S., Bui, M. Q. N., Falk, B. W., ... & Dandekar, A. M. (2014). Agrobacterium tumefaciens mediated transient expression of plant cell wall-degrading enzymes in detached sunflower leaves. *Biotechnology Progress*.

Hwang, M. S., Lindenmuth, B. E., McDonald, K. A., & Falk, B. W. (2012). Bipartite and tripartite Cucumber mosaic virus-based vectors for producing the Acidothermus cellulolyticus endo-1, 4-β-glucanase and other proteins in non-transgenic plants. *BMC biotechnology*, *12*(1), 66.

Lindenmuth, B. E., & McDonald, K. A. (2011). Production and characterization of *Acidothermus cellulolyticus* endoglucanase in *Pichia pastoris*. *Protein expression and purification*, *77*(2), 153-158.

Production of Cellulase Enzymes in Plant Hosts Using Transient Agroinfiltration. U.S. Patent United States 61/090,221.

Burks, G. A., Velegol, S. B., Paramonova, E., Lindenmuth, B. E., Feick, J. D., & Logan, B. E. (2003). Macroscopic and nanoscale measurements of the adhesion of bacteria with varying outer layer surface composition. *Langmuir*,*19*(6), 2366-2371.

Presentations:

Lindenmuth, B. (2014). *Resin Bed Deterioration: IMAC Case Study.* Talk presented at the Chromatography Best Practices Workshop, Genentech, Vacaville, CA.

Lindenmuth, B. (2012). *Closed Pack-in-Place Technology for Chromatography Resins.* Talk presented at the Chromatography Best Practices Workshop, Bayer HealthCare, Berkeley, CA.

Lindenmuth, B.E, McDonald K.A. (2010). *Transient In Planta Expression of Cellulose-Degrading Enzymes.* Poster presented at the ACS National Conference, San Francisco, CA.

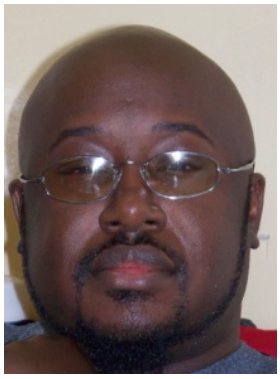
Lindenmuth, B.E, McDonald K.A. (2008). *Transient In Planta Expression of Cellulose Degrading Enzymes: Plant Tissues as Bioreactors.* Poster presented at the ACS National Meeting, Philadelphia, PA.

Winters, M.A., Lindenmuth, B.E., Svab, T.J., and Lander, R. (2005). *Impact of pump shear on membrane fouling during yeast microfiltration process.* Talk presented at the ACS National Conference, San Diego, CA.

Honors & Awards:
Nominated for UC Davis Outstanding Graduate Teaching Assistant Award (2010)
Awarded NSF-Sponsored CREATE-IGERT Traineeship (2008 – 2010)
Outstanding TA Honorable Mention, UC Davis Chemical Engineering Department (2009)
Awarded First-Year Student Fellowship, UC Davis Designated Emphasis in Biotechnology Program (2006 – 2007)

Websites & Social Media Links:
Personal LinkedIn Site https://www.linkedin.com/in/benlindenmuth
Bayer HealthCare Careers http://www.career.bayer.us/en/
McDonald Research Group http://mcdonald.ucdavis.edu/

Sonni-Ali Miller
Integrative Biosciences PhD program, Mentors--Drs. Marcia Martinez and Jesse M. Jaynes
Smiller5532@mytu.tuskegee.edu and Snorlax188@aol.com



Education & Experience:
BS Biology, Tuskegee University
MS Food & Nutrition Sciences, Tuskegee University

Mr. Miller is currently a 5th year student in the Integrative Biosciences PhD program at Tuskegee University. He previously earned his MS and BS degrees from Tuskegee University in Food and Nutritional Sciences and Biology, respectively.

His thesis title is "The Role of IL-12 on Apoptosis in the TNC Microenvironment and the Effects of the Immunomodulatory Peptide IMP-10 on Circulating IL-12 and SLE symptoms in Lupus-prone mice."

He is a member of the American Society for Cell Biology, and Sigma Xi, Beta Kappa Chi, and Golden Key Honor Societies. He has mentored six undergraduate students and has served as a teaching assistant in Bioinformatics, General Biology and Molecular, Cell and Genetic Biology course

Research Interests: As an IBS PhD student his research has focused primarily on the functional relationship of thymic nurse cells and IL-12 secretion on the development of the T-cell repertoire. His research uses mice as an animal model combined with molecular, immunohistochemical and immunocytological techniques to elucidate the correlationship between these factors. His research also looks at the role immunomodulatory peptides may play in the progression of autoimmune diseases. In a broader context, his research interests also include the application of nutritional interventions to analyze specific effects of dietary factors on specific diseases.

Publications:
Miller, S-A., Davis, F.R., Henley, S.C., Nhliziyo, M., Lopez, H., Jaynes, J. M. and Martinez, M. 2013. The Immunomodulatory Effects of Synthetic Peptide IMP10 on IL-12 Levels and Associated lupus-like Symptoms in NZBWF1 Mice. *Mol Biol Cell* 24, 24: 3775 (abstract# 1534).

