



## 2013 CREATE-IGERT SYMPOSIUM



**February 22, 2013**  
**UC Davis Genome Center**



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



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

***IGERT Symposium and Distinguished Lecture  
Genome Center, UC Davis***

***February 22, 2013***

Welcome to the 2012-2013 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, 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 as we honor our trainees 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, and this year's Distinguished Lecturer, Dr. Rachel Chikwamba, Council of Scientific and Industrial Research (CSIR), University of Pretoria, South Africa.

I'd especially like to thank Dr. Denneal Jamison-McClung, CREATE-IGERT Program Coordinator and Associate Director of the Biotechnology Program, and Marianne Hunter, Assistant Director of the Biotechnology Program, 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  
Professor, Chemical Engineering & Materials Science***



## ***Images from the 2012 Symposium***



*(L->R) G. Chris Bernard, Prof. Annaliese Franz, Sonni-Ali Miller, Patrick O'Dell (back row), Prof. Georgia Drakakaki, Prof. Judy Kjelstrom, Dr. Lloyd Yu, Charnita Kanyi, Dominique Gales, Steven Samuels, Geoff Benn (back row), Marta Bjornson, Tim Butterfield (back row) Student, Prof. Ruihong Zhang, Prof. Abhaya Dandekar, Lisa Andersen, Steve Zicari, Prof. Bo Liu, Hyrum Gillespie, Mark Lemos, Lucas Arzola, Prof. Karen McDonald and Prof. Denneal Jamison-McClung*



*(L->R) Prof. Richard Michelmore, Prof. Karen McDonald, Dr. Vidadi Yusibov (Distinguished Lecturer 2012, Fraunhofer USA Center for Molecular Biotechnology) and Prof. Satya Dandekar. Prof. Abhaya Dandekar in the background.*

**CREATE-IGERT Distinguished Lecture and Symposium Schedule**  
**February 22, 2013**  
**Genome Center, UC Davis**

- 10:30 - 11:00am      Registration
- 11:00 – 11:50am      Distinguished Lecture – Dr. Rachel Chikwamba, *“Plant-Made Products for Sustainable Solutions in Nutrition & Health – Opportunities & Challenges”*
- Noon – 1:00pm      Lunch and Poster Session

***Oral Presentations***

- 1:00 - 1:15pm      Welcome by Prof. Jeff Gibeling, Dean of Graduate Studies
- 1:15 - 1:30pm      Program Overview by Prof. Karen McDonald, PI NSF CREATE-IGERT

***Session 1 – Plant Cell Walls & Bioenergy***

- 1:30 - 1:50pm      Natasha Worden, Drakakaki Laboratory, Plant Sciences  
*“Discovering New Proteins Involved in Cell Wall Deposition”*
- 1:50 - 2:10pm      Patrick O'Dell, Jeoh Laboratory, Bio & Ag Engineering  
*“Studies of the Impact of Cellulose Microfibrillar Properties on Productivity of Cellulases”*
- 2:10 - 2:30pm      Steve Zicari, Zhang Laboratory, Bio & Ag Engineering  
*“From Lab to Pilot: Scale Up of a Sugar Beet Bioethanol Process”*
- 2:30 - 2:50pm      Mark Lemos, Dehesh Laboratory, Plant Biology & McDonald Laboratory, Chemical Engineering & Material Science  
*“Investigation of Metabolic Conduits Involved in Rechanneling the Carbon Flux from Starch into Oil”*
- 2:50 - 3:05pm      POSTER AND COFFEE BREAK

***Session 2 – Plant Resistance to Disease & Environmental Stresses***

- 3:05 - 3:25pm      Hyrum Gillespie, Dandekar Laboratory, Bio & Ag Engineering  
*“Developing an Effective Detection System for X. fastidiosa using SCFVS, with Application in the Early Detection of Citrus Variegated Chlorosis”*

- 3:25 - 3:45pm Mitch Harkenrider, Ronald Laboratory, Plant Pathology  
*"Identification and Comparative Genomic Analysis of Glycosyltransferase 2 Gene Family in Switchgrass"*
- 3:45 - 4:05pm Mitch Elmore, Coaker Laboratory, Plant Pathology  
*"Quantitative Proteomics Identifies Novel Proteins that Control Plant Disease Resistance"*
- 4:05 - 4:20pm POSTER AND COFFEE BREAK

### ***Session 3 – Plant Production Systems & Natural Products***

- 4:20 – 4:40pm Dominique Gales, Samuel Laboratory, IBS Program, Tuskegee University, *"The Role of Sweetpotato Green Extract on MicroRNA Expression Using Human Prostate Cancer Cell Line"*
- 4:40 – 5:00pm Sonni-Ali Miller, Martinez Laboratory, IBS Program, Tuskegee University, *"Inhibition of IL-12 Bioactivity Reduces Thymocyte Apoptosis in TNCS"*
- 5:00 - 5:20pm Erica Vonasek, Nitin Laboratory, Bio & Ag Engineering  
*"Improving Optical Imaging Methods for Use in Plant Systems"*
- 5:20pm Closing Remarks by CREATE PI, Prof. Karen McDonald



*2012 Distinguished Lecture by Dr. Vidadi Yusibov, Fraunhofer USA Center for Molecular Biotechnology, "High Performance Production System for Vaccines & Therapeutics"*



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

***NSF Award DGE-0653984***

***August 15, 2007 – July 31, 2012***

***No-cost Extension – July 31, 2013***

**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 NSF CREATE-IGERT Training Program Participants

### *Trainees*

- ❖ Benn, Geoffrey, PhD Student, Dehesh Laboratory, Plant Biology Grad Group, Dept. of Plant Biology
- ❖ Bernard, Gregory “Chris”, 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
- ❖ Butterfield, Timothy, PhD Student, Dandekar Laboratory, Plant Biology Grad Group, Dept. of Molecular & Cellular Biology
- ❖ Castillo, Elenor, PhD Student, Negre-Zakharov and Dandekar Laboratories, Plant Biology Grad Group, Dept. of Plant Sciences
- ❖ Elmore, J. Mitch, PhD Student, Coaker Laboratory, Plant Biology Grad Group, Dept. of Plant Pathology
- ❖ 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
- ❖ Harkenrider, Mitch, PhD Student, Ronald Laboratory, Plant Biology Grad Group, Dept. of Plant Pathology
- ❖ Kerwin, Rachel, PhD Student, Kliebenstein Laboratory, Plant Biology Grad Program, Dept. of Plant Sciences
- ❖ Lemos, Mark, PhD Student, Dehesh and McDonald Laboratories, Plant Biology Grad Group, Dept. of Plant Biology
- ❖ Miller, Sonni-Ali, PhD Student, Martinez Laboratory, Integrative Biosciences (IBS) Training Program, Tuskegee University
- ❖ O'Dell, Patrick, MS Student, Jeoh Laboratory, Biological Systems Engineering Grad Group, Dept. of Biological and Agricultural Engineering
- ❖ 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
- ❖ Worden, Natasha, PhD Student, Drakakaki Laboratory, Plant Biology Grad Group, Dept. of Plant Sciences
- ❖ Zeng, Tracy, PhD Student, Liu Laboratory, Plant Biology Grad Group, Dept. of Plant Biology
- ❖ Zicari, Steve, PhD Student, Zhang Laboratory, Biological Systems Engineering Grad Group, Dept. of Biological and Agricultural Engineering



*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 – Degree Awarded 2012
- ❖ Chiniquy, Dawn, PhD, Ronald Laboratory, Plant Biology Grad Group, Dept. of Plant Pathology – 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 – Degree Awarded 2012
- ❖ Lateef, Dalya, PhD, Bovell-Benjamin Laboratory, IBS Program, Tuskegee University – Degree Awarded 2011
- ❖ Lindenmuth, Ben, PhD, McDonald Laboratory, Chemical Engineering Grad Group, Dept of Chemical Engineering & Materials Science – Degree Awarded 2011
- ❖ 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 – Degree Awarded 2011
- ❖ Wolf, Mark, MS, Parales Laboratory, Biochemistry & Molecular Biology Grad Group, Dept. of Microbiology – Degree Awarded 2010



*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, Assistant Professor, Dept. of Plant Sciences
- ❖ Blumwald, Eduardo, Professor, Dept. of Plant Sciences
- ❖ Bovell-Benjamin, Adelia, Professor, IBS Program, Tuskegee University
- ❖ Coaker, Gitta, Assistant Professor, Dept. of Plant Pathology
- ❖ Dandekar, Abhaya, Professor, Dept. of Plant Sciences & Co-PI, CREATE-IGERT
- ❖ Dandekar, Satya, Chair & Professor, Dept. of Medical Microbiology & Immunology
- ❖ Dehesh, Katayoon, Professor, Dept. of Plant Biology

- ❖ Drakakaki, Georgia, Assistant Professor, Dept. of Plant Sciences
- ❖ Egnin, Marceline, Professor, IBS Program, Tuskegee University
- ❖ Falk, Bryce, Professor, Dept. of Plant Pathology
- ❖ Fan, Zhiliang (Julia), Assistant Professor, Dept. of Biological & Agricultural Engineering
- ❖ Franz, Annaliese, Assistant Professor, Dept. of Chemistry
- ❖ German, Bruce, Professor, Dept. of Food Science & Technology,
- ❖ Gibeling, Jeffery, Dean, Office of Graduate Studies & Professor, Dept. of Chemical Engineering & Materials Science
- ❖ Hill, Walter, Professor, IBS Program, Tuskegee University
- ❖ Jamison-McClung, Denneal, Associate Director, Biotechnology Program & Program Coordinator, CREATE-IGERT
- ❖ Jaynes, Jesse, Professor, IBS Program, Tuskegee University
- ❖ Jenkins, Bryan, Professor, Dept. of Biological & Agricultural Engineering
- ❖ Jeoh, Tina, Assistant Professor, Dept. of Biological & Agricultural Engineering
- ❖ Joh, Larry, Dept. of Chemical Engineering & Materials Science, CREATE-IGERT Program Engineer & Short Course Instructor
- ❖ Kjelstrom, Judy, Director, Biotechnology Program & Senior Personnel, CREATE-IGERT
- ❖ Kliebenstein, Daniel, Assistant Professor, Dept. of Plant Sciences
- ❖ Labavitch, John, Professor, Dept. of Plant Sciences
- ❖ Lagarias, J. Clark, Professor, Dept. of Molecular and Cellular Biology
- ❖ Lebrilla, Carlito, Professor, Dept. of Chemistry
- ❖ Liu, Bo, Associate Professor, Dept. of Plant Biology
- ❖ Martinez, Marcia, Professor, IBS Program, Tuskegee University
- ❖ McDonald, Karen, Professor, Dept. of Chemical Engineering & Materials Science, Associate Dean of Research & Graduate Education, College of Engineering & Director, CREATE-IGERT
- ❖ Micheltore, Richard, Director, UC Davis Genome Center and Bioinformatics Program, Professor, Dept. Plant Sciences, College of Agriculture and Environmental Sciences; Professor, Dept. Molecular and Cellular Biology, College of Biological Sciences; Professor, Dept. Medical Microbiology and Immunology, School of Medicine
- ❖ Neale, David, Professor, Dept. of Plant Sciences
- ❖ Negre-Zakharov, Florence, Assistant Professor, Dept. of Plant Sciences
- ❖ Newell-McGloughlin, Martina, Executive Director, Life & Health Sciences Research Development & Co-PI, CREATE-IGERT
- ❖ Nitin, Nitin, Assistant Professor, Dept. of Food Science & Technology
- ❖ Paraless, Becky, Professor, Dept. of Microbiology
- ❖ Prakash, CS
- ❖ Ronald, Pamela, Professor, Dept. of Plant Pathology, & Co-PI, CREATE-IGERT
- ❖ Samuel, Temesgen, Professor, IBS Program, Tuskegee University
- ❖ Savageau, Michael, Professor, Dept. of Biomedical Engineering
- ❖ Shoemaker, Sharon, Executive Director, California Institute Food & Agricultural Research (CIFAR)
- ❖ Theg, Steven, Professor, Dept. of Plant Biology
- ❖ Tricoli, David, Manager, Ralph M. Parsons Foundation Plant Transformation Facility, & Senior Personnel, CREATE-IGERT
- ❖ VanderGheynst, Jean, Associate Dean of Undergraduate Studies, College of Engineering, Professor, Dept. of Biological & Agricultural Engineering, & Co-PI, CREATE-IGERT

