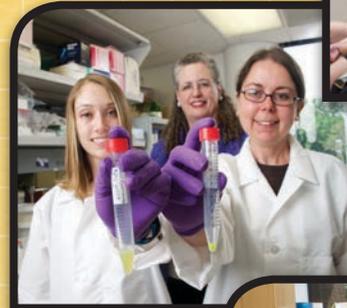


FUTURE

IN BIOMEDICINE PROGRAM

Fostering Undergraduate Talent - Uniting Research and Education



2013



UNIVERSITY OF IOWA
CARVER COLLEGE
OF MEDICINE

University of Iowa Health Care

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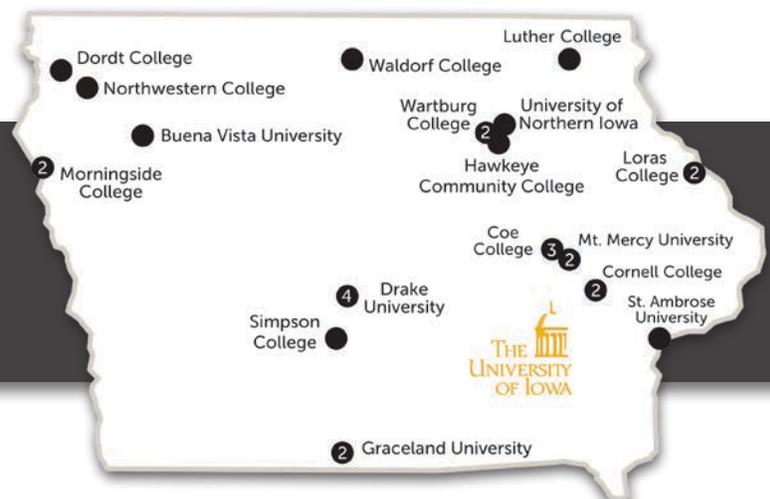
FROM THE DIRECTOR

The **FUTURE** - Fostering Undergraduate Talent – Uniting Research and Education - in Biomedicine Program of the Carver College of Medicine seeks to foster a network of scientist-educators throughout the state of Iowa in order to enhance preparation of students for biomedically related careers in research or clinical practice, and to share the unique resources of the Carver College of Medicine with our colleagues at primarily undergraduate institutions.

This yearbook describes many of the exciting activities of the 5th Annual **FUTURE** in Biomedicine Program. First-time Faculty Fellows in the class of 2013 came from **Drake University, Graceland University, Mount Mercy University,** and the **University of Northern Iowa.** Returning Senior Faculty Fellows were from **Cornell College** and **Morningside College.**

To promote education and research, each Fellow selected an undergraduate student to participate in the experimental studies conducted during the summer. The departments of Biochemistry, Internal Medicine, Microbiology, and Molecular Physiology and Biophysics hosted participants.

2009-2013 PARTICIPATING SCHOOLS





The photographs here capture a few of the major activities of the summer program, beginning with orientation in late May. During the summer, there was a program of weekly seminars or panels, and the summer closed with the Research Symposium in August. In the fall, in collaboration with the Biosciences Program, we hosted a Biomedical Pre-Graduate School Conference, timed to coincide with the Pre-Medical School Conference. To our mutual benefit, alumni Faculty Fellows continue to participate in these events, building stronger intercollegiate ties among primarily undergraduate institutions in Iowa.

This year, with support from the Office of the Provost, we offered Better Futures for Iowans grants to support faculty throughout our state to use our research core facilities as part of a classroom or research experiment that involved undergraduate students. Ten awards were made—half for the Central Microscopy Facility and half for the DNA Core for sequencing. Students prepared samples and participated in the analysis of results—gaining a perspective for the nature of true research, where the answers are not known in advance.

Several Faculty Fellows have developed ongoing collaborations with their host laboratories or other Carver College of Medicine faculty they met while in residence on our campus. Past Fellows have conducted subsequent sabbatical

research in Iowa City, published scientific papers with UI faculty, presented their studies at national or international conferences and participate in successful grant applications to fund collaborative research. They continue to use libraries and core research facilities, and recommend our training programs to their students.

The 2013 Faculty Fellows and students had varied interests at the start of the summer. As they describe in their reflections, their experiences on our campus changed their view of their own future and created stronger ties with the University of Iowa. Several students from past classes have pursued PhD or MD degrees, or became research assistants or clinical technicians. We look forward to learning about the next steps of the Class of 2013!

We thank all of the individuals who applied to the FUTURE in Biomedicine Program and appreciate the commitment of their academic colleagues who nominated them. We look forward to the coming year bringing new opportunities to foster scientific and educational interactions among academic institutions throughout Iowa.

I welcome your inquiries about the FUTURE in Biomedicine Program.

Sincerely,

A handwritten signature in black ink that reads "Madeline A. Shea".

Madeline A. Shea, Ph.D.
 Director, *FUTURE in Biomedicine Program*
 Professor of Biochemistry

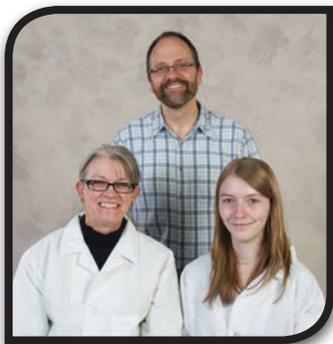
Since 2009, FUTURE in Biomedicine has now connected 25 fellows at 17 Iowa institutions and continues to expand each year.

For more information about past participants, events, and programs of the FUTURE in Biomedicine Program beyond this yearbook, visit online at www.medicine.uiowa.edu/future.

CLASS OF 2013



Above: Carver College of Medicine Dean Debra Schwinn, MD (left) with the Class of 2013 Fellows and Students



CORNELL COLLEGE

Senior FUTURE in Biomedicine Fellow:

Barbara Christie-Pope, PhD, *Professor of Biology*

Student Researcher:

Brianna Christensen

UI Faculty Host:

Robert Cornell, PhD, *Associate Professor of Anatomy and Cell Biology*



DRAKE UNIVERSITY

Ruth Ann Henriksen FUTURE in Biomedicine Fellow:

Adina Kilpatrick, PhD, *Assistant Professor of Physics*

Student Researcher:

Amanda Marwitz

UI Faculty Host:

Madeline Shea, PhD, *Professor of Biochemistry*



GRACELAND UNIVERSITY

FUTURE in Biomedicine Fellow:

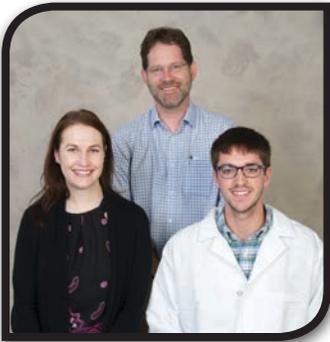
Mary Shawgo, PhD, *Assistant Professor of Biology*

Student Researcher:

Christopher Chambers

UI Faculty Host:

John Kirby, PhD, *Associate Professor of Microbiology*



MORNINGSIDE COLLEGE

Senior FUTURE in Biomedicine Fellow:

Rachel Robson, PhD, *Assistant Professor of Biology (not available for photos)*

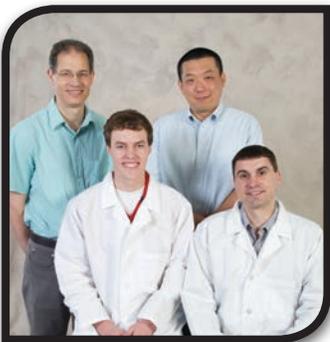
Student Researcher:

Quinton Behlers

UI Faculty Hosts:

Dan Diekema, MD, *Professor of Internal Medicine*

Tara Smith, PhD, *Associate Professor of Epidemiology*



MOUNT MERCY UNIVERSITY

FUTURE in Biomedicine Fellow:

Ryan Bezy, PhD, *Assistant Professor of Biology*

Student Researcher:

Jeremy Cline

UI Faculty Host:

David Weiss, PhD, *Associate Professor of Microbiology*



UNIVERSITY OF NORTHERN IOWA

FUTURE in Biomedicine Fellow:

Nalin Goonesekere, PhD, *Associate Professor of Chemistry*

Student Researcher:

Logan Poole

UI Faculty Host:

Michael Henry, PhD, *Associate Professor of Molecular Physiology and Biophysics*

EVENTS

SUMMER 2013 FUTURE IN BIOMEDICINE EVENTS & MEETINGS

MAY 29	Orientation Day for the Class of 2013 Welcome and Tours of Research Core Facilities, followed by photos with Dean and Host Faculty Lunch with Deans, Host PI's, lab members, Alumni Fellows & Hosts
MAY 31	Biosciences Survival Skills Workshop for Young Researchers
JUNE 3	UI Graduate Programs in Biomedical Sciences Dr. Doug Spitz, Ph.D., Professor of Radiation Oncology, Director - Free Radical Radiation Biology Program Director of the Biosciences Graduate Admissions Program
JUNE 10	Overview of Medical Scientist Training Program (MSTP) UI M.D./Ph.D. program funded by the National Institutes of Health Program Administrator Leslie Harrington, and MSTP Student representative
JUNE 17	Overview of Iowa Institute of Human Genetics - Research, Outreach, Training Internships Dr. Colleen Campbell, Ph.D., M.S., CGC (Genetic Counseling)
JUNE 24	Panel on Training to be a Physician, Physician Assistant, or Physical Therapist MD - Ms. Kathlene Huebner, Director of Admissions for M.D. program of the Carver College of Medicine PA - Asst. Dean David Asprey, representing Physician Assistant Program PT - Byron Bork, representing Physical Therapy and Rehabilitation Science Program
JULY 1	Panel Discussion by FUTURE Faculty Fellows – Introducing Schools
JULY 4	UI Holiday Enjoy the Iowa City Jazz Fest (evening of Friday, July 5 through Sunday, July 7)
JULY 8	FUTURE Faculty Fellows - Midsummer Research Progress & Alumni Talks Talks by current Fellows concentrate on background material and preliminary findings
JULY 15	FUTURE Faculty Fellows - Midsummer Research Progress & Alumni Talks Talks by current Fellows concentrate on background material and preliminary findings
JULY 22	Panel Discussion by FUTURE Faculty Fellows on Careers at Liberal Arts Colleges Presented for the benefit of UI Graduate Students and Postdoctoral Fellows
JULY 29	Student Presentations for Research Symposium Students present draft SURC/FUTURE posters as a talk
JULY 31	Summer Undergraduate Research Conference (SURC) Iowa Memorial Union Students present posters at this event organized by the University of Iowa Graduate College
AUGUST 2	FUTURE in Biomedicine Research Symposium Faculty Fellows talks, and students present posters. Recipients of Better Futures for Iowans and FUTURE in Biomedicine Alumni

SUMMER 2013 BIOSCIENCES PROGRAM UNDERGRADUATE SEMINAR SERIES

JUNE 4	Welcome Reception All students participating in biomedical summer research programs attend	
JUNE 6	Tina Tootle, PhD Assistant Professor of Anatomy & Cell Biology	<i>Using Drosophila to study human disease</i>
JUNE 13	Jon Houtman, PhD, Associate Professor of Microbiology	<i>How Fak and Pyk2 control human T cell activation</i>
JUNE 20	John Colgan, PhD Associate Professor of Internal Medicine	<i>Regulation of T cell responses by the surface molecule Tim-3</i>
JUNE 27	Deborah Dawson, PhD Professor of Dows Institute for Dental Research	<i>Elements of Study Design: How Statistics Can Help You Optimize Your Research Efforts</i>
JULY 11	Christie Thomas, MD Professor of Internal Medicine	<i>Soluble Flt1, implicated in pre-eclampsia, originates in the placenta in multiple ways.</i>
JULY 18	George Weiner, MD Professor of Internal Medicine	<i>Anti-Cancer Monoclonal Antibodies</i>
JULY 25	Brandon Davies, PhD Associate Professor of Biochemistry	<i>The Super Secret Shadow Organ that Facilitates Fat Metabolism</i>
JULY 30	Farewell Reception All students participating in biomedical summer research programs attend	
AUGUST 1	Bridget Lear, PhD Assistant Professor of Biology	<i>From Clocks to Behavior: Neural Output in the Drosophila Circadian Pacemaker</i>

FALL 2013 EVENTS

SEPTEMBER 27	65th Annual Pre-Medical School Conference 5th Annual Biomedical Pre-Graduate School Conference
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EVENTS

ORIENTATION DAY

Wednesday, May 29, 2013



UI GRADUATE PROGRAMS IN BIOMEDICAL SCIENCES

Monday, June 03, 2013

Presented by Doug Spitz, PhD



OVERVIEW OF MEDICAL SCIENTIST TRAINING PROGRAM (MSTP)

Monday, June 10, 2013

Presented by Program Administrator Leslie Harrington, and MSTP student representatives



EVENTS

PANEL ON TRAINING TO BE A PHYSICIAN, PHYSICIAN ASSISTANT, OR PHYSICAL THERAPIST

Monday, June 24, 2013

Presented by Kathlene Huebner, Director of Admissions for the MD program of the Carver College of Medicine; David Asprey, Assistant Dean representing Physician Assistant Program; Byron Bork, representing Physical Therapy and Rehabilitation Science Program



PANEL DISCUSSION BY FUTURE FACULTY FELLOWS

Monday, July 01, 2013

Fellows highlighted the science curriculum and academic programs at their institutions for leaders of graduate and clinical programs at the University of Iowa.



CAREERS PANEL

Monday, July 22, 2013

The Careers Panel discussion was titled "Paths to Becoming a Faculty Member at a Liberal Arts College". It was presented by the 2013 FUTURE in Biomedicine Faculty Fellows and open for UI Graduate Students and Postdoctoral Fellows to attend.