Miller, S., Henley, S.C., Davis, F.R., Lewis, H.R. and Martinez, M. 2013. Inhibition of IL-12 Bioactivity Reduces Thymocyte Apoptosis in TNCs. Published in the minutes of the Annual CREATE-IGERT Trainees Symposium, February 22nd, 2013 at UC Davis in Davis, CA.

Miller, S., Henley, S.C., Davis, F.R., Lewis, H.R. and Martinez, M. 2012. Inhibition of IL-12 Bioactivity Reduces Thymocyte Apoptosis in TNCs. Published in the minutes of the 13th Annual RCMI International Symposium on Health Disparities, December 10th -13th, 2012 in San Juan, PR.

Henley, S., **Miller, S.**, Davis, F., Lewis, R., and Martinez, M. Use of TNC Transplants to Alleviate SLE Symptoms in Mice. Published in the minutes of the 13th RCMI International Symposium on Health Disparites December 10-13, 2012 in San Juan, PR.

Mills, S., **Miller, S-A.**, Henley, S.C., Davis, F., Lewis, R. and Martinez, M. 2012. Loss of IL-12 Responsiveness by Double Positive Thymocytes in the TNC Microenvironment. Published in the minutes of the Annual Biomedical Research Conference for Minority Students (ABRCMS) November 7th-10th, 2012

Wheeler, J., **Miller, S-A.**, Henley, S.C., Davis F.R., Lewis, R.H., and Martinez, M. 2012. Apoptotic Induction and TP Thymocyte Clearance in the TNC Microenvironment. Published in the minutes of the Annual Biomedical Research Conference for Minority Students (ABRCMS) November 7th-10th, 2012

Ehivet, S., Henley, S.C., Mills, S., **Miller, S.**, Davis, F. and Martinez, M. 2012. Analysis of Thymic Nurse Cell Function in NZBWF1 Mice. Published in the minutes of the Annual Biomedical Research Conference for Minority Students (ABRCMS) November 7th-10th, 2012.

Miller, S-A, Henley, SC, Davis, FR, Lewis, RH, Bernard, GC, Samuels, S, Martinez, MT. 2011. Effect of IL-12 on negative selection in the TNC microenvironment. *Mol Biol Cell* 22, 4705 (abstract# 3164).

Miller, S-A, Dean, D., Ganguli, S., Abdalla, M. and Bovell-Benjamin, A.C. 2003. Physico-chemical and Viscometric Properties of a Sweetpotato Syrup. SAE Technical Paper 2003-01-2620, 2003, doi:10.4271/2003-01-2620.

Presentations:

Miller, S-A, Davis, F.R., Henley, S.C., Nhliziyo, M., Lopez, H., Jaynes, J. M. and Martinez, M. 2013. The Immunomodulatory Effects of Synthetic Peptide IMP10 on IL-12 Levels and Associated lupus-like Symptoms in NZBWF1 Mice. Poster presented at the 52nd Annual Meeting of the American Society for Cell Biology, December 13-17, 2014, New Orleans, LA.

Miller, S., Henley, S.C., Davis, F.R., Lewis, H.R. and Martinez, M. 2013. The Effects of IL-12 on Thymocyte Apoptosis in the TNC Microenvironment. Oral presentation at the 1st Annual Southern Cell Biology Research Symposium, June 28, 2013, Tuskegee University, Tuskegee, AL.

Miller, S., Henley, S.C., Davis, F.R., Lewis, H.R. and Martinez, M. 2013. The Effects of IL-12 on Thymocyte Apoptosis in the TNC Microenvironment. Poster presented at the 1st Annual Southern Cell Biology Research Symposium, June 28, 2013, Tuskegee University, Tuskegee, AL.

Miller, S., Henley, S.C., Davis, F.R., Lewis, H.R. and Martinez, M. 2013. The Effects of IL-12 on Thymocyte Apoptosis in the TNC Microenvironment. Poster presented at the 2nd Annual Health Disparities Institute for Research and Education Symposium, April 12-13, 2013, Tuskegee University, Tuskegee, AL.

Miller, S and Jaynes, J. 2011. Development of a Process for Cyclodextrin Production from Sweetpotato [Ipomoea batatas (L.)Lam.]. Poster presented at the 2011 Annual CREATE-IGERT Trainees Symposium. Davis, CA.

Honors & Awards:

- Sigma Xi Scientific Research Society (2013-present)
- Golden Key International Honour Society (2011-present)
- NASA/CFESH Research Scholar and Fellow (2000-03)
- Beta Kappa Chi Honor Society (1999-present)
- Recipient—American Society for Cell Biology Minorities Affairs Committee Travel Award2013 ASCB Annual Meeting, December 13th-18th, 2013, New Orleans, LA
- 2nd place—Poster Competition, Health Disparities Institute for Research and Education Symposium, "Fostering Community and Academic Partnerships to Eliminate Health Disparities in Minority and Underserved Populations." April 12-13, 2012, Tuskegee University, Tuskegee, AL
- 1st place, Graduate Poster Competition. 2003. Association of 1890 Research Directors Scientific Research Conference.