- ❖ 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
- ❖ Yoder, John, Professor, Dept. of Plant Sciences
- ❖ Zabawa, Robert, Professor, IBS Program, Tuskegee University
- ❖ Zhang, Ruihong, Professor, Dept. of Biological and Agricultural Engineering



(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, Chair, Crop Sciences, University College Dublin

### ***In Memoriam***

- ❖ Kanyi, Charnita, MS, Program Assistant, Integrative Biosciences (IBS) Program, Tuskegee University (b. 1980 - d. 2012)

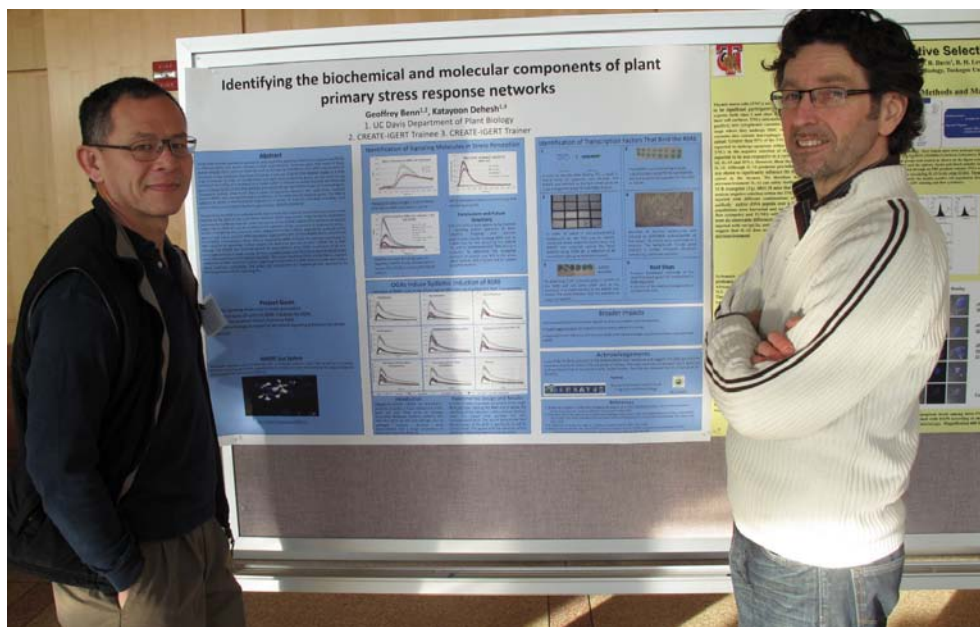


*In December 2012, we lost our colleague, Charnita Kanyi, to illness. Charnita was an integral part of the Integrative Biosciences administrative team and served the Tuskegee University student community as a mentor and role model. A lovely human being, Charnita leaves behind husband Peter Kanyi, one year old son Benaiah, and many saddened friends, family and colleagues. She was with us at the 2012 Symposium, healthy and vibrant – may we always remember her beautiful smile and kind spirit.*

## E-IGERT External Advisory Board Members

- ❖ Aglan, Heshmat, Professor & Associate Dean, College of Engineering & Physical Sciences, Tuskegee University
- ❖ Castle, Linda, Research Director Trait Discovery Pioneer Hi-Bred, Verdia Campus
- ❖ Cuevas, Hector, Director of Outreach, Recruitment & Retention, UC Davis Office of Graduate Studies
- ❖ Hamann, Bernd, Associate Vice Chancellor, UC Davis Office of Research
- ❖ Huang, Ning, Vice President of Research & Development, Ventria Bioscience
- ❖ McHughen, Alan, CE Biotechnology Specialist, UC Riverside & 2011-2012 Jefferson Science Fellow, Dept. of State, Washington, D.C.
- ❖ 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 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*



## NSF CREATE-IGERT 2012-2013 Distinguished Lecture

**Dr. Rachel Chikwamba**  
Chief Scientist, Plant Biotechnology Group  
CSIR Biosciences, University of Pretoria

**“Plant-Made Products for Sustainable Solutions in  
Nutrition & Health – Opportunities & Challenges”**



**Friday, February 22, 2013**

**1005 Genome & Biomedical Sciences Facility, UC Davis**

**11:00am -12:00pm**

The UC Davis NSF CREATE-IGERT program is honored to host Dr. Rachel Chikwamba, chief scientist in the Biosciences unit at the Council of Scientific and Industrial Research (CSIR), University of Pretoria, South Africa.

Dr. Chikwamba is an active global leader in plant biotechnology research for plant-made pharmaceuticals and crop biofortification. She is the research leader for the African Biofortified Sorghum (ABS) project and the GreenPharm initiative, as well as holding a lecturer appointment in the Department of Plant Science and Agricultural Research Institute (FABI), at the University of Pretoria, South Africa.

Dr. Chikwamba is currently involved in many collaborative research initiatives funded by the Royal Society, the EU Sixth Framework, the Bill & Melinda Gates Foundation and the Rockefeller Foundation. She is a Fellow of CSIR Biosciences, an Honorary Research Fellow at St Georges, University of London, and a member of the Academy of Science of South Africa. She is also a member of the Global Healthshare Initiative, a project-based organization founded by Drs. Ray Rodriguez and Somen Nandi (UC Davis).

<http://ghs.ucdavis.edu/ourmembers-chikwamba.html>









## *Oral Presentations*



## **DISCOVERING NEW PROTEINS INVOLVED IN CELL WALL DEPOSITION**

Trainee: Natasha Worden

Faculty Trainer: Georgia Drakakaki

Campus: University of California, Davis

### **Natasha Worden\* and Georgia Drakakaki**

Department of Plant Sciences, University of California, Davis

The cell wall is an interwoven meshwork of polysaccharides residing in the apoplast of plant cells, functioning in protection and support for the plant. Although much is known about the composition of the cell wall, comparatively little is known about the trafficking of its components to the apoplast. Typically, the contents of the apoplast are secreted through the endomembrane system, a network of interconnected vesicles, including the endoplasmic reticulum, the Golgi apparatus, the trans-Golgi network and the plasma membrane, although the details of this as it pertains to the cell wall are less understood. I am investigating the role of proteins found in the SYP61 proteome 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, and I hypothesize may have a specific role in cell wall deposition. To further study the intersection of endomembrane trafficking and cell wall deposition, SYP61 vesicles were extracted by affinity purification and proteomics analyses conducted on their contents (Drakakaki et al 2011). The proteome contained 145 proteins, including cellulose synthase, implying a role in cell wall polysaccharide deposition. Many of the proteins are of a previously unknown function and I am investigating their role in the trafficking of cell wall related components.



## **STUDIES OF THE IMPACT OF CELLULOSE MICROFIBRILLAR PROPERTIES ON PRODUCTIVITY OF CELLULASES**

Trainee: Patrick O'Dell

Faculty Trainer: Tina Jeoh

Campus: University of California, Davis

### **Patrick O'Dell\* and Tina Jeoh**

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

In the bioconversion of lignocellulosic biomass to fuels and chemicals, the crux lies in the challenges in dissociation of microfibrils and depolymerization of cellulose. The reaction mechanisms of cellulose hydrolysis by cellulases are yet unsolved, leaving the industry to rely on costly trial-and-error scale-up strategies. The elusiveness of the reaction mechanisms is due to complexities in the physical properties of cellulose and the complexities in the surface interactions between cellulase and cellulose. Cellobiohydrolases, the workhorse in synergistic mixtures of cellulases, are informative probes in the study of cellulase-cellulose interactions, such as to elucidate substrate properties that impact hydrolysis rates. Combining biochemical analyses with microscopy to track changes in cellulose fibrils with hydrolysis rates, we have previously observed that bacterial cellulose fibrils undergo large changes in the supramolecular structure due to *Trichoderma reesei* Cel7A (TrCel7A) cellobiohydrolase activity. In this research, Bacterial Cellulose grown from *G. xylinum* is subjected to varying degrees of sonication. Using electron microscopy, we observe changes in the overall length and shape of cellulose microfibrils. Additionally, we are exploring the relationships between cellulose microfibril lengths, microfibril surface chemistry, and the enzymatic hydrolyzability of microfibrils.

## **FROM LAB TO PILOT: SCALE UP OF A SUGAR BEET BIOETHANOL PROCESS**

Trainee: Steve Zicari

Faculty Trainer: Ruihong Zhang

Campus: University of California, Davis

**Steve Zicari\*, Natthiporn Aramruerang, and Ruihong Zhang**

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

UC Davis is collaborating with the California based Mendota Bioenergy group, a grower-led consortium of public and private partners conducting research and development work aimed at developing and applying technologies for production of advanced biofuel production from sugar beets. In part funded by a two-year, \$1.5-million, California Energy Commission (CEC) grant, research on bioethanol and biogas production from sugar beets have been conducted at lab-scale and were scaled to 5-ton pilot-scale at the UC Davis bioenergy pilot facility. Our research findings indicate that advanced sugar beet ethanol production can have significantly higher yield productivity (ie. gallons/acre) than first generation technologies, and, due to high yields and an integrated system design, may provide for a much lower carbon intensity fuel as compared to other fuel pathways currently available for meeting CA's low carbon fuel goals. Development work to support a commercial plant capable of producing 40MM gallons of bioethanol (or 20MM gallons drop-in fuel equivalent) annually, from 1.4MM tons of energy beets and other renewable feedstocks employing integrated biomass conversion technologies such as fermentation, AD, and gasification, is underway. Mendota Bioenergy has recently received notice of a proposed award for \$5-million from the CEC to support construction and operation of an Advanced Biorefinery Center Integrated Demonstration Plant over the next 24-months.

## **INVESTIGATION OF METABOLIC CONDUITS INVOLVED IN RECHANNELING THE CARBON FLUX FROM STARCH INTO OIL**

Trainee: Mark Lemos

Faculty Trainer: Katie Dehesh

Campus: University of California, Davis

### **Mark Lemos\* and Katayoon Dehesh**

Department of Plant Biology, University of California Davis

Oil based biofuels are renewable source of liquid fuel with favorable economic and energy content over ethanol produced biofuels derived from starch. The goal of the project is to identify the regulatory genetic determinants of carbon flux between starch and oil biosynthetic pathways, with the ultimate goal of re-directing the reduced carbon to oil biosynthesis in plants. Using global transcriptomic analysis platform obtained from oil accumulating endosperms of two closely related oat cultivars, one a low-oil containing variety Freja and the other a high-oil containing variety Matilda, a number of candidate genes with potential key regulatory functions in channeling the carbon flux from starch towards oil biosynthesis were identified.