EVENTS

SUMMER UNDERGRADUATE RESEARCH CONFERENCE

Wednesday, July 31, 2013

FUTURE IN BIOMEDICINE STUDENTS

CORNELL
COLLEGE

Brianna Christensen

Senior FUTURE in Biomedicine Fellow:
Barbara Christie-Pope, PhD
*UI Faculty Host: Robert Cornell, PhD, Associate Professor
of Anatomy and Cell Biology*

*Inhibition of Aldehyde Dehydrogenase
Affects Melanocytes and
Dopamine Neurons*

DRAKE
UNIVERSITY

Amanda Marwitz

Ruth Ann Henricksen FUTURE in Biomedicine Fellow:
Adina Kilpatrick, PhD
UI Faculty Host: Madeline Shea, PhD, Professor of Biochemistry

*Biophysical studies of calmodulin
interaction with the ryanodine receptor in
Drosophila Melanogaster*

GRACELAND
UNIVERSITY

Christopher Chambers

FUTURE in Biomedicine Fellow:
Mary Shawgo, PhD
*UI Faculty Host: John Kirby, PhD, Associate Professor
of Microbiology*

*Determining Genes Associated with
Myxococcus xanthus Predation of Wild
Bacillus Subtilis*

MORNINGSIDE
COLLEGE

Quinton Behlers

Senior FUTURE in Biomedicine Fellow:
Rachel Robson, PhD
*UI Faculty Hosts: Dan Diekema, MD, Professor of Internal
Medicine and Tara Smith, PhD, Associate Professor
of Epidemiology*

*Assessing the susceptibility of MRSA
and MSSA isolates to two lytic phages
of S. aureus*

MOUNT MERCY
UNIVERSITY

Jeremy Cline

FUTURE in Biomedicine Fellow:
Ryan Bezy, PhD
*UI Faculty Host: David Weiss, PhD, Associate Professor
of Microbiology*

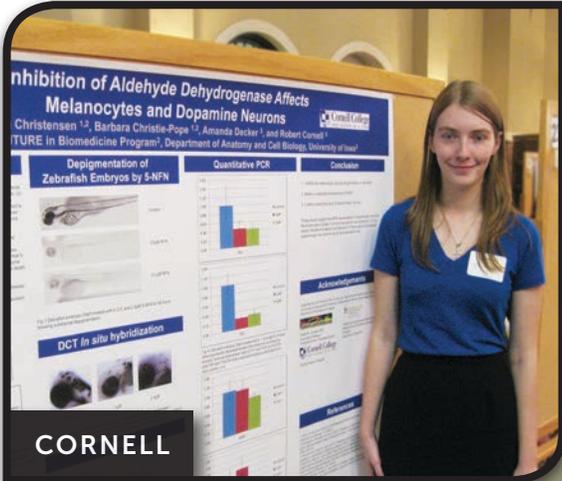
*Genetic Analysis of putative cell division
genes in E. Coli*

UNIVERSITY
OF NORTHERN
IOWA

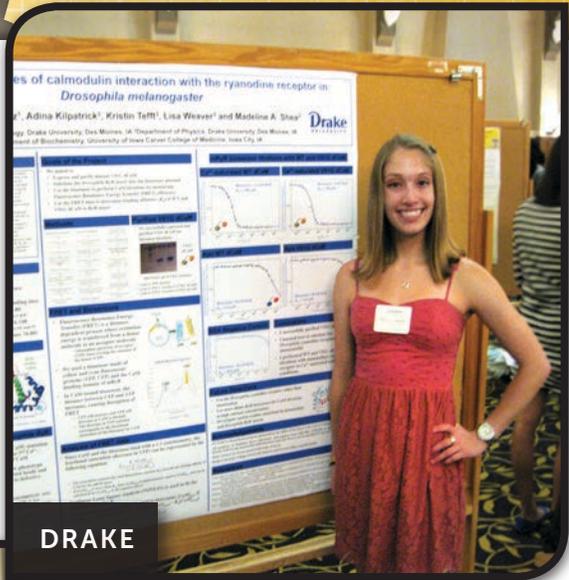
Logan Poole

FUTURE in Biomedicine Fellow:
Nalin Goonesekere, PhD
*UI Faculty Host: Michael Henry, PhD, Associate Professor
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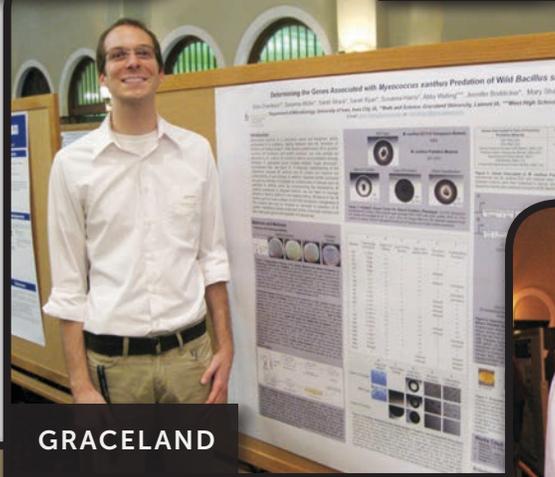
*Identification of mTORC1 Independent
Mechanisms of Autophagy in EMT*