Websites & Social Media Links:

LinkedIn - www.linkedin.com/pub/sonni-ali-miller/58/ab4/992/

Patrick O'Dell
Professor Tina Jeoh Zicari Laboratory
Biological Systems Engineering Graduate Group, UC Davis
pat.j.odell@gmail.com.

Education & Experience:
2008 BS Chemical Engineering, University of Florida
2013 MS Bio & Ag Engineering, UC Davis

Patrick completed his Masters degree in Bio & Ag Engineering at UC Davis in 2013 and has launched a teaching career in Scotts Valley, CA. Patrick says, "I enjoyed my ability to learn and grow as a teacher and student at UCD and elsewhere, and I encourage all of you to be both teachers and students daily".

Research Interests:
Patrick's work concerned the molecular interactions between cellulose and cellulose-hydrolyzing enzymes. This research will use multiple types of high resolution microscopy, including confocal microscopy and atomic force microscopy, to study the kinetic mechanisms of cellulose hydrolysis by cellulases.

Publications:
Jeoh, T., Santa-Maria, M. C., & O'Dell, P. J. (2013). Assessing cellulose microfibrillar structure changes due to cellulase action. *Carbohydrate polymers*, *97*(2), 581-586.

Posters and Presentations:
2011 – May 2 – 5, 33rd Symposium on Biotechnology for Fuels and Chemicals: "Atomic Force Microscopy , Cellulose Microfibrils Interactions with Cellulases", Seattle, WA.

2011 – April 2, Biotechnology Training Retreat: "Atomic Force Microscopy to study Cellulose Microfibrils Interactions with Cellulases", Napa, CA

2011- February 17, CleanStart's Powersurge Event: "Atomic Force Microscopy to study Cellulose Microfibrils Interactions with Cellulases", Davis, CA

2011 – January 12 – 13, CREATE Symposium: "Atomic Force Microscopy to study Cellulose Microfibrils Interactions with Cellulases", Davis, CA

Honors & Awards:
2011 NSF CREATE-IGERT
2012 NSF RESOURCE

Trainee Name : LaKisha J. Odom
Graduate Group/PhD Program, PI Integrative Biosciences /Agricultural Biotechnology:
Dr. Ramble Ankumah and Dr. Jesse Jaynes
Email: ljodom@hotmail.com or lakisha.j.odom@aphis.usda.gov

Education & Experience: Dr. LaKisha J. Odom earned her PhD in Integrative Biosciences with an emphasis on soil science and agricultural biotechnology from Tuskegee University in 2011. Her dissertation work was titled: Effect of Transgenic Cotton Plants Transformed with Antimicrobial Synthetic peptide *D4E1* on Cotton Seedling Disease, Soil Microbial Diversity and Enzymatic Function. In 2004, she received her Master's degree from The George Washington University and she received her Bachelors of Science from Tuskegee University in Environmental Science with a focus in Soil Science in 1999. In 2013, she was selected to be a Science and Technology Policy Fellow for the American Association for the Advancement of Science (AAAS), where she is currently placed within the USDA Biotechnology Regulatory Service. Since 2012, she has served as the American Phytopathological Society Public Policy Board Early Career Intern and has been an instructor at Tuskegee University and is currently an adjunct professor with Kaplan University.

Research Interests: Her primary focus is in agricultural biotechnology with an emphasis on regulation, policy, and food security issues, on a national and international level. She currently works in the USDA BRS office which regulates the movement and planting of genetically engineered plant products. She is also interesting in understanding risk communication that is associated with genetically engineered organisms.

In the broader context of understanding regulation of genetically engineered plants and plant products, Dr. Odom interacts with scientists, policy makers and regulatory agencies both domestically and abroad. She aims to gain a greater understanding biotechnology, how it will impact the future of food production and the perception of risk associated with biotechnology as it pertains to agriculture.

Selected Publications:

- Odom, LaKisha. Effect of Antimicrobial Synthetic Peptide D4E1 on Infestation of Cotton Seedling Disease and on Soil Microbial Diversity. Proceedings of the 66th Annual Professional Agricultural Workers Conference, 20008. Tuskegee University, Tuskegee, AL, 2008. Print.

- Lakisha Odom, Kara Pickett , Timothy Purdie, Jr., John Heath, A.D. Alexander. A Survey of Kaolin Geophagia in Macon County, AL. Journal of Health Care in the Poor and Underserved. In Press.

- Lakisha J. Odom, Kara Cromwell, DeJuana Grant, Micoya Myers, Eddy Cadet, Hamid A. Mahama, Vijaya Rangari, Ralphenia D. Pace, Ramble Ankumah, Curtis A. Fluker, A. Deloris Alexander. The Biological Consequences of Kaolin Geophagia. Environmental Health Perspectives. In Peer Review.