Among the candidates are genes conserved among eukaryotes encoding voltage dependent anion channels (VDAC) reported to function as the primary conduit of metabolites between the mitochondria and cytosol. Oat endosperm transcriptome profiling led to identification of six VDAC genes, two of which were significantly upregulated in the high oil oat cultivar. Interestingly, one of the candidates encodes a protein that contains an upstream region most homologous to heat shock proteins. Toward the goal of functional analysis of these two genes, we have begun to determine the inter-cellular localization of the encoded products, by transforming plants with cDNA-GFP fusion destination vectors. Subsequent to the localization studies, we will utilize these transgenic lines for metabolic profiling. Furthermore, we will perform functional assays by complementation, using *Arabidopsis* mutant lines containing T-DNA insertions in the VDAC genes. Ultimately, we will assess the role of these genes in directing the carbon flux from starch to oil by transforming plants with a binary construct combining our genes of interest with those directly involved in oil production.

## **DEVELOPING AN EFFECTIVE DETECTION SYSTEM FOR X. FASTIDIOSA USING SCFVS, WITH APPLICATION IN THE EARLY DETECTION OF CITRUS VARIEGATED CHLOROSIS**

Trainee: Hyrum Gillespie

Faculty Trainer: Abhaya Dandekar

Campus: University of California, Davis

### **Hyrum Gillespie\* and Abhaya Dandekar**

Department of Plant Sciences, University of California, Davis

Why is orange juice so expensive? One big reason: Insect-borne plant diseases such as Huanglongbing (HLB) and Citrus Variegated Chlorosis (CVC), are decimating citrus production groves in Brazil, Florida, and around the world. Brazil, the world's largest sweet orange producer, and Florida, the largest U.S. domestic producer, supply approximately 85% of the world's orange juice. Currently, HLB and CVC management consists primarily of pesticide application and— after visual confirmation of disease infection—elimination of entire orchard blocks. This has proven economically destructive and ineffective. During the development and regulatory approval of disease resistant plant varieties, new pathogen detection methods need to be developed or optimized for specific pathogens. Detection systems must be able to be feasibly used by growers in the field, in order to more quickly identify high-risk plant pathogens in early stages of plant infection long before visual symptoms of disease occur. Such detection systems would help growers decrease their dependence on pesticides, and lead to more effective and more environmentally stable management strategies.

Polyclonal antibodies are often used to detect specific antigens, and can be used to quantitatively measure pathogen levels via ELISA. Single-chain variable fragments (scFvs) are fusion proteins of the light and heavy immunoglobulin chains of an antibody. Theoretically, an scFv retains the specificity of an antibody, but can be expressed as a single peptide--optimal for the creation of handheld devices aiding citrus growers in the early detection of plant pathogens in the field. We present progress in the development of an scFv capable of detecting and quantifying *X. fastidiosa*, the plant pathogen responsible for Citrus Variegated Chlorosis.

## IDENTIFICATION AND COMPARATIVE GENOMIC ANALYSIS OF GLYCOSYLTRANSFERASE 2 GENE FAMILY IN SWITCHGRASS

Trainee: Mitchell Harkenrider

Faculty Trainer: Dr. Pamela Ronald

Campus: University of California, Davis

### **Mitchell Harkenrider\* and Pamela Ronald**

Department of Plant Pathology, University of California, Davis

Switchgrass (*Panicum virgatum*) is a perennial grass native to North America that is receiving attention from breeders and molecular biologists due to its use as a bioenergy crop. Although the genetic resources available for switchgrass are currently limiting, a tremendous opportunity exists to leverage genomic information from the model grass, *Oryza sativa*, for switchgrass improvement. In order to identify switchgrass orthologs of rice genes controlling key biomass traits, the Ronald lab established an efficient, qPCR-based screening system. I screened two BAC libraries comprising >200,000 BAC clones, organized into pools and superpools using primers designed from switchgrass ESTs and rice sequences. Full-length sequences of selected BACs were obtained for members of the glycosyltransferase 2 (GT2) gene family known to be involved in plant cell wall biosynthesis. I analyzed the expression profiles of switchgrass orthologs of several GT2 family genes in six organs, including young leaves, mature leaves, stems, nodes, roots and flowers. Comparison of these switchgrass expression profiles with expression profiles of orthologs in rice, suggest differences and similarities in GT2 family function in these two species.

## **QUANTITATIVE PROTEOMICS IDENTIFIES NOVEL PROTEINS THAT CONTROL PLANT DISEASE RESISTANCE**

Trainee: J. Mitch Elmore

Faculty Trainer: Gitta Coaker

Campus: University of California, Davis

**J. Mitch Elmore<sup>\*1</sup>, Koste Yadeta<sup>1</sup>, Brett Phinney<sup>2</sup>, and Gitta Coaker<sup>1</sup>**

<sup>1</sup>Department of Plant Pathology, University of California, Davis, CA

<sup>2</sup>Genome Center Proteomics Core Facility, University of California, Davis, CA

Innovative strategies for sustainable disease control in agriculture can be developed by understanding the mechanisms underlying plant-pathogen interactions. Over the last 20 years, much progress has been made to identify the plant immune receptors responsible for pathogen recognition, but deciphering the molecular events following receptor activation has been a challenge. Our laboratory seeks to understand how the plant cell is reprogrammed in order to mount effective defense responses.

We are using quantitative proteomics to identify novel components of plant disease resistance at the plant plasma membrane (PM). As many plant pathogens remain extracellular during their lifecycle, the plant PM is a crucial mediator of pathogen recognition, signal transduction, and downstream defense responses. We have examined changes at the PM following activation of two distinct types of plant immune receptors. Preliminary data indicate that recognition of pathogens by these different classes of immune receptors results in distinct, yet overlapping, patterns of PM protein regulation. We are integrating our protein expression data with gene expression and protein-protein interaction data in order to identify important hubs in the plant immune signaling network. These signaling hotspots represent attractive targets for engineering disease resistant crops. Furthermore, our functional analyses have identified novel proteins which control plant defense responses.



## THE ROLE OF SWEET POTATO GREEN EXTRACT ON MICRORNA EXPRESSION USING HUMAN PROSTATE CANCER CELL LINE

Trainee: Dominique N. Gales, M.S.

Faculty Trainer: Clayton C. Yates

Campus: Tuskegee University

**Dominique N. Gales\*, Ritu Aneja, and Clayton Yates**

Department of Biology, Tuskegee University, Tuskegee, AL

Prostate cancer is the most commonly diagnosed cancer among men in the US and the second most common cause of cancer death among men. Even more alarming is the disparity in incidence and mortality between African Americans compared to other races. One possible explanation is African American men typically consume a lower amount of fruits and vegetables. Extensively consumed as a vegetable in Africa and Asia, sweet potato (*Ipomoea batatas*) greens (leaves) are an excellent source of dietary polyphenols such as anthocyanins and phenolic acids. Previous reports from our lab demonstrated the anti-cancer effects of sweet potato green leaves, however the underlying mechanism has not been explored. In recent years, microRNAs (miRNAs) have received greater attention in cancer research. miRNAs play important roles in many normal biological processes; however, studies have also shown that aberrant miRNA expression is correlated with the development and progression of cancers. Furthermore, miRNAs have demonstrated to be regulated by natural agents, which could lead to the inhibition of cancer cell growth, however the effect of sweet potato leaves has not yet been explored. In this study we focused on the effect of SPGE to alter miRNA expression that effect cell proliferation. Cellular proliferation was determined by MTT [3-(4,5-Dimethylthiazol-2-yl)-2,5-Diphenyltetrazolium Bromide] assay. The IC<sub>50</sub> using MTT with SPGE for PC-3 and DU-145 cells were 2.0 mg/mL (inhibiting cell growth by 50 %). We also investigated the effects of SPGE on miRNA expression levels. To obtain the miRNA expression profiles, we conducted a miRNA microarray, which consisted of an 84 panel of cancer specific miRNAs. Analysis of prostate cancer cells treated with SPGE, we found robust differential expression patterns. Quantitative PCR validation revealed that SPGE significantly up-regulated miR-200c, and miR-29b, but no change in miR-30c in prostate cancer cell line PC-3. Although preliminary this is the first report to demonstrate that SPGE has an effect on miRNA expression that could ultimately be responsible for its anti-cancer effects.

## **INHIBITION OF IL-12 BIOACTIVITY REDUCES THYMOCYTE APOPTOSIS IN TNCS**

Trainee: Sonni-Ali Miller

Faculty Trainers: M. Martinez and J. Jaynes

Campus: Tuskegee University

**S-A. Miller\*, S. Mills, S.C. Henley, F. Davis, R. Lewis and M. Martinez**

Integrative Biosciences Ph.D program, Tuskegee University, Tuskegee, AL.

Thymic nurse cells (TNCs) are cortical epithelial cells that appear to be significant participants in the negative selection of CD4<sup>+</sup>CD8<sup>+</sup>TCR<sup>lo</sup> (triple positive or TP) thymocytes. TNCs express class I and class II major histocompatibility (MHC) proteins on their cell surfaces. TNCs internalize 2 - 200 TP thymocytes into cytoplasmic vacuoles. These thymocytes undergo MHC restriction. Over 95% of TNC-interactive thymocytes undergo apoptosis and are degraded within TNC vacuoles. TP thymocytes are reported to be non-responsive to a variety of cytokines. However, IL-12 is known to promote deletion of TP thymocytes in the thymus. Additionally, preliminary data showed that TNCs release IL-12 in co-cultures with thymocytes. We hypothesized that IL-12 influences the high level of apoptosis among TNC interactive thymocytes. Transgenic D011.10 mice which carry T cell receptors (TCR) that specifically recognize the 323 – 339 chicken ovalbumin (cOVA) peptide were treated with different combinations of anti-mouse IL-12 antibody or rat IgG2a and/or cOVA peptide over a four day period. ELISA was used to analyze IL-12 levels in the serum of treated mice. TNC and thymocyte populations were harvested and analyzed for apoptosis using Annexin V with flow cytometry or TUNEL with fluorescent microscopy. High levels of apoptosis were observed among TNC interactive and non-TNC interactive TP thymocytes in animals treated with cOVA peptide. However, there were remarkable reductions in all TP thymocyte subsets when IL-12 bioactivity was reduced. These data suggest that IL-12 plays a role in apoptosis in the TNC microenvironment.

## IMPROVING OPTICAL IMAGING METHODS FOR USE IN PLANT SYSTEMS

Trainee: Erica Vonasek

Faculty Trainer: Nitin Nitin, Ph.D.