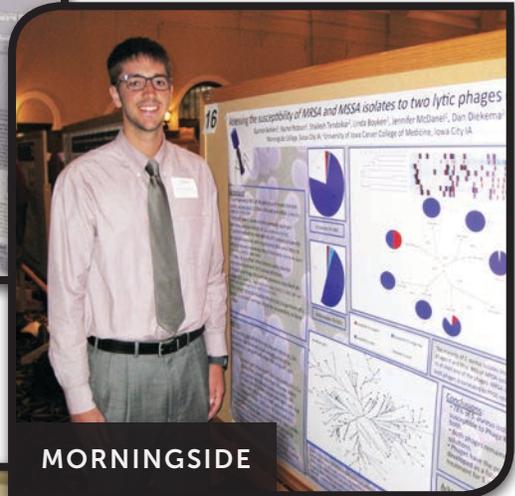
CORNELL



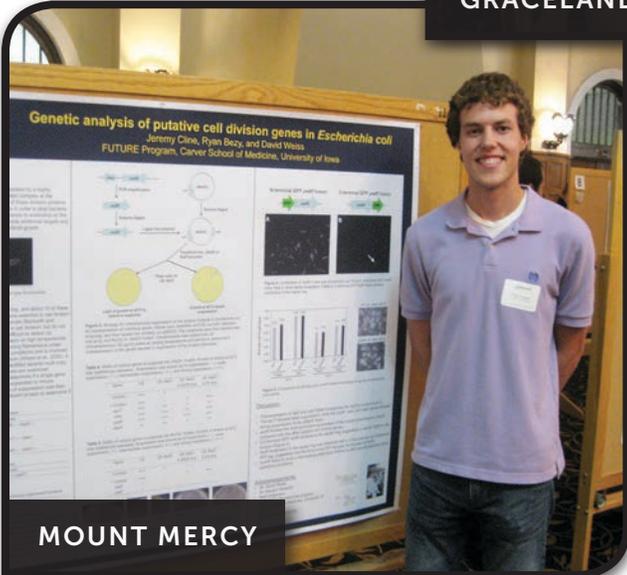
DRAKE



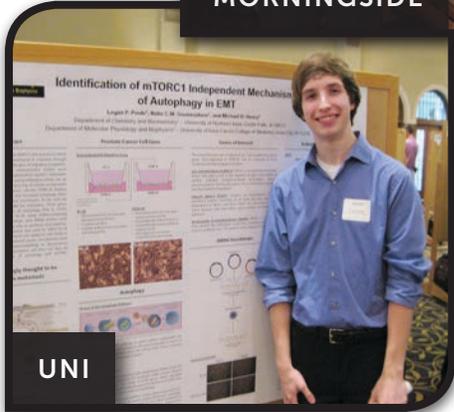
GRACELAND



MORNINGSIDE



MOUNT MERCY



UNI

EVENTS

SUMMER UNDERGRADUATE RESEARCH CONFERENCE

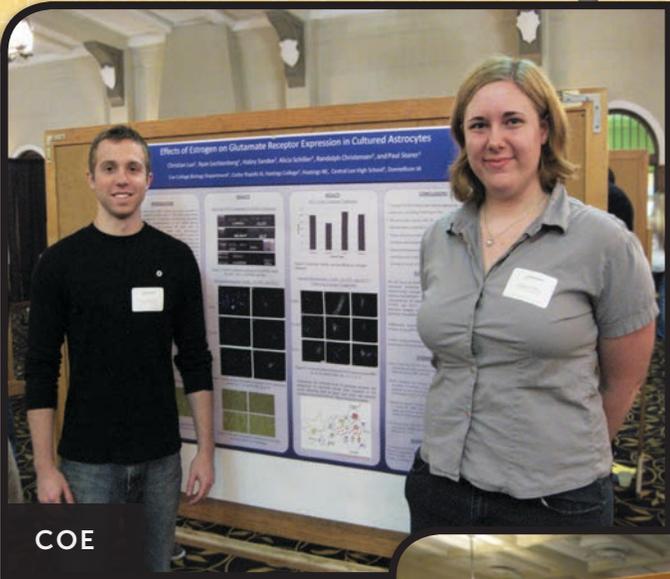
Wednesday, July 31, 2013

ONGOING CONNECTIONS WITH THE FUTURE IN BIOMEDICINE NETWORK

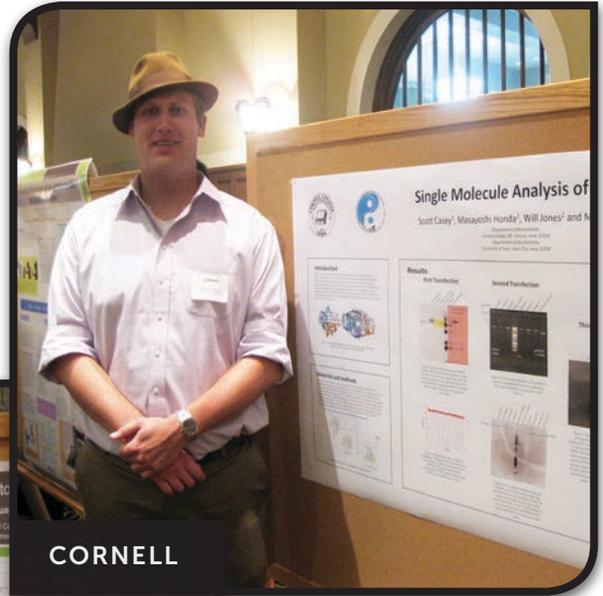
The FUTURE in Biomedicine program is fostering an expanding network of scientist-educators throughout Iowa who have participated as Faculty Fellows, and continue to mentor students doing research on their own campuses. We are also facilitating opportunities for additional undergraduates from their institutions to participate in independent research projects at the University of Iowa. Students in this network of laboratories were invited to present their work at the Summer Undergraduate Research Conference, sponsored by the University of Iowa Graduate College, as well as the FUTURE in Biomedicine symposium at the end of the summer.

This year, alongside posters presented by students who participated in the FUTURE in Biomedicine program with their Faculty Fellow mentors, posters were presented by students who conducted research at their home institutions of Coe and Mount Mercy, and by Cornell Fellows who traveled to Iowa City to conduct research in the Department of Biochemistry of the University of Iowa Carver College of Medicine.

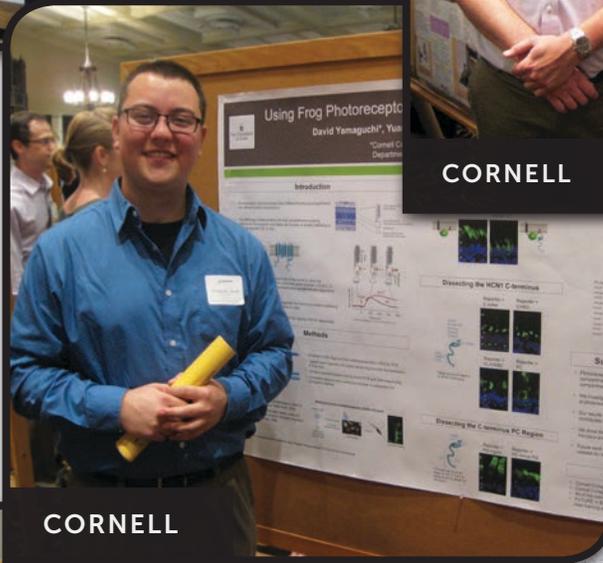
COE COLLEGE	Christian Lux, Haley Sandoe <i>Advisor: Paul Storer, PhD, Assistant Professor of Biology</i>	<i>Effects of estrogen on the expression of glutamate receptors using cultured astrocytes</i>
CORNELL COLLEGE	Scott Casey <i>Advisor: Maria Spies, PhD, Associate Professor of Biochemistry (University of Iowa)</i>	<i>Single molecule analysis of FANCDJ</i>
	David Yamaguchi <i>Advisor: Sheila Baker, PhD, Associate Professor of Biochemistry (University of Iowa)</i>	<i>Using frog photoreceptors to identify HCN1 trafficking signals</i>
MOUNT MERCY UNIVERSITY	Zachary Fritz <i>Advisor: Joseph Nguyen, PhD, Assistant Professor of Chemistry</i>	<i>Characterizing dual infection and superinfection inhibition by two alphaherpesviruses in a natural host with scanning confocal microscopy and transmission electron microscopy</i>
	Nicole Morrow <i>Advisor: Kristopher Keuseman, PhD, Assistant Professor of Chemistry</i>	<i>Synthesis of palladium-nacnac complexes for use in heterogeneous catalysis</i>