Selected Presentations

- "Effect of Transgenic Cotton Plants Transformed with Antimicrobial Synthetic peptide *D4E1* on Cotton Seedling Disease, Soil Microbial Diversity, and Enzymatic Activity." Presented at the National Science Foundation IGERT Project meeting. May 23, 2010-May 25, 2010. Washington, DC.

- "Effect of Transgenic Cotton Plants Transformed with Antimicrobial Synthetic Peptide *D4E1* On Cotton Seedling Disease, Soil Microbial Diversity. "Presented at the Agronomy Society of America International meeting in Long Beach, CA November 1-5, 2010.

- "Effect of Transgenic Cotton Plants Transformed with Antimicrobial Synthetic peptide D4E1 on Cotton Seedling Disease, Soil Microbial Diversity, and Enzymatic Activity." Presented at the American Chemical Society, August 26, 2010-August 29, 2010, Boston, MA.

Honors & Awards:

- National Science Foundation. Women's International Research Collaborations (WIRC) for Minority Serving Institutions, 2012-2013.
- CREATE-IGERT Fellowship, U.C. Davis 2007-2011
- May 2013, Selected as AAAS Science and Policy Technology Fellow
- August 2012, Selected as American Phytopathological Society Early Career Intern
- May 2011, Selected for Tuskegee University Integrative Biosciences Director's Distinguished Service Award
- April 2009, Nominated for membership in the Tuskegee University Chapter of Sigma Xi, the Scientific Research Society
- April 2008, Nominated for membership in the Tuskegee University Chapter of Gamma Sigma Delta, the Honor Society of Agriculture
- 2002, Awarded Presidential Bronze Medal, U.S. Environmental Protection Agency, for Implementation of Brownfield Revitalization and Environmental Restoration Act

Websites & Social Media Links:

LinkedIn- http://www.linkedin.com/pub/lakisha-odom/34/87a/532
PhD Program Website: Tuskegee University Integrative Biosciences Program
http://www.tuskegee.edu/phd_program_in_integrative_biosciences.aspx
AAAS Science and Technology Policy Fellowships: http://www.aaas.org/program/science-technology-policy-fellowships
APS Public Policy Board: http://www.apsnet.org/members/outreach/ppb/Pages/default.aspx

Steven Samuels
Plant Biotechnology, Dr. Marceline Egnin and Immunology, Dr. Toufic Nashar
ssamuels6952@mytu.tuskegee.edu

Education & Experience: Mr. Steven Samuels earned his BS degree in Plant Biotechnology from Fort Valley State University in 2003, where he participated in several internships at Fort Valley State University, The University of Florida, Michigan State University, and Fordham University. In 2010 he obtained his Master's degree from Tuskegee University in Plant and Soil Science. In 2010 he joined the Integrated Biosciences program at Tuskegee University and is scheduled to graduate in 2015 with a dissertation title of Engineering Sweetpotato [*Ipomoea Batatas (L.) Lam*] Expressing Synthetic Lytic Peptide for the Potential Inhibition of Human Immunodeficiency Virus Replication. Mr. Samuels obtain teaching experience by TAing for Dr. M. Egnin Plant Breeding class in Fall 2011-13 and Plant and Animal Biotech for Drs. Egnin and Witola, fall 2010-11.

Research Interests: Steven's interests are in plant mediated treatment of human diseases thought biotechnology and recombinant DNA technology. Currently he is working to develop an HIV therapy using synthetic peptides expressed in Sweetpotato that can potentially reduce overall viral transmission.

Publications:

Samuels, S. Egnin, M. Jaynes, J. (2009). Development of Transgenic Sweetpotato [*Ipomoea batatas* (L. lam)] Expressing Synthetic Lytic Peptide Genes jc41N and jc41ND as a Plant-based Treatment Regimen Against HIV. Society for Invitro Biology Meeting. Charleston, SC June 2009. Invitro Cell and Dev. Journal 45 (4)

Samuels, S. Egnin, M. Scoffield, J. Bey, B. Traore, S. Prakash, C.S. Jaynes, J. Jackson, J. (2011). Embryogenesis and Genetic Transformation of Multiple Sweetpotato Sweetpotato [*Ipomoea batatas* (L. lam)] Cultivars for Enhanced Productivity, Nutritional and Health Values. Proceeding of the National Sweetpotato Collaborators Group Progress Report

Presentations:

2014 Presented poster at the George Washington Carver Symposium, Iowa state University, Ames, Iowa. Entitled Engineering Sweetpotato [*Ipomoea Batatas (L.) Lam*] Expressing Synthetic Lytic Peptide for the Potential Inhibition of Human Immunodeficiency Virus Replication. Samuels, Steven, Marceline Egnin, Chris Bernard and Jesse Jaynes Plant Biotechnology and genomics Research Laboratory, Department of Agriculture and Environmental Sciences, CAENS, Tuskegee University, Tuskegee AL 36088.