Campus: University of California, Davis

**Erica Vonasek<sup>1\*</sup> and Nitin Nitin<sup>1,2</sup>**

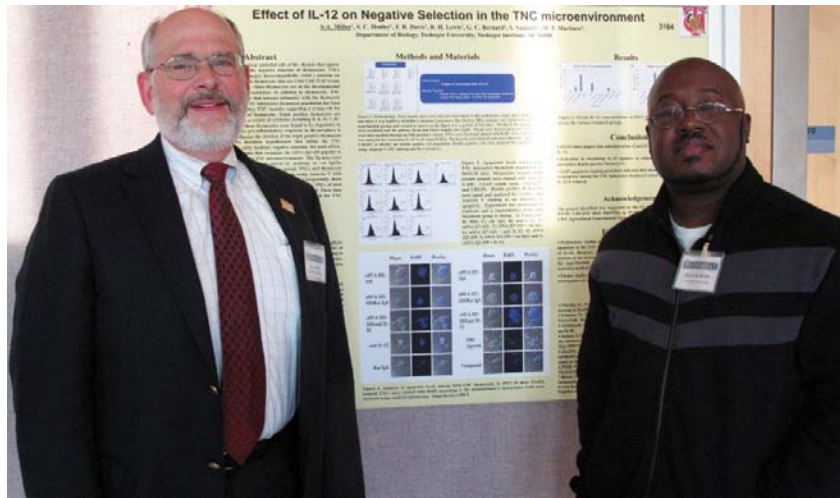
<sup>1</sup>Department of Biological and Agricultural Engineering

<sup>2</sup>Department of Food Science and Technology

University of California, Davis

Optical imaging is a powerful tool for observing phenomena both spatially and in real time in a biological system and particularly in plant-microbe interactions. Some of the key challenges to optical imaging in plant systems at high magnifications suitable for microbes include limitations on depth penetration into the plant, autofluorescence of plant tissue in the visible light range, and heterogeneity of plant tissue. The goal of this work is to develop easy to use methods to overcome those key challenges and become another tool in characterizing phenomena in plant systems. The first of these methods is the application of multiphoton microscopy, specifically two photon microscopy, to reduce the overall plant tissue autofluorescence and increase depth penetration as compared to confocal microscopy in order to image bacteria of interest. In the visible light wavelengths confocal microscopy depends on for imaging, plant tissue contains molecules and cell structures that contribute to autofluorescence, absorbance, and scattering of light which significantly complicates the problem of obtaining relevant images with signal of interest. Multiphoton microscopy overcomes these limitations by using near infrared wavelengths (700nm to 1400nm) to reduce the autofluorescence and scattering and limits the excitation of fluorescent molecules to the focal field, further limiting background signal that may mask the signal of interest. In order to demonstrate the significant advantages of multiphoton over confocal microscopy, a comparison between both imaging methods was used to characterize forced bacterial pathogen infiltration of a lettuce leaf. A further study was conducted to examine the potential for an industrial cooling standard (vacuum cooling) to induce infiltration of food pathogens into fresh produce. From our results, we concluded that multiphoton microscopy yields more detailed images and greater depth penetration into the sample as compared to confocal microscopy. Additionally, vacuum cooling seems to have limited impact on infiltration of microbial pathogens into produce. The second category of optical imaging methods to be developed is in enhancing imaging of viruses in biological systems. The key challenge in imaging viruses is that the vast majority of viruses are unable to be resolved in an optical microscope due to their small size. Common approaches to fluorescently stain viruses include using chemical labeling of the protein capsid and nucleic acid stains. In work to date, the challenges to overcome in these areas are lack of signal for chemical labeling and nonspecific signal for nucleic acid stains. Future work in this area will include overcoming these challenges and demonstrating the method in a relevant application in plant systems.

## *Poster Session*



*Dean Jeff Gibeling and Trainee Sonni-Ali Miller (2012)*



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



## **GENETIC EXPRESSION ANALYSIS OF MOLECULAR MARKERS INVOLVED IN HOST DEFENSE AGAINST THE ROOT-KNOT NEMATODE *M. INCOGNITA* USING RESISTANT AND SUSCEPTIBLE SWEETPOTATO PLANTS**

Trainee: Gregory C. Bernard

Faculty Trainer: Marceline Egnin

Campus: Tuskegee University

**Gregory C. Bernard\*, Marceline Egnin, Steven Samuels\*, Conrad Bonsi, William Witola,**  
Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL

Sweetpotato is one of the most important crops in the world cultivated as a staple food source in most countries. Healthy sweetpotato plants provide an assortment of nutraceuticals and bioactive compounds that lessen disease incidence in humans as well as providing significant value additions such as biofuel and processed food products. A major constraint in sweetpotato production is the emergence and progression of disease resulting in deleterious effects such as reduced crop yields and nutritional quality. The root knot nematode *Meloidogyne spp* is a significant pest in sweetpotato and is responsible for devastating losses in crop yields and reductions in overall quality of storage roots. The use of resistant cultivars is a desirable option for root-knot nematode management; however, the molecular events involved in the host response to root knot nematode infection are often poorly understood. The development and identification of root-knot nematode resistant plants requires an in-depth understanding of the global genetic mechanisms involved in the defense response pathway. In this study, we have investigated the expression patterns of molecular markers involved in nematode infection in resistant and susceptible sweetpotato plants in efforts to distinguish genotypes. Endpoint cDNA expression analyses have shown differences in the genetic expression of candidate expressed sequence tags in resistant and susceptible cultivars. Elevated levels of a Pathogenesis-related protein (**GW276062**) and Leucine rich repeat protein (**GW276050**) transcripts were shown in root-knot resistant sweetpotato cultivars in comparison to susceptible ones. Selected amplicons of interest from both genotypes will be analyzed by qPCR and sequenced to provide important information on the quantitative and qualitative mechanisms underlying root knot nematode resistance and susceptibility in sweetpotato. Overall, this project may promote efficacy of successful marker assisted selection of root-knot nematode resistance in sweetpotato breeding programs.

Funding for this research is supported by NSF-IGERT, Tuskegee University GWCAENS, USDA-EVANS-ALLEN and USDA-NIFA-TCAP



## QUANTITATIVE PROTEOMICS REVEALS DYNAMIC CHANGES AT THE PLASMA MEMBRANE DURING ARABIDOPSIS IMMUNE SIGNALING

Trainee: J. Mitch Elmore

Faculty Trainer: Gitta Coaker

Campus: University of California, Davis

**J. Mitch Elmore<sup>\*1</sup>, Jun Liu<sup>1</sup>, Brett Phinney<sup>2</sup>, and Gitta Coaker<sup>1</sup>**

<sup>1</sup>Department of Plant Pathology, University of California, Davis, CA

<sup>2</sup>Genome Center Proteomics Core Facility, University of California, Davis, CA

Many classes of plant pathogens remain outside the host cell membrane during their lifecycle. As a result, the plant plasma membrane (PM) mediates critical aspects of plant immunity including pathogen recognition, signal transduction, and downstream defense responses. Investigating how the plasma membrane proteome changes during these events will lead to a better understanding of plant immune signaling and identify novel components of plant disease resistance. We have used label-free shotgun proteomics to examine PM dynamics during plant defense signaling. Transgenic *Arabidopsis* plants expressing the bacterial effector AvrRpt2 under the control of a dexamethasone (Dex)-inducible promoter were used to initiate effector-triggered immunity (ETI). Expression of the AvrRpt2 protease results in RIN4 cleavage and activation of the disease resistance protein RPS2. PM vesicles were isolated 6 hours post-Dex treatment and subjected to gel-enhanced liquid chromatography tandem mass spectrometry (Gel LC-MS/MS) for protein identifications. More than 2300 proteins were identified in total and label-free spectral counting was employed to quantify relative protein abundance. Over 20% of upregulated proteins have known roles in plant immune responses. Proteins that are up-regulated during ETI include those involved in calcium and lipid signaling, membrane transport, metabolism, protein phosphorylation, redox homeostasis, and vesicle trafficking. A similar approach is being undertaken to examine pattern-triggered immune (PTI) responses upon activation of the FLS2 immune receptor. Preliminary data indicate that activation of ETI and PTI results in distinct, yet overlapping, patterns of PM protein regulation. These experiments provide a framework for understanding global PM proteome dynamics during plant immune responses.

## DEVELOPMENT OF BIOTECHNOLOGICAL CONTROL TOOLS FOR CROP PATHOGEN VECTORS

Trainee: Elenor Castillo

Faculty Trainers: Abhaya Dandekar and Florence Negre-Zakharov

Campus: University of California, Davis

**Donna Farvard, Elenor Castillo\*, Abhaya Dandekar and Florence Negre-Zakharov**

Department of Plant Sciences, University of California, Davis, CA 95616

The goal of this project is to develop alternative methods to pesticide applications by using volatile compounds naturally produced by plants. Floral volatiles are commonly associated with attracting insects to flowers for pollination, while volatiles produced in vegetative tissues have been implicated with the plant's defense mechanisms, for example by repelling herbivores that feed on plants. This project takes advantage of the defense-related function of volatile compounds to design control strategies against the psyllid *Diaphorina citri* (or Asian Citrus Psyllid) that carries the bacterial disease Huanglongbing (HLB), also known as citrus greening disease. This disease, caused by *Candidatus Liberibacter*, is extremely virulent and has spread to many areas of the United States. Currently there is no cure for this disease, and infection of a citrus tree remains asymptomatic for many months but eventually leads to death within two years. In Florida this disease has spread to two-thirds of the state and threatens a billion dollar industry. In an effort to eradicate this disease, growers spray costly pesticides amounting to over 27 sprays a year. This dosage is excessive and can have adverse effects on our health and environment. In Vietnam, where the HLB disease is also present, citrus growers plant guava trees in their orchards to repel the psyllid. A recent characterization of guava leaf volatile profile identified sulfur-containing compounds (dimethyl sulfide, DMS, and dimethyl disulfide, DMDS) as the likely repellent.

## **BIOTECHNOLOGICAL TOOLS FOR THE BIOREMEDIATION OF SE COMPOUNDS IN SOIL**

Trainee: Elenor Castillo

Faculty Trainers: Abhaya Dandekar and Florence Negre-Zakharov

Campus: University of California, Davis

**Nate Westrick, Elenor Castillo\*, Florence Zakharov and Abhaya Dandekar**

Department of Plant Sciences, University of California, Davis, CA 95616

Selenium is a well known antioxidant and anti-cancerous agent in humans when taken in the correct dose, however an over abundance of selenium is toxic to humans and other small animals as is seen in the Kesterson Effect. This phenomena, first studied in 1982 at the Kesterson National Wildlife Refuge in the San Joaquin Valley, demonstrates Se's ability to bioaccumulate in small ponds and can manifest in up to a 64% deformation rate among embryos and hatchlings of aquatic birds. The goal of this project is to demonstrate the ability of transgenic tomato plants with sulfur volatilization capabilities to successfully phytoremediate toxic Selenium compounds from the soil. Recently our lab has effectively transformed *Solenum lycopersicum* to produce the sulfur volatile Dimethyl Sulfide (DMS); a sulfur volatile not typically emitted by tomato. Selenium belongs to the same chemical group as sulfur and is often inter-changeable in many sulfur compounds. For example, plants in sulfur deficient environments can substitute selenium to secure primary metabolism. Thus, cysteine a sulfur containing amino acid can be replaced with Se-Cysteine. Moreover, scientists have proven that selenium can replace sulfur in many sulfur volatiles such as DMS. In order to facilitate the experiment, transformed and wild-type samples of *Solenum lycopersicum* will be grown hydroponically in growth chambers with Hoagland's solution. Subsequently, a treatment of 20  $\mu\text{M}$  Se in the form of  $\text{Na}_2\text{SeO}_4$  or  $\text{Na}_2\text{SeO}_3$  will be administered to the soil and volatile assays will be performed to determine if our transgenic tomato plants can volatilize selenium.