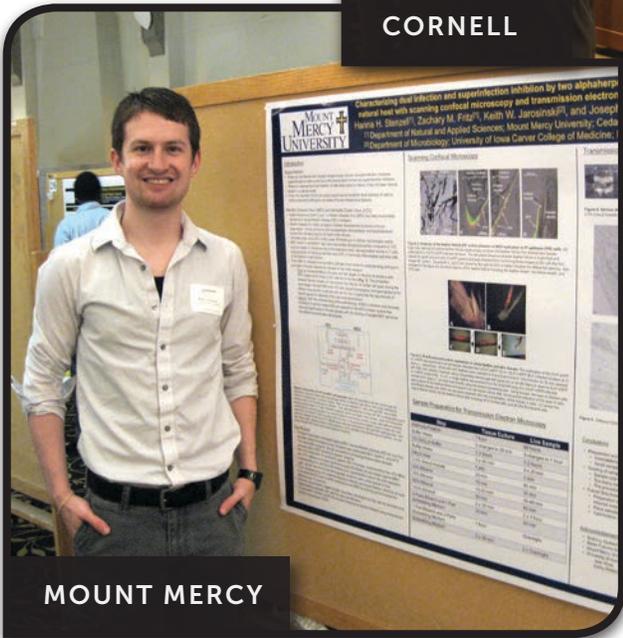
COE



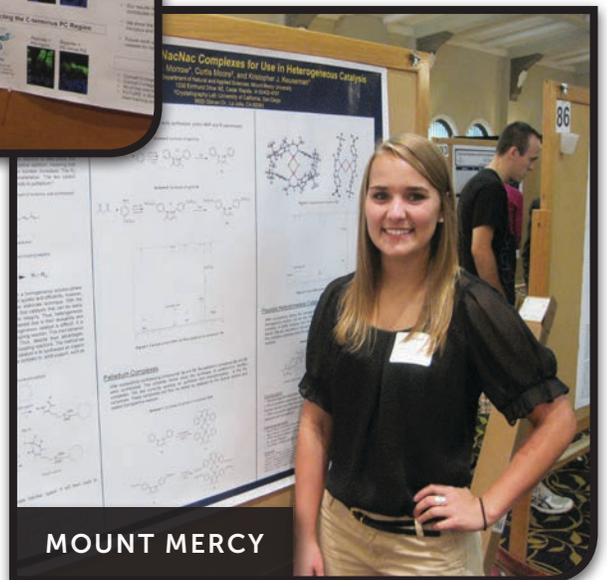
CORNELL



CORNELL



MOUNT MERCY



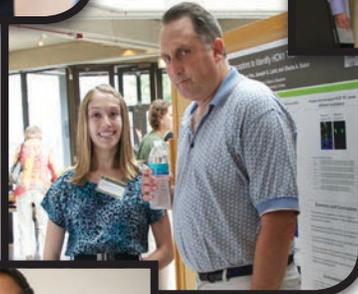
MOUNT MERCY

EVENTS

RESEARCH SYMPOSIUM

Friday, August 2, 2013

1:00 PM	Introductory Remarks - <i>Madeline A. Shea, PhD, Director</i>	
1:15 PM	Ryan Bezy, PhD , Assistant Professor of Biology Mount Mercy University, Cedar Rapids, IA <i>UI Faculty Host: David Weiss, PhD, Associate Professor of Microbiology</i>	<i>Characterization of novel Escherichia coli cell division genes</i>
1:45 PM	Mary Shawgo, PhD , Assistant Professor of Biology Graceland University, Lamoni, IA <i>UI Faculty Host: John Kirby, PhD, Associate Professor of Microbiology</i>	<i>Genetic Regulation of Microbial Communities by a Biofilm Destroyer</i>
2:15 PM	Barbara Christie-Pope, PhD , Professor of Biology Cornell College, Mt. Vernon, IA <i>UI Faculty Host: Robert Cornell, PhD, Associate Professor of Anatomy and Cell Biology</i>	<i>Investigating Gene/Environmental Interactions Underlying Parkinson's Disease: The Potential Role of Endogenous Neurotoxins</i>
2:45 PM	Poster Presentations - <i>Undergraduate Researchers, Alumni and Better Futures for Iowans grant recipients</i>	
3:30 PM	Adina Kilpatrick, PhD , Assistant Professor of Physics Ruth Ann Henricksen FUTURE in Biomedicine Fellow Drake University, Des Moines, IA <i>UI Faculty Host: Madeline Shea, PhD, Professor of Biochemistry</i>	<i>Thermodynamic analysis of calmodulin recognition of the ion channel ryanodine receptor</i>
4:00 PM	Nalin Goonesekere, PhD , Associate Professor of Chemistry University of Northern Iowa, Cedar Falls, IA <i>UI Faculty Host: Michael Henry, PhD, Associate Professor of Molecular Physiology and Biophysics</i>	<i>Identifying genes associated with autophagy in prostate cancer</i>
4:30 PM	Rachel Robson, PhD , Assistant Professor of Biology Morningside College, Sioux City, IA <i>UI Faculty Hosts: Dan Diekema, MD, Professor of Internal Medicine and Tara Smith, PhD, Associate Professor of Epidemiology</i>	<i>No Wrong Answers: How Undergraduate Questions Improved My Research</i>
5:00 PM	Closing Remarks - <i>Madeline A. Shea, PhD, Director</i>	