2013 Presented poster at the 17th Biennial Research Symposium . Association of 1890 Research Directors. Entitled Development of Transgenic Sweetpotato Expressing Lytic Peptide As a Treatment Regime against HIV. Samuels, Steven, Marceline Egnin, Chris Bernard and Jesse Jaynes Plant

Biotechnology and genomics Research Laboratory, Department of Agriculture and Environmental Sciences, CAENS, Tuskegee University, Tuskegee AL 36088.

2013 Professional Agriculture Workers Conference, Tuskegee University, Tuskegee Al. Entitles *In-Planta* Engineering and Expression of Biomolecules Against HIV Replication .Samuels, Steven, Marceline Egnin, Chris Bernard and Jesse Jaynes Plant Biotechnology and genomics Research Laboratory, Department of Agriculture and Environmental Sciences, CAENS, Tuskegee University, Tuskegee AL 36088.

Honors & Awards:
2014 Recipient of the George Washington Carver Summer Internship Program, Iowa State University, Ames Iowa

Websites & Social Media Links: ssamuels6952@mytu.tuskegee.edu
PhD Program Website –Integrative Biosciences PhD Program
http://www.tuskegee.edu/phd_program_in_integrative_biosciences.aspx

Raymon Shange
IBS Program, Ankumah Soil and Water Quality Laboratory & Zabawa Laboratory
College of Agricultural, Environmental, and Natural Sciences,
Tuskegee University

Education & Experience:
2004 BS Biology, Xavier University of Louisiana
2006 MA Philosophy, Howard University
2011 PhD Integrative Biosciences, Tuskegee University

Raymon is currently an Assistant Professor and Assistant to the Director of the Carver Integrative Sustainability Center at Tuskegee University, AL. Following the award of his PhD in 2011, he worked as a post-doctoral scholar microbial ecology

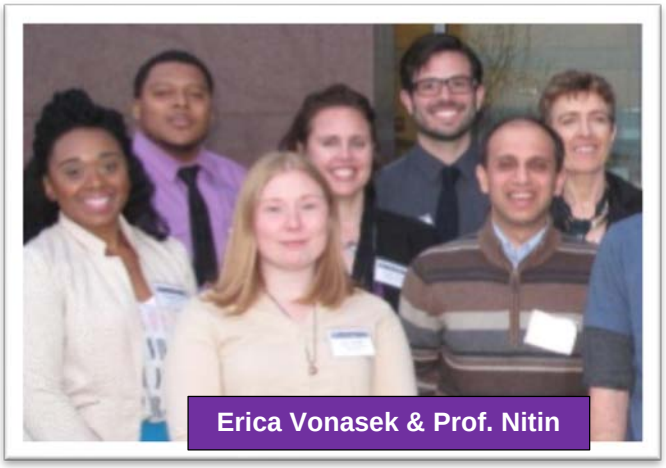
Research Interests:
Raymon's research has directed him into the area of metagenomics and bioinformatics. His future concerns in research include the characterizations of microbial populations in differing environments, and their transcriptomic and proteomic responses to human influence (natural resources communities as well as organismal mutualisms). He retains an avid interest in the interface between science, the humanities, and society and hopes to be able to venture into this area in the future as well. He maintains his interests and completes lectures in Environmental Justice, Environmental Sustainability, Environmental Ethics, and the Philosophy of Nature.

Publications:
Shange, R. S., Ankumah, R. O., Ibekwe, A. M., Zabawa, R., & Dowd, S. E. (2012). Distinct soil bacterial communities revealed under a diversely managed agroecosystem. *PloS one*, *7*(7), e40338.

Honors & Awards:
2012 US Fish & Wildlife Faculty Fellowship

Websites & Social Media Links:
LinkedIn: www.linkedin.com/pub/**raymon-shange**/2a/64a/28b

Erica Vonasek
Biological Systems Engineering, Dr. Nitin Nitin
elvonasek@ucdavis.edu


Erica Vonasek & Prof. Nitin

Education & Experience:
2010 BS Biological Systems Engineering, UC Davis

Erica Vonasek received her Bachelor of Science degree in Biological Systems Engineering at UC Davis and is in the process of earning her PhD in Biological Systems Engineering with a Designated Emphasis in Biotechnology from UC Davis with an expected graduation date of September 2015.

Her PhD work is entitled "Integrating Bacteriophages with biomaterials for applications in food and agriculture, including formulation and modeling delivery and release of bacteriophages to biofilms". She also participates in the Graduate Student Association as her graduate group's assembly represntative.

Research Interests: Erica research focuses on creating films, dip coatings, cellulose fiber membranes, and emulsions out of biomaterials, such as cellulose, protein, and polysaccharides, for bacteriophage release and delivery for planktonic bacterial pathogens and biofilms in food and agricultural applications. These different materials are analyzed for both physical characteristics and antimicrobial efficacy. As a secondary topic, she also models forced mass transfer of phages into biofilms using Comsol Multiphysics.