## DEVELOPMENT OF A PLANT-BASED TREATMENT REGIMEN AGAINST HIV REPLICATION

Trainee: Steven Samuels

Faculty Trainer: Marceline Egnin

Campus: Tuskegee University

**Steven B. Samuels\*, Marceline Egnin, Jesse Jaynes and Gregory C. Bernard\***

Department of Agriculture and Environment Sciences, Tuskegee University, Tuskegee AL

Recombinant plant systems offer economic alternatives to producing large amounts of pharmaceutical proteins as well as providing the most promising opportunity to supply low-cost drugs and vaccines for major diseases such as HIV, especially 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 on the individual in need of treatment. With the new revolution of producing therapeutic compounds in plant based systems, the cost of production has dramatically decreased with the direct effect being a reduction in the cost of medication. Synthetic antiviral genes capable of inhibiting the progression of HIV have been developed at Tuskegee University for expression in plants. In this study 24 putative transgenic regenerants were developed from *Agrobacterium*-mediated transformation of sweetpotato cultivar PI318846-3, with the complete gene constructs of peptide series JC41. PCR screening resulted in seven transgenic plantlets, from which the peptide transcripts were successfully amplified in an RT-PCR test. Further analysis by Southern blotting to confirm the stable integration of the JC peptides into the sweetpotato genome, and preliminary biosafety, and efficacy studies are subsequently scheduled. Expression of these genes in sweetpotato may have significant implications as a cost efficient biofactory for the production of therapeutic proteins against HIV progression. Work supported by Tuskegee University GWCAES, USDA Evans-Allen, NIH-EXPORT, and NSF CREATE-IGERT.



# ***CREATE-IGERT***

## ***Current Trainee Biographies***



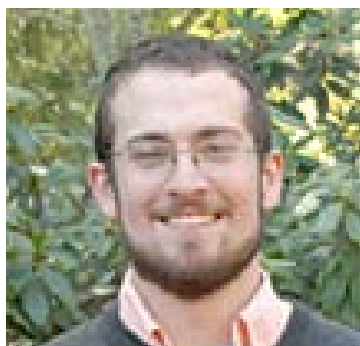
*(L→R) Hyrum Gillespie, Tracy Zeng, Mitch Elmore, Dr. Lloyd Yu, Phoebe Wu, Rachel Kerwin, Steven Samuels, Sonni-Ali Miller, Patrick O'Dell, Steve Zicari, Dominique Gales, Raymon Shange, Prof. Ramble Ankumah, Prof. Karen McDonald, and Lakisha Odom (CREATE-IGERT Lab 2011)*



*(L→R) Lucas Arzola, Patrick O'Dell, Mitch Elmore, Geoff Benn, Hyrum Gillespie, Chris Simmons, Prof. Karen McDonald, Steve Zicari, Prof. Denneal Jamison-McClung, Ben Lindenmuth, Tracy Zeng and Marta Bjornson (Biotech Retreat 2011)*







## BIOGRAPHICAL SKETCH

**Geoffrey Benn**  
**Professor Katie Dehesh Laboratory**  
**Email: gkbenn@ucdavis.edu**

### NAME

Geoffrey Benn

### P.I.(s):

Katayoon Dehesh

### TITLE OF DISSERTATION ON RESEARCH:

Identifying the biochemical and molecular components of plant primary stress response networks

**GRADUATE GROUP** (i.e. Plant Biology)  
 Plant Biology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residence if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of Illinois at Urbana-Champaign	B.S.	05/08	Crop Sciences

## A. Research Focus

The goal of my research is to understand plant stress perception and subsequent early signal transduction events, specifically those involved in the plant response to diverse stresses. In a more general sense, I am interested in applying genomic, bioinformatic, and systems biological approaches to understanding plant interactions with other organisms.

## B. Honors and Awards

2011 Monsanto Endowed Student Fund in Agricultural Biotechnology award

### Professional Experience (TAing/Research Internships)

2011 TA, PLB 111, Fall Quarter

### **C. Publications and Patents**

N/A

### **Additional posters and presentations**

2012 February 3, CREATE-IGERT Symposium, "Identifying the biochemical and molecular components of plant primary stress response networks," Davis, CA

### **Outreach Activities**

2012 Mentored student through the Biotechnology Academy E-Mentoring program at Vallejo High School

2012 Gave lab tour and discussed biotechnology and CREATE-IGERT project with students from two Solano County high schools

2011 Gave lab tour and discussed biotechnology and CREATE-IGERT project with visiting undergraduate students from Kyushu University in Japan.

2011 Gave one hour overview presentation of Dehesh lab research to representatives from the Gates foundation.

2011 Gave lab tour and discussed CREATE-IGERT project with students in the Forensics Academy at James Enochs High School in Modesto, CA

2011 Developed experiment and accompanying forensics mystery activity for the DEB exhibit at UC Davis's Picnic Day (campus-wide open house)

### **University Service**

2011 Plant Biology Graduate Student Association Social Activities Co-Chair

2011-2012 Plant Biology Graduate Student Association Recruitment Co-Chair



## BIOGRAPHICAL SKETCH

**Gregory Christopher Bernard**

**Professor Marceline Egnin & Professor Jesse Jaynes Laboratories**

**Email: gbernard4673@mytu.tuskegee.edu**

<b>NAME</b> Gregory Christopher Bernard	<b>P.I.(s): Jaynes and Egnin</b>		
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Integrative Biosciences, Plant Biotechnology and Genomics Research Lab. College of Agricultural, Environmental and Natural Sciences. Tuskegee University, Tuskegee AL.	<b>TITLE OF DISSERTATION ON RESEARCH:</b> Genetic characterization of nematode resistance genes in sweetpotato and the development of transgenic nematode resistant plants.		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
North Carolina A&T State University	B.S.	1999	Animal Science
North Carolina A&T State University	M.S.	2004	Animal Health
Virginia Polytechnic University Post Baccalaureate Research		2005	Animal Science
North Carolina State University	M.S.	2010	Plant Pathology
Tuskegee University	Ph.D.	2010-	Integrative Biosciences /Plant Biotechnology

### A. Research Focus

Infection of plants by plant parasitic nematodes results in devastating losses in crop production. The sweetpotato is an economically important crop and a staple food in most countries.

The objective of this research is aimed at functional and structural characterization of nematode resistance genes in sweetpotatoes in efforts to develop transgenic disease resistant plants, and enhance resistance in normally susceptible cultivars. Additional research will involve the co-introduction of a synthetic storage gene (*asp-1*, Artificial Storage Protein) into nematode resistant transformants to increase protein concentrations. Overall, the elucidation of nematode resistance gene function will be demonstrated in efforts to reduce disease incidence and increase sweetpotato yields for producers and consumers and hopefully help elucidate nematode resistance pathways in sweetpotato.

## B. Honors and Awards

- Department of Animal Science at N.C. A&T Scholarship Recipient
- 2003 Awarded Scholarship and Completed Summer Institute in Statistical Genetics at North Carolina State University
- 2004 Awarded NIH Minority Fellowship at Virginia Polytechnic and State University
- Completed A Field Guide to GenBank and NCBI Molecular Biology Resources Lecture and Workshop
- 2008/2009 Nominated as one of 2000 Outstanding Scientists by the International Biographical Center
- Outstanding Volunteer- 2008 APS meeting
- 2010 North Carolina Plant Pathology Student Representative

## Positions and Employment

2001-2004	Graduate Research Assistant	N.C. A&T SU
2004-2005	Post Baccalaureate Research Assistant	Virginia Tech
2005-2010	Graduate Research Assistant	NCSU
2010-	IBS Doctoral Fellow	Tuskegee University

## Professional Experience (TAing/Research Internships)

2008-2010      SCIBLS Teaching Assistant- assisted Dr. Sivamani in teaching and laboratory experiments for high school students in the Summer College In Biotechnology and Life Sciences program.

Completed Teaching Assistant requirements for graduate programs at N.C A&T and NCSU

## C. Publications and Patents

- 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, Bernard, Gregory C. (2009). Bernard, Gregory, C. , Mitchell, TK, Marui, Junichiro, Dean, Ralph. (2008). Presented poster entitled "Functional Characterization of 3 transcription factors involved in virulence in *M. oryzae*
- 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 4<sup>th</sup> 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 pathogenicity of *Magnaporthe grisea*
- 2007. Abstract published. APS meeting 2007, Presented Poster Bernard, Gregory, C. , Mitchell, TK, Marui, Junichiro, Dean, Ralph. (2008). "Functional characterization of a transcription factor putatively involved in the pathogenicity of *Magnaporthe grisea*" San Diego, California
- 2007.4<sup>th</sup> IRBC- Rice Blast Conference 2007, Changsha, China. Presented Poster Bernard, Gregory, C. Mitchell, TK, Marui, Junichiro, Dean, Ralph. (2007). "Functional characterization of a transcription factor putatively involved in the pathogenicity of *Magnaporthe grisea*
- 2004 Annual Dairy and Animal Science Meeting presented abstract of thesis work, (2004) Bernard, Gregory C. Ahmedna, Mohammed, Worku, Mulumebet. " Evaluation of Diatomaceous Earth as an alternative anthelmintic in meat goats".

#### **Additional posters and presentations**

2009	Presented PhD proposal seminar on Functional characterization of a transcription factors and proteomics involved in the pathogenicity of <i>Magnaporthe oryzae</i> . North Carolina State University, Raleigh N.C.
2008	Genetic seminar and taught experimental procedures to youth group for neighboring Community center
2008	Presented in lab genetic seminar and experiments involving bacterial pathogens for Boys Scouts
2007, 2008	Provided genetic seminar and experimental analysis for youths at Compassionate Tabernacle of Faith Missionary Baptist Church.
2008	Presented workshop at Fayetteville State University on functional genomics.
2004	Presented thesis work at Biotechnology Symposium held at N.C. A&T held by mentor Dr. Mulumebet Worku.
2004	Presented information to existing and prospective meat goat producers on meat goat health husbandry at the Franklin County, N.C. Meat Goat Extension Meeting.



**Outreach Activities**

2007-2008	Big Brother Program
2008-2009	American PhytoPathology Society Member
2009	Member of International Plant Microbe Interactions Congress

Executive Board Member of Biodiversity and Conservation Research Trust (founded by Dr. Malali Gowda) where assisted in the writing a proposal to preserve the Indian Elephant and resolve human-animal conflict through public awareness campaigns and tree-based farming.

**University Service**

2011	Judge for Professional Agricultural Workers Conference, Tuskegee,AL.
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## BIOGRAPHICAL SKETCH

**Marta Bjornson**

**Professor Abhaya Dandekar & Professor Katie Dehesh  
Laboratories**

**Email:** [marta.l.bjornson@gmail.com](mailto:marta.l.bjornson@gmail.com)

**NAME** Marta Bjornson

**P.I.(s):** Abhaya Dandekar and Katie Dehesh

**GRADUATE GROUP** (i.e. Plant Biology)  
Horticulture and Agronomy

**TITLE OF DISSERTATION ON RESEARCH:**  
Improving Phytophthora resistance through  
manipulation of arachidonic acid responses

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Rice University. Houston, TX	BS	05/09	Bioengineering

### A. Research Focus

Marta is looking at the potential signaling role of arachidonic acid in eliciting plant-stress responses. Recently it has been demonstrated that this fatty acid modulates plant responses to a range of pathogens through alteration of jasmonic acid and salicylic acid stress responsive pathways. Marta's project will elucidate various components of arachidonic acid-mediated plant stress perception and response networks. Her findings have the potential of discovering novel strategies to enhance plant resistance to pests.