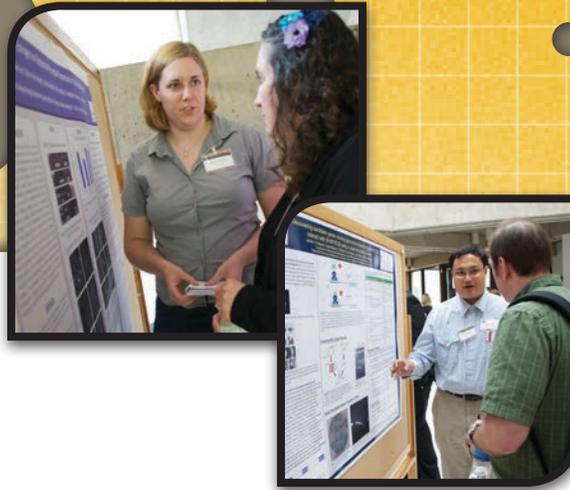
EVENTS

RESEARCH SYMPOSIUM POSTER PRESENTATIONS

Friday, August 2, 2013

UNDERGRADUATE RESEARCHERS, CLASS OF 2013

CORNELL COLLEGE	<p>Brianna Christensen Senior FUTURE in Biomedicine Fellow: Barbara Christie-Pope, PhD <i>UI Faculty Host: Robert Cornell, PhD, Associate Professor of Anatomy and Cell Biology</i></p>	<i>Inhibition of Aldehyde Dehydrogenase Affects Melanocytes and Dopamine Neurons</i>
DRAKE UNIVERSITY	<p>Amanda Marwitz Ruth Ann Henricksen FUTURE in Biomedicine Fellow: Adina Kilpatrick, PhD <i>UI Faculty Host: Madeline Shea, PhD, Professor of Biochemistry</i></p>	<i>Biophysical studies of calmodulin interaction with the ryanodine receptor in Drosophila Melanogaster</i>
GRACELAND UNIVERSITY	<p>Christopher Chambers FUTURE in Biomedicine Fellow: Mary Shawgo, PhD <i>UI Faculty Host: John Kirby, PhD, Associate Professor of Microbiology</i></p>	<i>Determining Genes Associated with Myxococcus xanthus Predation of Wild Bacillus Subtilis</i>
MORNINGSIDE COLLEGE	<p>Quinton Behlers Senior FUTURE in Biomedicine Fellow: Rachel Robson, PhD <i>UI Faculty Hosts: Dan Diekema, MD, Professor of Internal Medicine and Tara Smith, PhD, Associate Professor of Epidemiology</i></p>	<i>Assessing the susceptibility of MRSA and MSSA isolates to two lytic phages of S. aureus</i>
MOUNT MERCY UNIVERSITY	<p>Jeremy Cline FUTURE in Biomedicine Fellow: Ryan Bezy, PhD <i>UI Faculty Host: David Weiss, PhD, Associate Professor of Microbiology</i></p>	<i>Genetic Analysis of putative cell division genes in E. Coli</i>
UNIVERSITY OF NORTHERN IOWA	<p>Logan Poole FUTURE in Biomedicine Fellow: Nalin Goonesekere, PhD <i>UI Faculty Host: Michael Henry, PhD, Associate Professor of Molecular Physiology and Biophysics</i></p>	<i>Identification of mTORC1 Independent Mechanisms of Autophagy in EMT</i>



BETTER FUTURES FOR IOWANS INVESTIGATORS

Seven of the ten recipients of the Better Futures for Iowans grant presented their research at the FUTURE in Biomedicine Symposium.

COE COLLEGE	Christian Lux, Haley Sandoe, Ryan Lechtenberg, Alicia Schiller 2013 BFFI Award Recipient: Paul Storer, PhD	<i>Effects of estrogen on the expression of glutamate receptors using cultured astrocytes</i>
DORDT COLLEGE	Brandon Wubben, Kim Buyert, Sam De Nooy, Nick Wilson, Tony Jelsma 2013 BFFI Award Recipient: Robbin Eppinga, PhD	<i>Learning Upper Level Molecular Biology Using the Yeast Two-Hybrid (Y2H) System</i>
DRAKE UNIVERSITY	Robert Sterner 2013 BFFI Award Recipient: Jerry E. Honts, PhD	<i>Exploring the distribution of cytoskeletal proteins in the ciliated protozoan <i>Tetrahymena thermophila</i> using green fluorescent protein-(GFP)-tagged proteins</i>
	Mallory Tough, Natalie Bensen 2013 BFFI Award Recipient: Abebe Mengesha, PhD	<i>Thermosensitive monoglycerides blend for local delivery of chemotherapeutic agents</i>
MOUNT MERCY UNIVERSITY	James Estipona 2013 BFFI Award Recipient: Alesia Hruska-Hageman, PhD	<i>Discovering candidate genes causing glaucoma by identifying proteins that interact with SH3PX2B using a yeast two-hybrid screen</i>
	Zachary Fritz 2013 BFFI Award Recipient: Joseph Nguyen, PhD	<i>Characterizing dual infections and superinfection inhibition by two alphaherpesviruses in a natural host with scanning confocal microscopy and transmission electron microscopy</i>
SIMPSON COLLEGE	Madelyne Besack ('14), John Greaves ('14) 2013 BFFI Award Recipient: Jackie Brittingham, PhD	<i>Characterization of Wnt Disruptors on <i>Nematostella vectensis</i> Development</i>



EVENTS

BIOMEDICAL PRE-GRADUATE SCHOOL CONFERENCE

Friday, September 27, 2013

Each year, University of Iowa PhD training programs seek out the most highly qualified and diverse individuals to join their programs. The Biomedical Pre-Graduate School Conference, co-organized with the UI Biosciences Program, is a free, one-day event for academic advisors and their advisees. The conference is offered as an opportunity to interact with faculty and current graduate students to learn more about training programs including research areas, admissions, student life and research environment. The events are specifically designed for maximum opportunities to meet one-on-one with faculty and socialize with current graduate students.

This funding for this conference was provided primarily by the Office of the Provost to extend University of Iowa resources to lowans and addresses an important goal of the University Strategic Plan - to provide better futures for lowans.

PARTICIPATING TRAINING PROGRAMS

- Anatomy and Cell Biology
- Biochemistry
- Biology
- Biomedical Engineering
- Biosciences Program
- Free Radical and Radiation Biology
- Genetics Immunology
- Medical Scientist Training Program (MD, PhD)
- Microbiology
- Molecular and Cellular Biophysics
- Neuroscience
- Pharmacology
- Physical Therapy and Rehabilitation Science (PhD only)

SCHEDULE OF EVENTS

9:00 AM	Welcome, Registration, and Continental Breakfast - <i>Information Tables with Literature and Liaisons from PhD Training Programs</i>
9:40 AM	Unique Research Opportunities at The University of Iowa - <i>Doug Spitz, PhD, Professor of Radiation Oncology</i>
10:00 AM	Just what the PhD ordered: Qualities we seek in applicants to our doctoral programs (also known as, "How to Prepare for Success in Graduate School") - <i>Mark Stamnes, PhD, Associate Professor of Molecular Physiology and Biophysics</i>
10:30 AM	Break
10:45 AM	Admissions Procedures from A-Z - <i>Jodi Graff, MA, Director of Admissions and First-Year Experience</i>
11:10 AM	I got an interview for grad school: What do I do? - <i>Madeline Shea, PhD, Professor of Biochemistry</i>
11:40 PM	Closing Remarks - <i>Sherree Wilson, PhD, Associate Dean for Cultural Affairs and Diversity</i>
12:00 PM	Lunch with UI Graduate Students
1:15 PM	Informal Q&A with Admissions Committee Members
2:00 PM	Additional Opportunity - <i>Research Core Facility Tour or Laboratory Tour with Graduate Student</i>

REFLECTIONS FROM PARTICIPANTS

CORNELL COLLEGE - MOUNT VERNON, IA

UI Faculty Host: Robert Cornell, PhD, Associate Professor of Anatomy and Cell Biology

Project: Understanding Neurodegeneration - Learning from a Little Fish

"The FUTURE program is appropriately named. It truly achieves the goal of uniting undergraduates with research. The program enhances a student's education by demonstrating that science occurs in the laboratory and is filled with challenges and questions that cannot be approached in a classroom or by a textbook. Perhaps more importantly, the FUTURE program unites students with their professors in a way that is unique and engaging. Both become learners and colleagues.