As a secondary research topic, she also collaborates with food scientists to use fluorescence microscopy to analyze and demonstrate changes in food as it is processed. Past projects include tracking E. coli O157:H7 in leafy greens using 2 photon microscopy to determine infiltration probabilities in vacuum cooling, an industry standard cooling method for cooling fresh picked produce and in collaboration with Diane Barrett lab (Food Science, University of California, Davis), potato cells as a function of cooking method are imaged using 2 photon microscopy and conventional confocal microscopy in order to qualitatively and quantitatively assess cell wall and starch structure.

Publications:
Han, J. H., Wang, M. S., Das, J., Sudheendra, L. M., Vonasek, E., Nitin, N., & Kennedy, I. M. (2014). The capture and detection of T7 bacteriophages on a nanostructured interface. *ACS applied materials & interfaces*.

Vonasek, E., Le, P., & Nitin, N. (2014). Encapsulation of bacteriophages in whey protein films for extended storage and release. *Food Hydrocolloids*, *37*, 7-13.

Fuentes, A., Vázquez-Gutiérrez, J. L., Pérez-Gago, M. B., Vonasek, E., Nitin, N., & Barrett, D. M. (2014). Application of nondestructive impedance spectroscopy to determination of the effect of temperature on potato microstructure and texture. *Journal of Food Engineering*, *133*, 16-22.

Presentations:
Vonasek, E. Le, P. Nitin, N. (July 2013). Integrating Bacteriophages and Edible Packaging for Antimicrobial Food Coatings. 2013 Annual Meeting. Institute of Food Technologists (IFT).

Vonasek, E. Nitin, N. (July 2013). Vacuum Cooling Influence on Microbe Infiltration in Fresh Leafy Greens. 2013 Annual Meeting. Institute of Food Technologists (IFT).

Vonasek, E. and Nitin N. (February 2013). Improving Optical Imaging Methods for Use in Plant Systems. NSF CREATE-IGERT Symposium. Davis, California.

Vonasek, E. (2012, July). Influence of Vacuum Cooling on Microbe Infiltration in Fresh Leafy Greens. In 2012 Annual Meeting. IAFP.

Vonasek, E. Hsieh, Y.L., Nitin, N. (January 2012). Encapsulation of Bacteriophages in Biopolymers for Agricultural and Food Applications. NSF CREATE-IGERT Symposium. Davis, California.

Vonasek, E. Nitin, N. (April 2011). Encapsulation of Bacteriophages in Biopolymers to Control Food Pathogens in Food. UC Davis Interdisciplinary Graduate and Professional Symposium.

Honors & Awards:
- National Science Foundation IGERT: Collaborative Research & Education in Agriculture Technologies and Engineering (NSF CREATE-IGERT). Fellowship, 2012-2014.
- 1st Place, Packaging Division Poster Competition for poster entitled “Integrating Bacteriophages and Edible Packaging for Antimicrobial Food Coatings.” IFT 2013, Chicago IL.
- Robert Mondavi Institute Industry Partnership Program Fellowship: Del Monte. Fellowship 2012.
- Jastro Shields Scholarship. 2011-2012.

Websites & Social Media Links:
PhD Program Website – bae.engineering.ucdavis.edu
Lab Website – N/A
LinkedIn - www.linkedin.com/pub/erica-vonasek/36/646/321/

Natasha N. Worden
Plant Biology, Drakakaki lab
nnworden@ucdavis.edu

Education & Experience: Natasha is completing her fourth year of her PhD in Plant Biology with a Designated Emphasis in Biotechnology at UC Davis. She is expecting to receive her PhD in December of 2015 with a thesis titled "Investigating the endomembrane trafficking processes involved in cell wall deposition". She received her Bachelor's degree in Biology with a minor in Chemistry from Smith College in 2008. She TAed for the molecular biology and biochemistry lab (MCB 120L) in the fall of 2013. She will be interning at the Monsanto Calgene campus in Davis this summer.

Research Interests: Natasha is studying the secretion of proteins related to cell wall biosynthesis and regulation. These cell wall related proteins are trafficked to the wall through the endomembrane system, a system of transportation through membrane bound subcellular compartments, in which proteins reach the outside of the cell through vesicle secretion. This process is thought to play a large regulatory role in cell wall development, although little is known about the details of this process. I am studying these processes by using small molecules to disrupt the trafficking of cell wall related proteins and studying proteins of unknown function found in the same vesicles as important cell wall proteins.

Publications:

Worden, N., Esteva Esteve, V., Domozych, D., Drakakaki, G. (In press) "Using Chemical Genomics to Study Cell Wall Formation and Cell Growth in *Arabidopsis thaliana* and *Penium margaritaceum*." Plant Cell Growth and Expansion - Methods and Protocols Ed. J. Estevez.

Worden, N., Park, E., & Drakakaki, G. (2012). "Trans-Golgi Network- an intersection of trafficking cell wall components". Journal of integrative plant biology.

Worden, N, Girke, T and Drakakaki, G (2013). "Endomembrane Dissection Using Chemical Induced Bioactive Clusters." Methods Mol Biology: Methods in Chemical Genomics Ed. G Hicks.