### B. Honors and Awards

#### Positions and Employment

N/A

**Professional Experience (TAing/Research Internships)**

N/A

**C. Publications and Patents**

N/A

**Additional posters and presentations**

Woodward, A., Ratzel, S., Lingard, M., Bjornson, M., Ornelas, A., Vasquez, V., Gill, M., Strader, L., Bartel, B. (2011 August) Screening for Arabidopsis mutants requiring exogenous fixed carbon and displaying indole-3-butyric acid resistance reveals novel alleles of peroxisome function genes. Poster session presented by Woodward, A. at the annual American Society of Plant Biologists meeting, Minneapolis

**Outreach Activities**

2012	(2011, before reporting period) Sheldon High School e-mentor
2011	Teen Biotech Challenge

**University Service**

2011	Horticulture and Agronomy Journal Club Coordinator
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## BIOGRAPHICAL SKETCH

**Timothy Butterfield**  
**Professor Abhaya Dandekar Laboratory**  
**Email: [tsbutterfield@ucdavis.edu](mailto:tsbutterfield@ucdavis.edu)**

NAME	P.I.(s): Abhaya Dandekar		
Timothy Butterfield	TITLE OF DISSERTATION ON RESEARCH: Regulation of the hydrolysable tannin pathway in walnut, and the activities of hydrolysable tannins as defense compounds.		
GRADUATE GROUP (i.e. Plant Biology)			
Plant Biology			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
The University of Texas at Austin	B.S.	05/2004	Biology; Plant Biology
The University of Texas at Austin	M.A.	08/2007	Plant Biology
The University of California, Davis	Ph.D.	12/2013?	Plant Biology

### A. Research Focus

Tim is pursuing research that will lead to new strategies for agronomic crop improvement in walnut and alfalfa. Specifically, he is exploring the biosynthesis and utility of phenolic compounds, in particular a class of polyphenolics known as the hydrolysable tannins. To pursue these studies, we have cloned several genes in the hydrolysable tannin pathway from walnut. These cloned genes have been used to generate transgenic walnut trees and alfalfa plants exhibiting altered expression (walnut) of native polyphenol biosynthetic genes or expressing these genes in a crop species, alfalfa, which lacks these genes and specific class of metabolites.

We are using these transgenic plants to study both the regulatory relationships between the shikimic acid and phenylpropanoid pathways in 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.

## **B. Honors and Awards**

### **Positions and Employment**

N/A

### **Professional Experience (TAing/Research Internships)**

2011	TA, BIS 2C, Winter Quarter TA, BIS 2C, Spring Quarter TA, BIS 2C, Fall Quarter
2012	TA, BIS 2C, Winter Quarter

## **C. Publications and Patents**

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.

Jeter C, Tang W, Henaff E, Butterfield T, and Roux S. 2004. Evidence of a Novel Cell Signaling Role for Extracellular Adenosine Triphosphates and Diphosphates in *Arabidopsis*. *The Plant Cell* 16: 2652-2664.

Rubendall A and Butterfield T. 2003. Brownfield Redevelopment: East Austin Tank Farm—Austin, TX. Dissertation. Community and Regional Planning Program, School of Architecture, University of Texas.

### **Additional posters and presentations**

2011 January 11. 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. 9<sup>th</sup> 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.

### **Outreach Activities**

2010	Teen Biotech Challenge
2010	Biotech Program's Picnic Day Event
2009	Biotech Program's Picnic Day Event
2008	Biotech Program's Picnic Day Event

### **University Service**

2008-2009	Plant Biology Graduate Student Assembly – GSA Representative
2009-2010	Plant Biology Graduate Student Assembly – Selection Committee
2011-2012	Plant Biology Graduate Group Executive Committee – Student Representative
2011-2012	Plant Biology Graduate Student Assembly - President





## BIOGRAPHICAL SKETCH

**Elenor Castillo**

**Professor Florence Negre-Zakharov & Professor Abhaya Dandekar Laboratories**

**Email: [elecastillo@ucdavis.edu](mailto:elecastillo@ucdavis.edu)**

<b>NAME</b> Elenor Castillo	<b>P.I.(s):</b> Negre-Zakharov & Dandekar
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Plant Biology	<b>TITLE OF DISSERTATION ON RESEARCH:</b> Investigating the Role of Sulfur Volatiles in Repelling Psyllids; A Crop Pathogen Vector

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Chabot College, Hayward, CA	A.A.	06/05	Biological Sciences
Mills College, Oakland, CA	B.S.	05/08	Biological Sciences

### A. Research Focus

Elenor's 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.



## **B. Honors and Awards**

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

## **Professional Experience (TAing/Research Internships)**

TA, Chicano Studies

## **C. Publications and Patents**

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).

### **Additional posters and presentations**

Castillo E, Dandekar A, Negre-Zakharov F (2009, November). Sulfur Volatile Compounds: An alternative to pesticides for the Citrus disease Huanglongbing. Research presented at the CREATE-IGERT Annual Symposium, Davis, CA.

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.

### **Outreach Activities**

2009, 2010	Picnic Day, Biotechnology Program exhibit
2009	Teen Biotech Challenge
2009-2010	Women in Science and Engineering (WISE) mentor
2009	Picnic Day Volunteer, Plant Sciences Department

### **University Service**

2009	Co-Chair, Latino Graduate Student Association (LGSA)
2010	NSF CREATE-REU Summer Research Mentor



## BIOGRAPHICAL SKETCH

**Mitch Elmore**  
**Professor Gitta Coaker Laboratory**  
**Email: [jmelmore@ucdavis.edu](mailto:jmelmore@ucdavis.edu)**

<b>NAME</b>		<b>P.I.(s):</b>	
James M. Elmore, "Mitch"		<b>TITLE OF DISSERTATION ON RESEARCH:</b>  Quantitative Proteomics Analysis of Plant Immune Responses	
<b>GRADUATE GROUP</b> (i.e. Plant Biology)			
Plant Biology			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
<b>INSTITUTION AND LOCATION</b>	<b>DEGREE (if applicable)</b>	<b>MM/YY</b>	<b>FIELD OF STUDY</b>
St. Louis University, St. Louis, MO, USA University of California at Davis, Davis, CA, USA	B.S. PhD	05/2005 in progress	Biological Sciences Plant Biology

### A. Research Focus

Innovative strategies for sustainable disease control in agriculture can be developed by understanding the molecular mechanisms underlying plant-pathogen interactions. Mitch's research uses a quantitative proteomics approach to identify novel components of plant immune responses with the ultimate goal of engineering plants to be more resistant to pathogens.

### B. Honors and Awards

2011	Summer Graduate Student Researcher Award, UC Davis
2009-2011	NSF CREATE-IGERT Research Traineeship (DGE-0653984)
2008-2010	Golden Key International Honor Society Invitation
2005	Graduated <i>Magna Cum Laude</i> , St. Louis University

### **Positions and Employment**

2007- Graduate Student Researcher, Department of Plant Pathology, University of California at Davis, Davis, CA  
2005-2007 Research Technician, Donald Danforth Plant Science Center, St. Louis, MO

### **Professional Experience (TAing/Research Internships)**

N/A

### **C. Publications and Patents**

Elmore, J.M., Liu, J., Smith, B., Phinney, B., & Coaker, G. (2012). Quantitative Proteomics Reveals Dynamic Changes in the Plasma Membrane Proteome During *Arabidopsis* Immune Signaling. *Molecular and Cellular Proteomics*. *In press*.

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<sup>+</sup>-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<sup>+</sup>-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].

### **Additional posters and presentations**

2012 March, International Symposium of the Association of Biomolecular Resource Facilities  
2012. 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 (BARD)  
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, 22<sup>nd</sup> International Conference on *Arabidopsis* Research. Poster Title: *"Quantitative Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling"*. Madison, WI.

2011 April, Annual UC Davis Biotechnology Program Retreat. Poster Title: *"Quantitative Proteomics Reveals Dynamic Changes at the Plasma Membrane During Plant Defense Signaling"*. Davis, CA.

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.

2010 March, Keystone Symposia: Receptors and Signaling in Plant Development and Biotic Interactions. Poster Title: *"Quantitative Proteomics Reveals Dynamic Changes Occurring at the Plant Plasma Membrane During Defense Signaling"*. Tahoe City, CA.

2009 November, NSF CREATE-IGERT Research Symposium. Oral Presentation Title:  
*"Investigating Host-Mediated Activation of Bacterial Effector Proteins"*. Davis, CA.

2009 July, Meeting 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.

### **Outreach Activities**

2011	Teen Biotech Challenge Awards Banquet
2009	Teen Biotech Challenge Awards Banquet
2008	Teen Biotech Challenge Awards Banquet

### **University Service**

2011-2012	Educational Policy Committee, Plant Biology Graduate Group
2010	Admissions Committee, Plant Biology Graduate Group
2009-2010	Graduate Student Association Representative, Plant Biology Graduate Group
2006-2007	Safety Committee, Donald Danforth Plant Science Center





## BIOGRAPHICAL SKETCH

**Dominique Gales**  
**Professor Clayton Yates Laboratory**  
**Email: [DNCGales31@gmail.com](mailto:DNCGales31@gmail.com)**

<b>NAME</b>		<b>P.I.(s): Dr. Clayton C. Yates</b>	
Dominique N. Gales		<b>TITLE OF DISSERTATION ON RESEARCH:</b>  The Role of Sweet Potato Leaf Extract on MicroRNA Expression Levels Using Human Prostate Cancer Cell Lines.	
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Biology			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
<b>INSTITUTION AND LOCATION</b>	<b>DEGREE (if applicable)</b>	<b>MM/YY</b>	<b>FIELD OF STUDY</b>
Tuskegee University, Tuskegee, AL	B.S.	08/05-05/09	Biology
Tuskegee University, Tuskegee, AL	M.S.	06/09-05/12	Biology

### A. Research Focus

Prostate cancer is the most commonly diagnosed cancer among men in the US and the second most common cause of cancer death among men. It is estimated that about 1 in 6 men in the US will be diagnosed with prostate cancer during their lifetime and 1 in 36 will die from this disease. Metastasis, the uncontrollable spread of cells that invade other parts of the body, particularly the bones and lymph nodes makes it difficult to successfully treat patients in an effective manner after its occurrence. It is therefore vital to have early markers for prostate cancer. Recent reports have indicated that fruits and vegetables contain chemopreventive agents, which could have protective effects against cancer. Beta-Carotene fibers, Vitamins A, C and E, Iron, Calcium, Proteins and Zinc have recently been identified in the Sweet Potato greens as a potential anticancer component. It has also been shown that SPGE has an excellent source of which are classified as dietary polyphenols. It also believed that cancer progression are regulated by miRNA, which are believed to be key regulators in various biological and pathologic processes. MicroRNAs are short 21 to 23 nucleotide single-stranded non-coding RNA molecules that are endogenously expressed. This is an area that is largely underexplored, in particular in prostate cancer, and warrants further investigation. Therefore,

the purpose of this study is to determine the role of SPGE on miRNA expression levels on human prostate cancer cell.

## **B. Honors and Awards**

### **Positions and Employment**

N/A

### **Professional Experience (TAing/Research Internships)**

2009	TA, Human Biology Lecture, Summer Semester
2009	TA, Human Biology Lecture, Fall Semester
2010	TA, Human Biology Lecture, Spring Semester
2011	TA, Cell and Genetics Lab, Fall Semester
2012	TA, Cell Biology Lab, Spring Semester

## **C. Publications and Patents**

N/A

### **Additional posters and presentations**

#### **Awards:**

Annual 37<sup>th</sup> Sigma Xi Symposium Poster Presentation: 3rd Place. Spring, 2010

Title of Poster: Investigation of Sweet Potato Leaf Extract and its Role in Programmed Cell Death  
Dominique N. Gales B.S., Shaniece Theodore M.S, PhD., Clayton Yates PhD, and Timothy Turner PhD. Tuskegee University Department of Biology and Carver Cancer Research, Tuskegee, AL.