I have had the incredible fortune of participating in the FUTURE program twice. The first summer I was with the program, I began a reciprocal collaboration that has continued for the last 3 years. I have sent 3 students to my host's lab for the summer. One of these students returned to the lab during the academic year to complete his experiments. The connections I have made through the program have allowed me to send 4 other students to University of Iowa laboratories. In addition, my host and his graduate student have given seminars at my institution, and one of my colleagues is redesigning an experimental laboratory module connected to one of his courses which will be based on the work in my host's lab.

The FUTURE program reaches more than just the faculty and their students who directly participate in the program. It enhances the curriculum at the undergraduate institution; it connects the University of Iowa to these institutions through facilities, through expertise, through collaboration. Faculty often feel isolated as the only expert in their particular field at their institution. The FUTURE program allows faculty to refresh and expand their knowledge, to revitalize their teaching, and to actively engage in the process that led them to become scientists in the first place. It truly fosters our passion for science and for teaching."

Barbara Christie-Pope, PhD

Professor of Biology

Senior FUTURE in Biomedicine Fellow

"I've benefited in so many different ways from the FUTURE Program. Since I've only completed my freshman year, my exposure to laboratory research is limited. This program allowed me to get the opportunity to gain a variety of terminology and skills, as well as gain an understanding of what research is actually like. It also helped me get a foot in the door with research not only for other research opportunities, but with the lab I've made connections with as well. The FUTURE Program provided seminars that helped me understand the process of applying to different graduate programs. I didn't know that you could participate in a dual MD/PhD program before this summer, and now I'm heavily considering it as a possibility for me. It has been a great summer!"

Brianna Christensen

Student Researcher



DRAKE UNIVERSITY - DES MOINES, IA

UI Faculty Host: Madeline Shea, PhD, Professor of Biochemistry

Project: Biophysical Studies of Calmodulin Recognition of the Ryanodine Receptor

“The FUTURE in Biomedicine program represented a wonderful opportunity to focus exclusively on research for nine weeks, and work on a biophysical project closely related to my overall research interest in calcium-binding proteins. I am very grateful for the support and help of our host this summer, Madeline Shea, and all the members of her lab. Madeline and her group graciously shared their amazing expertise, ideas and state-of-the-art instrumentation, and truly made us feel like members of the lab. Both I and Amanda, the Drake student who accompanied me, improved our existing research skills and learned many new techniques that we will hopefully implement in the future in my lab at Drake. I hope the results of this summer’s work will represent the groundwork for continued collaboration with Madeline’s lab and will lead to many more exciting results.

In addition to research, I very much enjoyed the many discussions with members of Madeline’s lab, participating in lab meetings and weekly FUTURE in Biomedicine meetings and workshops, as well as interacting with peers and students from other undergraduate institutions in Iowa. I also appreciated the opportunity to learn about the programs of study and admission guidelines at the University of Iowa – this information is very useful for me as I have only recently started advising students at Drake. The exchange of ideas during this summer’s meetings and discussions, both related to research and teaching, have been amazing, and it will prove invaluable for me as I return to Drake to develop my biophysical chemistry research program and teach physics and biophysics courses. Thank you for the opportunity to participate in the FUTURE in Biomedicine program. This experience could not have come at a more opportune time for me, and it will significantly impact my teaching, curriculum development efforts, and research. I hope that many other faculty and students from primarily undergraduate institutions in Iowa will have this opportunity in the future.”

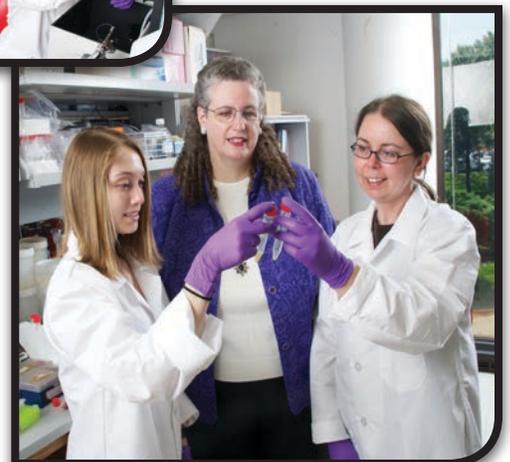
Adina Kilpatrick, PhD

Assistant Professor of Physics

Ruth Ann Henriksen FUTURE in Biomedicine Fellow

“Getting a chance to participate in the FUTURE program was both unexpected and wonderful. As a student who enjoys participating in research, but is applying to Physical Therapy School, I did not see myself as a likely candidate to spend a summer conducting biochemistry research. So, imagine my surprise when Dr. Kilpatrick asked me to join her this summer! Before this summer I did not know what it was like to research full time and to be honest I was not sure if I would like it. Fortunately, I have really enjoyed my time this summer, made some good friends, and have learned more than I ever imagined I would. Furthermore, I did not just learn new lab techniques, but also strengthened my ability to critically think, work in a group, collaborate, and give presentations—all are skills that I will carry with me and use for the rest of my life! Overall, I would recommend this program to anyone interested in science whether they want to go to graduate school or some sort of professional school such as Medical School. Spending a summer immersed in research can be very rewarding and you will develop skills that will help you in all areas of your life.”

Amanda Marwitz
Student Researcher



REFLECTIONS FROM PARTICIPANTS

GRACELAND UNIVERSITY - LAMONI, IA

UI Faculty Host: John Kirby, PhD, Associate Professor of Microbiology

Project: Genetic Regulation of Microbial Communities by a Biofilm Destroyer

"The FUTURE in Biomedicine program is very comprehensive. It has allowed me to make great connections with the University of Iowa and faculty from other small Iowa universities, as well as strengthen my scientific background.

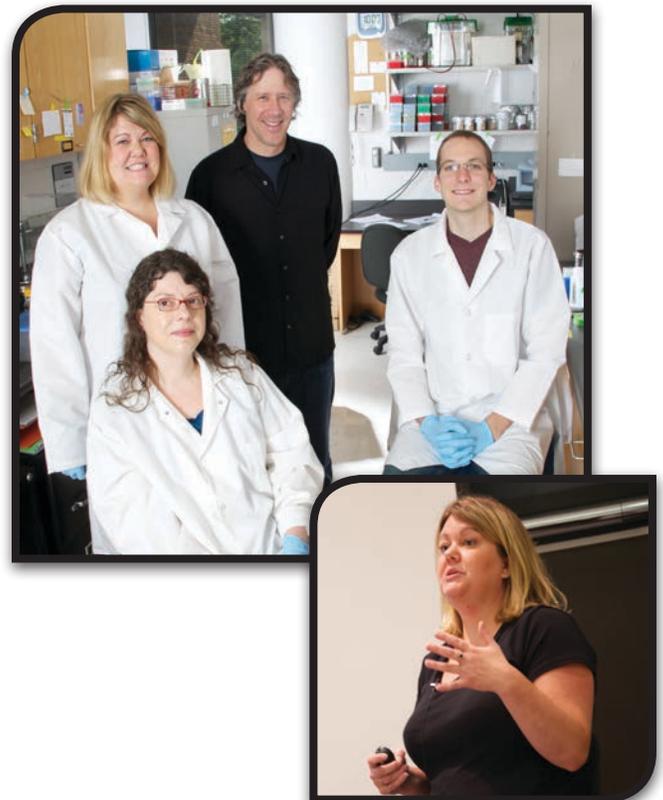
The program has allowed me to make a great research connection with John Kirby, PhD and Susanne Mueller, PhD. We have made plans to continue the project both here at the University of Iowa and at Graceland University. Bringing a student with me this summer has enabled me to bring the project back. Side by side, we have learned the techniques and essential background information to continue our project at Graceland. My student not only learned laboratory techniques, but more importantly has learned about conducting high quality scientific research. Back home, Chris will be able to help me resume the project earlier than if I worked on it by myself. This will allow my senior research students to have the opportunity to work on a collaborative effort that has the potential to be published and/or presented at a scientific meeting. These connections also include faculty from small universities that teach similar classes. We have discussed problems, brainstormed ideas, and compared lesson plans to improve the way we teach.