Presentations:

Oral presentations

Worden, N,. Drakakaki, G. "Chemical disruption of cellulose synthase complex localization and mobility" ASPB Western section 2014. May 4th, 2014. Santa Clara, CA.

Worden, N., Drakakaki, G. "Understanding the Endomembrane Processes Involved in Cell Wall Deposistion." PBGG Fall Colloquium. September 23rd, 2013. Davis, CA.

Worden, N. Drakakaki, G. "Uncovering the endomembrane processes involved in cell wall deposition" UC Davis Plant Biology Retreat. Oct 25th, 2013

Worden, N., Drakakaki, G. "Characterization of Endomembrane Pathways Implicated In Cell Wall Deposition." CREATE-IGERT Symposium. February 20th, 2013. Davis, CA.

Worden, N., Schultink, A., Pauly, M., and Drakakaki, G. "Using Small Molecules to Investigate Plant Cell Wall Development with Potential Biofuel Applications". Interdisciplinary Graduate and Professional Student Symposium. April 27, 2012. Davis, CA.

Worden, N. and Drakakaki, G. "Studying the Endomembrane Trafficking Processes Involved in Cell Wall Deposition for Biofuel Improvement". 2011-2012 CREATE-IGERT Symposium. February 3rd, 2012. Davis, CA.

Worden, N. and Drakakaki, G. "Studying the Endomembrane Trafficking Processes Involved in Cell Wall Biosynthesis". Plant Cell Biology Training Program Retreat. Sept. 23, 2011, Monterey, CA.

Worden, N. and Drakakaki, G. "Using Chemical Genomics and Confocal Microscopy to Study Endomembrane Trafficking and Cell Wall Biosynthesis". Plant Biology Graduate Group Fall Colloquium. September 15, 2011, Davis, CA.

Poster presentations

Worden, N., Higdon, S., Singh, V., Drakakaki, G."Identifying New Trafficking Pathways Involved in Cell Wall Deposition". American Society of Plant Biologists, July 20-24, 2013. Providence, RI.

Worden, N., Schultink, A., Pauly, M., and Drakakaki, G. "Identifying New Trafficking Pathways Involved in Cell Wall Deposition". American Society of Plant Biologists, Western Section. April 12-13, 2013. Davis, CA.

Worden, N., Schultink, A., Pauly, M., and Drakakaki, G. "Identifying New Trafficking Pathways Involved in Cell Wall Deposition". 22nd Annual Biotechnology Retreat. March 23rd, 2013. Napa, CA.

Worden, N., Schultink, A., Pauly, M., and Drakakaki, G. "Identifying New Trafficking Pathways Involved in Cell Wall Deposition". Plant Cell Walls Gordon Conference. August 4-10, 2012. Waterville, ME. **Best Poster winner.**

Worden, N., Schultink, A., Pauly, M., and Drakakaki, G. "Investigating the Endomembrane Trafficking Processes Involved in Cell Wall Polysaccharide Biosynthesis and Deposition". 21st Annual Biotechnology Training Retreat. March 24, 2012. Napa, CA.

Honors & Awards:

Awarded the Monsanto Fellowship for agricultural biotechnology (2014)
"Best Poster" award winner at the 2012 Plant Cell Wall Gordon Conference.
Awarded the National Science Foundation's CREATE-IGERT (Collaborative Research & Education in Agricultural Technologies & Engineering-Integrative Graduate Education and Research Traineeship) for biofuels research (2011).
Awarded the Graduate Student Research Assistantship by the department of Plant Sciences (2011).
Awarded the Jastro-Shields Research Award by the Plant Biology Graduate Group (2012 & 2013).

Awarded Harriet Foote memorial prize by the Smith College Biology Department, for excellence in research in botany (2008).

Websites & Social Media Links:
PhD Program Website - http://bioscinet.ucdavis.edu/Students/Profiles/Display/10309
Lab Website - http://www.plantsciences.ucdavis.edu/plantsciences_faculty/drakakaki/index.htm
LinkedIn - http://www.linkedin.com/pub/natasha-worden/6a/23/137

Tracy Zeng
Professor Bo Liu Laboratory
Email: cjzeng@ucdavis.edu

Education & Experience: Tracy is completing her PhD with a Designated Emphasis in Biotechnology at UC Davis. She also received an AA from City College of San Francisco in 2004 and a B.S. from UC Davis in 2006.

Research Interests:. Tracy's research focuses on identifying components that are important for triggering the onset of cell wall formation using Aspergillus nidulans as a model organism. The goal of her studies is to design novel approaches aimed at manipulating filamentous fungi better suited for applications like fermentation and bioremediation.

Recent Publications:

Ho, C. M., Hotta, T., Kong, Z., Zeng, C. J., Sun, J., Lee, Y. R., & Liu, B. (2011) Augmin plays a critical role in organizing the spindle and phragmoplast microtubule arrays in Arabidopsis. Plant Cell: 23, 2606-18.

Tatebe, H, Morigasaki, S, Zeng, C. J., & Shiozaki, K. (2010) Rab-family GTPase regulates TOR complex 2 signaling in fission yeast. Current Biology: 20, 1975-82.