Awarded by UNCF Scholarships Programs:

GlaxoSmithKline

Coca-Cola First Generation Scholarship

#### **Presentations:**

2012	First Bioethics Conference on Cancer Health Disparities Research, Spring 2012 (Abstract has been accepted)
2012	69 <sup>th</sup> Joint Meeting of BKX/BIS, Spring 2012 (Abstract has been accepted)
2011	JARS Annual Meeting
2011	68 <sup>th</sup> Joint Annual Meeting of the BKX/BIS
2011	CREATE-IGERT Annual Symposium
2010	Tuskegee University Annual School of Veterinary Medicine Symposium
2010	Annual 37 <sup>th</sup> Sigma Xi Symposium
2009	Clark Atlanta University Annual Prostate Symposium

### **Outreach Activities**

2009-	S.T.E.P – Tuskegee University, Tuskegee AL Advisor: Dr. Roberta Troy
2009-	Graduate For Sure- Tuskegee University, Tuskegee AL, Department of Biology
2007-2009	YMCA – Tuskegee, AL
2006-	Tri-State Club – Tuskegee University, Tuskegee AL, Positions Held: Senate and President
2010-	Science On Saturdays – Montgomery, AL

**University Service**

2010- Beta Kappa Chi National Scientific Honor Society

**BIOGRAPHICAL SKETCH**

**Hyrum Gillespie**  
**Professor Abhaya Dandekar Laboratory**  
**Email: hgillespie@ucdavis.edu**

<b>NAME</b> Hyrum Gillespie	<b>P.I.(s):</b> Abhaya Dandekar
<b>GRADUATE GROUP</b> Genetics	<b>TITLE OF DISSERTATION ON RESEARCH:</b>  MOLECULAR MARKERS OF INFECTION AND IDENTIFYING SMALL MOLECULE THERAPEUTICS TO COMBAT HIGH RISK PLANT DISEASE

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

<b>INSTITUTION AND LOCATION</b>	<b>DEGREE (if applicable)</b>	<b>MM/YY</b>	<b>FIELD OF STUDY</b>
Utah State University	BS	05/2010	Crop Science

**A. Research Focus**

Hyrum will be developing biomarkers for disease identification in vector-borne citrus diseases, Huanglongbing (HLB) and Citrus Variegated Chlorosis (CVC). In addition to developing robust methods of monitoring disease progression, he will develop a plant therapy using anti-quorum sensing molecules.

**B. Honors and Awards**

2011 Jastro Graduate Research Scholarship

**Positions and Employment**

N/A



**Professional Experience (TAing/Research Internships)**

2011 TA, BIT 160, Winter Quarter  
2012 TA, BIT 160, Winter Quarter

**C. Publications and Patents**

N/A

**Additional posters and presentations**

2011 April 2, Biotechnology Training Retreat, Poster Title: "Mediation of Huanglongbing and Citrus Variegated Chlorosis using Chimeric Antimicrobial Proteins," Napa, CA

2011 January, Distinguished Lecture and Symposium, Poster Title: "Mediation of Huanglongbing and Citrus Variegated Chlorosis using Chimeric Antimicrobial Proteins," Davis, CA.

**Outreach Activities**

2012 Tuskegee Student Host

**University Service**

2011 Organized Transportation of Homeless during Winter  
2012 Organized Transportation of Homeless during Winter



## BIOGRAPHICAL SKETCH

**Mitchell Harkenrider**  
**Professor Pamela Ronald Laboratory**  
**Email: mharkenrider@ucdavis.edu**

<b>NAME</b> Mitchell Harkenrider	<b>P.I.(s): Pamela Ronald</b>
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Plant Biology	<b>TITLE OF DISSERTATION ON RESEARCH:</b>  Investigating the Biotic Stress Regulatory Network in Grasses

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Purdue University Columbus State Community College UC Davis	B.A.	05/05	Political Science Biological Sciences Plant Biology

### A. Research

Mitch's research is focused on identification and characterization of genes responsible for biotic and abiotic stress response and resistance in rice and switchgrass, a crop for cellulosic biofuel feedstocks. Understanding these networks is a crucial step in order to optimize the crop for the field.

### B. Honors and Awards

#### Positions and Employment

2011-2010      Event Co-chair of the Plant Biology Graduate Student Association

#### Professional Experience (TAing/Research Internships)

2012              TA, PLB 116, Winter Quarter

### **C. Publications and Patents**

N/A

#### **Additional posters and presentations**

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

#### **Outreach Activities**

2011 Teen Biotech Challenge Website Judge and Event Assistant

2011 Bay Area Science Festival

#### **University Service**

2011-2012 Plant Biology Graduate Student Association



## BIOGRAPHICAL SKETCH

**Rachel Kerwin**

**Professor Dan Kliebenstein Laboratory**

**Email: rekerwin@ucdavis.edu**

<b>NAME</b> Rachel Kerwin	<b>P.I.(s): Kliebenstein</b>
<b>GRADUATE GROUP</b> (i.e. Plant Biology) PBGG	<b>TITLE OF DISSERTATION ON RESEARCH:</b> Investigating the Importance of Natural Variation in the Glucosinolate Pathway Using the Model Organism <i>Arabidopsis thaliana</i> .

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Virginia Tech, Blacksburg , VA	B.S.	05/07	Biochemistry and Biology, minor in Chemistry with Biotechnology emphasis
UC Davis, Davis, CA	PhD	Expected Dec 2013	Plant Biology

### A. Research Focus

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.

## **B. Honors and Awards**

2011                Monsanto Endowed Student Fund in Agricultural Biotechnology  
2009-2011        NSF CREATE-IGERT Traineeship Award  
2009-2010        Henry A. Jastro Graduate Research Scholarship Award

## **Positions and Employment**

2005-2007                Undergraduate researcher, Glenda Gillaspay's Lab, Virginia Tech,  
                                 Blacksburg, VA  
2007-                      Graduate student, Daniel Kliebenstein's Lab, Plant Sciences, UC Davis,  
                                 Davis, CA  
Sept 2011-Feb 2012    Interning graduate student, Fiona Doohan's Lab, University College Dublin  
                                 Dublin, Ireland

## **Professional Experience (TAing/Research Internships)**

Summer 2007            TA, MCB120L, Upper Division Biochemistry Lecture + Laboratory Course  
Summer 2007            TA, BIS 1C, Introduction to Biology: Plant Biology  
Fall Qtrs 2008-2010    TA PLB111, Upper Division Plant Physiology Lecture

## **C. Publications and Patents**

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 Gillaspay 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.

## **Additional 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

**Outreach Activities**

N/A

**University Service**

Sept 2010 - Aug 2011 Co-Recruitment Chair for the Plant Biology Graduate Group (PBGG)

Sept 2008 - Aug 2010 President of the Plant Biology Graduate Student Association (PBGSA)





## BIOGRAPHICAL SKETCH

**Mark Lemos**

**Professor Katie Dehesh & Professor Karen McDonald  
Laboratories**

**Email: mslemos@ucdavis.edu**

<b>NAME</b> Mark Shawn Lemos	<b>P.I.(s):</b> Katayoon Dehesh Karen McDonald		
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Plant Biology Graduate Group	<b>TITLE OF DISSERTATION ON RESEARCH:</b> Engineering plants for biofuels		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of Nevada Reno (Reno, NV)	BS/MS	09/09	Biotechnology

### A. Research Focus

My research involves genetic engineering of plants for biofuels. The two projects I am involved in include:

- Rechanneling starch to oil.
- Expression of cellulose degrading enzymes in duckweed.

Ultimately, I am interested in development of duckweed as a scalable biomass crop for the production of biofuels and high value plant-made products.

### B. Honors and Awards

2011                      E-Team Grantee, National Collegiate Inventors and Innovators Alliance (NCIIA)

### Positions and Employment

N/A



**Professional Experience (TAing/Research Internships)**

N/A

**C. Publications and Patents**

N/A

**Additional posters and presentations**

N/A

**Outreach Activities**

Feb 2012	Will serve as a student host for prospective incoming class of plant biology graduate group.
Nov 2011	Led tour of STEM Transfer students through McDonald lab.
Sept 2011	Led tour for visiting students from Kyushu University (Japan) through McDonald lab.
Jun-Aug 2011	Served as a mentor for CREATE-REU student Debika Mitra (Georgia Tech).
May 2011	Volunteered time at the Teen Biotech Challenge awards ceremony.

**University Service**

2011	NSF CREATE-REU Summer Research Mentor
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## BIOGRAPHICAL SKETCH

**Sonni-Ali Miller**

**Professor Martinez & Professor Jesse Jaynes Laboratories**

**Email: Snorlax188@aol.com**

<b>NAME</b> Sonni-Ali Miller	<b>P.I.(s):</b> Dr. Martinez & Dr. Jaynes		
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Integrative Biosciences	<b>TITLE OF DISSERTATION ON RESEARCH:</b>  Effect of IL-12 on Negative Selection in the TNC microenvironment		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Tuskegee University—Tuskegee, AL 36088	M.S.	05/03	Food and Nutritional Sci.
Tuskegee University—Tuskegee, AL 36088	B.S.	05/00	Biology

### A. Research Focus

Sonni is interested plant-made products and in multi-faceted research concerning interactions between nutrition and cytological behavior, specifically in energy nutrient metabolism. He is characterizing specific biomarkers in atherosclerosis as a result of differences in lipid metabolism. He is also investigating the efficacy of peptide fragments as treatments effecting plaque formation in various rodent models.

### B. Honors and Awards

2011-2012	Member, American Society of Cell Biologists
2011-	Member, Golden Key International Honour Society
2003-2005	Member, Society of Automotive Engineers
2000-2003	Fellow, NASA/CFESH Research, Tuskegee University, Tuskegee, AL
1999-	Member, Beta Kappa Chi Scientific Honor Society

**Positions and Employment**

N/A

**Professional Experience (TAing/Research Internships)**

2010-2011 TA, BIOL 0368-Bioinformatics/Biotechnology, Fall Semester 2011& Spring Semester  
2010 TA, BIOL 0111-General Biology, Spring Semester  
2010 Instructor, BIOL 0250-Molecular, Cell, and Genetic Biology, Summer

**C. Publications and Patents**

N/A

**Additional posters and presentations**

S-A. Miller<sup>1</sup>, S. C. Henley<sup>1</sup>, F. R. Davis<sup>1</sup>, R. H. Lewis<sup>1</sup>, G. C. Bernard<sup>1</sup>, S. Samuels<sup>1</sup> and M. T. Martinez<sup>1</sup>. (Dec. 2011) "Effect of IL-12 on Negative Selection in the TNC microenvironment." Poster session presented at the annual meeting of the American Society of Cell Biologists, Denver, CO.

**Outreach Activities**

N/A

**University Service**

N/A



## BIOGRAPHICAL SKETCH

**Patrick O'Dell**  
**Professor Tina Jeoh Zicari Laboratory**  
**Email: pack21x@gmail.com**

### NAME

Patrick O'Dell

**P.I.: Dr. Tina Jeoh Zicari**

### GRADUATE GROUP

Biological Systems Engineering

**TITLE OF DISSERTATION ON RESEARCH:**  
**Investigating cellulose structure and enzyme accessibility using atomic force-microscopy.**

**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of Florida (Gainesville, FL)	B.S.	12/08	Chemical Engineering

## A. Research Focus

Patrick's work concerns 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.

## B. Honors and Awards

### Positions and Employment

2010- Graduate Student Researcher, University of California, Davis. Davis, CA.  
 2009-2010 Consultant Engineering Specialist Black & Veatch, Kansas City, MO.  
 2007-2008 Undergraduate Student Researcher University of Florida. Gainesville, FL.  
 Aug-Dec 2007 Chemical Engineering Intern, Citgo Petroleum Refinery, Lake Charles, LA.