Kim, J-M*, Zeng, C. J.*, Nayak, T, Shao, R, Huang, A-C, Oakley, B. R., & Liu, B. (2009) Timely septation requires SNAD-dependent spindle pole body localization of the septation initiation network components in the filamentous fungus *Aspergillus nidulans*. Molecular Biology of the Cell: 20, 2874-84. (*Equal contribution)

Zeng, C. J., Lee, Y-R, & Liu, B. (2009). The WD40 repeat protein NEDD1 plays a role in microtubule organization during mitotic cell division in Arabidopsis thaliana. Plant Cell: 21, 1129-40.

Recent Presentations:

2011 April 2, Biotechnology Training Retreat, Poster Title: *"The Small GTPase SPGA Plays a Critical Role in Septation in the Filamentous Fungus Aspergillus nidulans"*, Napa, CA

Kim, H-R, Zeng, C. J., & Liu, B. (2011, March). The small GTPase SPGA plays a critical role in septation in the filamentous fungus *Aspergillus nidulans*. Poster session presented at the 26th Fungal Genetics Conference at Asilomar, Pacific Grove, CA.

Steven Zicari
Biosystems Engineering, Prof. Ruihong Zhang Laboratory
szicari@ucdavis.edu

Education & Experience: Steven Zicari is currently a NSF CREATE-IGERT Trainee and 4th year PhD candidate in Biosystems Engineering with a Designated Emphasis in Biotechnology (DEB) within the Biological and Agricultural Engineering Department. Steven's research focuses on enzymatic conversion and bioprocessing of sugar beets and agricultural residues to liquid and gaseous fuels and he expects to graduate in 2015. Steven has both BS and MS degrees from Cornell University in Agricultural, Biological, and Environmental Engineering. He has worked in the renewable energy private sector for several years and is also a Licensed Professional Agricultural Engineer in California.

Research Interests: Steve is interested in developing systems employing bioconversion processes to transform agricultural feedstocks and organic residuals into renewable fuels and chemicals. Specific research underway includes optimizing processing conditions for enzymatic liquefaction of sugar beets and upgrading to ethanol, biogas, and higher value coproducts. In addition to investigating the physical and biochemical phenomena at play in bioconversion processes, Steve is interested in process and economic modelling of integrated systems to find innovative way to improve resource efficiency and commercial viability while working with multidisciplinary teams.

Recent Publications:

Li, J., Zicari, S., Cui, Z., and Zhang, R., Processing Anaerobic Sludge for Extended Storage as Anaerobic Digester Inoculum, Bioresource Technology (2014), doi: http://dx.doi.org/10.1016/j.biortech.2014.05.006

Zhang, R., Zicari, S., Diener, J., Tischer, J., Manternach, J., Pucheu, W., Moore, J., Winckler, J. (2014). U.S. Patent Application No. 14,220,033. Methods and System for Liquefaction, Hydrolysis, and Fermentation of Agricultural Feedstocks. Washington, DC: U.S. Patent and Trademark Office.

Recent Presentations:

Zicari, S., Aramrueang, N.A., Asato, C.M., Chen, C., & Zhang, R. (2014). Integrated processing of sugar beets at the lab and pilot scale for bioethanol and biogas production. Poster session presented at the 36th Symposium on Biotechnology for Fuels and Chemicals, Clearwater Beach, FL.

Zicari, S., Aramrueang, N.A., & Zhang, R. (2014). Enzymatic liquefaction of sugar beet as a versatile biofuel feedstock. Poster session presented at the 36th Symposium on Biotechnology for Fuels and Chemicals, Clearwater Beach, FL.

Liu, X.Y., Zicari, S., Li, Y.Q., & Zhang, R. (2014). Pretreatment of wheat straw with potassium hydroxide for increasing the enzymatic and microbial degradability. Poster session presented at the 36th Symposium on Biotechnology for Fuels and Chemicals, Clearwater Beach, FL.

Honors & Awards:
NSF CREATE-IGERT Trainee (National Science Foundation Collaborative Research in Agricultural Technology and Education Integrative Graduate Education and Research Training Program), UC Davis, 2012-2013.

UC Davis Sustainable AgTech Innovation Center (SATIC) prototype seed fund grant winner (2013), awarded to pursue commercialization of system producing sugars and clean water from agricultural wastes and regional feedstocks using a mobile processing design.

Henry A. Jastro Graduate Research Award Winner, 2011-2013.

UC Davis Graduate Studies Travel Award Recipient, 2014.

Professional Agricultural Engineer #AG571, California, 2009.

Member of the American Society for Agricultural and Biological Engineers (ASABE), Society for Industrial Microbiology (SIM), American Biogas Council (ABC), and the Alpha Epsilon (AE) Engineering Honor Society.

Websites & Social Media Links:
PhD Program Website: UC Davis Bio and Ag Engineering Dept. http://bae.engineering.ucdavis.edu/
LinkedIn: www.linkedin.com/in/szicari/
Twitter: https://twitter.com/BioConvert