**Professional Experience (TAing/Research Internships)**

N/A

**C. Publications and Patents**

N/A

**Additional 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

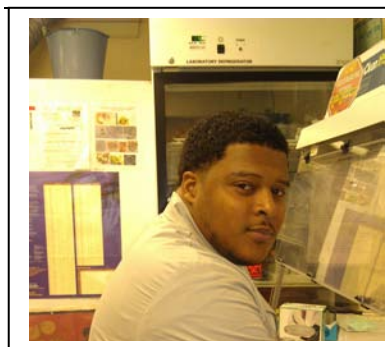
2011 – January 12 – 13, CREATE Symposium: “Atomic Force Microscopy to study Cellulose Microfibrils Interactions with Cellulases”, Davis, CA

**Outreach Activities**

2010, October 9, “Expanding Your Horizons” Event at California State University, Sacramento

**University Service**

2011                      NSF CREATE-REU Summer Research Mentor



## BIOGRAPHICAL SKETCH

**Steven Samuels**  
**Professor Marceline Egnin Laboratory**  
**Email: ssamuels1822@yahoo.com**

<b>NAME:</b> Steven Samuels	<b>P.I.(s):</b> Dr. Marceline Egnin <b>TITLE OF DISSERTATION ON RESEARCH:</b> Development of Transgenic Sweetpotato [ <i>Ipomoea batatas</i> (L. lam)] Expressing Synthetic Lytic Peptide Genes <i>jc41N</i> and <i>jc41ND</i> as a Plant-based Treatment Regimen against HIV Replication
<b>GRADUATE GROUP</b> Integrative Bioscience	

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Fort Valley State University	BS	12/07	Plant Science/Biotech
Tuskegee University	MS	05/11	Plant and Soil Science

### A. Research Focus

Steven is working on the development of transgenic sweetpotato lines expressing synthetic lytic peptides, for potential therapeutic uses. In addition to developing transgenic plants for the biomanufacture of drugs and vaccines in developing countries, Steven is interested in the use of transgenic plants to increase yields and nutrient levels of staple crops.

### B. Honors and Awards

#### Positions and Employment

2009	Professional Agricultural Workers Conference, Tuskegee, AL, 1 <sup>st</sup> Place Oral Presenter
2011	Professional Agricultural Workers Conference, Tuskegee, AL, 1 <sup>st</sup> Place Oral Presenter
2011	16th Biennial Research Symposium of the Association of Research Directors, Atlanta, GA, 2 <sup>nd</sup> Place Oral Presenter

### **Professional Experience (TAing/Research Internships)**

Jul. 2011 IGERT purification lab course  
TA of APSC 540, Plant and Animal Biotechnology course

### **C. Publications and Patents**

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

### **Additional posters and presentations**

2009 Professional Agricultural Workers Conference, Oral Presentation Title: Development of Transgenic Sweetpotato [*Ipomoea batatas* (L. lam)] Expressing Synthetic Lytic Peptide Genes *jc41N* and *jc41ND* as a Plant-based Treatment Regimen against HIV Replication

2009 Invitro Biology Meeting, Poster Presentation Title: Development of Transgenic Sweetpotato [*Ipomoea batatas* (L. lam)] Expressing Synthetic Lytic Peptide Genes *jc41N* and *jc41ND* as a Plant-based Treatment Regimen against HIV Replication

2010 Professional Agricultural Workers Conference , Oral Presentation Title: Development of Transgenic Sweetpotato [*Ipomoea batatas* (L. lam)] Expressing Synthetic Lytic Peptide Genes *jc41N* and *jc41ND* as a Plant-based Treatment Regimen against HIV Replication

2010-2011 CREATE IGERT SYMPOSIUM, Oral Presentation Title: Development of Transgenic Sweetpotato [*Ipomoea batatas* (L. lam)] Expressing Synthetic Lytic Peptide Genes *jc41N* and *jc41ND* as a Plant-based Treatment Regimen against HIV Replication

2010 National Sweet potato conference, Oral Presentation

2011 Successful defense of Masters of Science in Plant and Soil Science

2011 16th Biennial Research Symposium of the Association of Research Directors Oral Presentation Title: Development of Transgenic Sweetpotato [*Ipomoea batatas* (L. lam)] Expressing Synthetic Lytic Peptide Genes *jc41N* and *jc41ND* as a Plant-based Treatment Regimen against HIV Replication

### **Outreach Activities**

N/A

### **University Service**

N/A



## BIOGRAPHICAL SKETCH

**Erica Vonasek**  
**Professor Nitin Nitin Laboratory**  
**Email: elvonasek@ucdavis.edu**

<b>NAME</b> Erica Vonasek		<b>P.I.(s): N. Nitin, PhD</b>	
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Biological and Agricultural Engineering		<b>TITLE OF DISSERTATION ON RESEARCH:</b>	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of California, Davis	BS	06/10	Biological Systems Engineering

### A. Research Focus

Erica has expertise in biopolymer design for the controlled release of bacteriophages and is developing optical imaging systems to monitor the distribution of bacteria and viruses within plant tissues. Her work will have applications across all three focus areas, with emphasis on the use of bacteriophages as biocontrol agents in food and agricultural systems.

### B. Honors and Awards

#### Positions and Employment

N/A

#### Professional Experience (TAing/Research Internships)

N/A

### C. Publications and Patents .

N/A



**Additional posters and presentations**

2011 April 21, UC Davis Interdisciplinary Graduate and Professional Symposium, Poster Title: "Encapsulation of Bacteriophages in Biopolymers to Control Food Pathogens in Food", UC Davis

2010 April 19, Undergraduate Research Conference, Poster Title: "Encapsulation of Bacteriophages in Edible Thin Protein Films and Protein Fibers", UC Davis

**Outreach Activities**

2012	Sheldon High School Biotech Academy Mentor Program
2011	UC Davis CREATE-REU Mentor
2011	Teen Biotech Challenge

**University Service**

2011	Department of Biological and Agricultural Engineering Holiday Party Planning Committee
2011	NSF CREATE-REU Summer Research Mentor
2012	Department of Biological and Agricultural Engineering Retirement Planning Committee



## BIOGRAPHICAL SKETCH

**Natasha Worden**  
**Professor Georgia Drakakaki Laboratory**  
**Email: nnworden@ucdavis.edu**

<b>NAME</b> Natasha Worden	<b>P.I.(s):</b> Georgia Drakakaki
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Plant Biology	<b>TITLE OF DISSERTATION ON RESEARCH:</b>  <b>Studying the Endomembrane Trafficking Processes Involved in Cell Wall Deposition</b>

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
UC Davis, Davis, CA	Ph.D expected	06/2015	Plant Biology
Smith College, Northampton, MA	BA	05/2008	Biology

### A. Research Focus

Natasha is studying the endomembrane trafficking processes involved in cell wall biosynthesis using a chemical genomics approach, which involves using small molecules to alter cell wall and trafficking phenotypes. Cell walls are important in the production of cellulosic ethanol and studying their biosynthesis can lead to improved biofuel feedstocks.

### B. Honors and Awards

#### Positions and Employment

2011 GSR, Dept. of Plant Sciences

#### Professional Experience (TAing/Research Internships)

N/A

### **C. Publications and Patents**

Worden, N, Girke, T and Drakakaki, G (2012). "Endomembrane Dissection Using Chemical Induced Bioactive Clusters." Methods Mol Biology: Chemical Genomics Protocols (Submitted).

#### **Additional posters and presentations**

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

Worden, N., 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.

Worden, N. "Using Confocal Microscopy to Study Endomembrane Trafficking and Cell Wall Biosynthesis". CREATE-REU seminar. July 13, 2011. Davis, CA.

Drakakaki, G. Park, E., Worden, N. et al. Understanding endomembrane trafficking pathways involved in polysaccharide deposition. American Society of Plant Biologists. August 6-10, 2010, Minneapolis, MN.

#### **Outreach Activities**

2011	Organized PBGG Fall symposium
2011	CREATE-REU summer internship mentor
2011	Established mentorship program for new students in PBGG department
2011	Gave lab tour to visiting students from Japan

#### **University Service**

2011	NSF CREATE-REU Summer Research Mentor
2011-2012	Plant Biology Graduate Group Events Coordinator



## BIOGRAPHICAL SKETCH

Tracy Zeng  
 Professor Bo Liu Laboratory  
 Email: [cjzeng@ucdavis.edu](mailto:cjzeng@ucdavis.edu)

<b>NAME</b>	<b>P.I.(s):</b> Prof. Bo Liu
Cui Jing (Tracy) Zeng	<b>TITLE OF DISSERTATION ON RESEARCH:</b> Cellularization mechanisms in the filamentous fungus <i>Aspergillus nidulans</i>
<b>GRADUATE GROUP</b> (i.e. Plant Biology) Microbiology	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
City College of San Francisco, SF, CA	AA	May 04	Biology
University of California, Davis, CA	BS	June 06	Biochemistry and Molecular Biology

### A. Research Focus

My 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 my studies is to design novel approaches aimed at manipulating filamentous fungi better suited for applications like fermentation and bioremediation.

### B. Honors and Awards

#### Positions and Employment

N/A

### **Professional Experience (TAing/Research Internships)**

N/A

### **C. Publications and Patents**

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.

### **Additional posters and 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 26<sup>th</sup> Fungal Genetics Conference at Asilomar, Pacific Grove, CA.

### **Outreach Activities**

2011 Bay Area Science Festival

2012 Mentor for high school students in the Hogan High School Biotechnology Academy Program

### **University Service**

N/A



## BIOGRAPHICAL SKETCH

**Steve Zicari**  
**Professor Ruihong Zhang Laboratory**  
**Email: szicari@ucdavis.edu**

### NAME

Steve Zicari

**P.I.(s):** Dr. Ruihong Zhang

### TITLE OF DISSERTATION ON RESEARCH:

**GRADUATE GROUP** (i.e. Plant Biology)  
 Biosystems Engineering

Bioenergy production from sugar beets employing  
 an integrated bioenergy platform

**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Cornell University, Ithaca N.Y.	BS	5/99	Agricultural and Biological Engineering
Cornell University, Ithaca N.Y.	MS	1/03	Biological and Environmental Engineering

## A. Research Focus

Steve's research aims to better characterize Energy Beet non-sucrose compositions, study their effects on conversion to fuels and optimize downstream processing steps. Opportunities for upstream genetic plant modifications will also be identified. Steve's research will be conducted as a larger collaborative UCD research effort lead by Dr. Ruihong Zhang aimed at developing advanced biomass and conversion systems for producing biofuels and coproducts with Energy Beets and saline tolerant crops as core feedstocks

## **B. Honors and Awards**

### **Positions and Employment**

2010-2012      Trainee, NSF CREATE-IGERT program, University of California, Davis, Davis, CA  
2010-2011      PhD Student, Biosystems Engineering, Agricultural and Biological Engineering,  
University of California, Davis, Davis, CA

### **Professional Experience (TAing/Research Internships)**

N/A

## **C. Publications and Patents**

N/A

### **Additional posters and presentations**

2012              Bioenvironmental Engineering Group Meeting, Presentation Title: "Sugar beet to ethanol literature review and preliminary fermentation data results", Davis, CA

### **Outreach Activities**

2011              Tour Leader, Japanese Student Engineering Group, University of California, Davis  
2010-2011      Cyber-Buddie Program Mentor, Cordova High-School Polytechnic Academy,  
Cordova, CA

### **University Service**

2011              UC Davis Biogas Energy Plant, Tour Guide (Various occasions), University of California, Davis