I have gained knowledge and resources to help advise students in their classes, careers, and research. My research background originally is in mammalian cells and cancer signaling. Working at a small university, I have to teach a wide range of classes and help students conduct small research projects outside of my research background. Through this experience I have strengthened my understanding in two popular areas, microbiology and genetics. My student has also learned about potential graduate programs and different career paths. With his first-hand experience here at the University of Iowa, he will be able to provide insight to other students interested in graduate studies. I have had a wonderful, exciting, and challenging summer. It has been refreshing to be back in the laboratory learning new techniques, analyzing data, and collaborating with scientists involved in cutting edge research. I have had a great summer and look forward to a continued relationship with the University of Iowa."

Mary Shawgo, PhD
Assistant Professor of Biology
FUTURE in Biomedicine Fellow

"By exposing me to the mentality of research, the FUTURE in Biomedicine program has far exceeded any expectations I had leading up to this summer. The experiences my professor and I had in Dr. Kirby's lab went beyond merely conducting research by integrating experimental design, collaborative effort, and fostering a limitless thirst for understanding. For me, these experimental melodies all combined in to one great symphony of scientific discovery. Now, more than ever before, I know my future will consist of composing studies and conducting research."

Christopher Chambers
Student Researcher





MORNINGSIDE COLLEGE - SIOUX CITY, IA

UI Faculty Hosts: Dan Diekema, MD, Professor of Internal Medicine and Tara Smith, PhD, Associate Professor of Epidemiology

Project: Susceptibility of Community- and Hospital-acquired Staphylococcus aureus Isolates to Two Phages

"Quinton Behlers and I worked with two other students over the course of an entire year at Morningside College to assess whether about 100 samples of *Staphylococcus aureus* were susceptible to phages, viruses that kill bacteria. Over the course of two months in the FUTURE in Biomedicine Program in 2013, Quinton and I collected ten times as much data as he and I had been able to, in a year and with the help of two other colleagues, at our small college in Sioux City. The data from our work in the FUTURE in Biomedicine Program will be presented at the Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC) in September 2013. This is a prestigious international conference, and it is very rare for undergraduates to attend. Quinton will be not just attending, but presenting at this conference, because of the FUTURE in Biomedicine program.

Two years ago, I traveled with Morningside student J.P. Conradie to the annual meeting of the American Society for Microbiology, where he was given an award for the research he was presenting there. That research, too, was a result of the FUTURE in Biomedicine program.

The FUTURE in Biomedicine program has given my students the opportunity to present their research at two international conferences, and has resulted in one medical journal article. (So far: Quinton and I are currently preparing our data from our work in the FUTURE in Biomedicine program this summer for submission to a clinical microbiology journal.) The FUTURE in Biomedicine program has given my students access to equipment and materials necessary for conducting high-level biomedical research that are forever out of the reach of a small liberal arts college like Morningside. But the money invested in the FUTURE in Biomedicine program buys much more than just lab supplies. It buys students like Quinton an entirely new perspective. Working for two months with professional scientists—an experience not possible for Quinton had he stayed at an exclusively undergraduate campus like Morningside's—transformed him from a student who wanted to know answers into a scientist who wanted to ask questions. It is this metamorphosis, for Quinton and for so many other students, that I believe will be the FUTURE in Biomedicine program's legacy.

Small undergraduate colleges cannot provide the kinds of research experiences that places like the University of Iowa can. But that does not mean that students at schools like Morningside are uninterested in research. Quinton's countless hours in the under-equipped Morningside College lab last year is just one example of the burning desire that such students have to do research. The FUTURE in Biomedicine program allows those students to follow that desire. The FUTURE in Biomedicine program allows students like mine to make real discoveries about science, and about themselves. I am truly grateful to the FUTURE in Biomedicine program for that opportunity."

Rachel Robson, PhD

*Assistant Professor of Biology
Senior FUTURE in Biomedicine Fellow*

"The FUTURE in Biomedicine program was a great opportunity that allowed us to further our research here at the University of Iowa, Carver College of Medicine. We were given sufficient funding that allowed us to use materials and equipment that was not available for us at Morningside College. This opportunity allowed me to understand more about research, which has influenced what I would like to do with my future career. Along with learning a lot about research, this program allowed me to be able to talk with many people associated with the college to learn more about different careers. Thanks again to Dr. Madeline Shea for giving us the opportunity to participate in the program which allowed me to learn a lot and further our research."

Quinton Behlers

Student Researcher

REFLECTIONS FROM PARTICIPANTS

MOUNT MERCY UNIVERSITY - CEDAR RAPIDS, IA

UI Faculty Host: David Weiss, PhD, Associate Professor of Microbiology

Project: Genetic Analysis of Bacterial Cell Division

"As a professor at a small liberal arts school, it can be difficult to establish a robust research program with so many other demands on your time. The ability to interact with experts as part of the FUTURE program has been incalculable in creating a research project that my undergraduate students can participate in not only this summer but in the future.

Any faculty member wishing to start or build a stronger research program at their school would be hard pressed to find a better opportunity than participating in the FUTURE program at the University of Iowa."

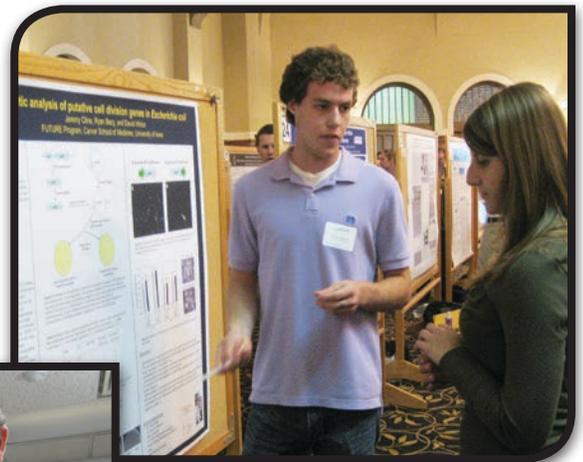
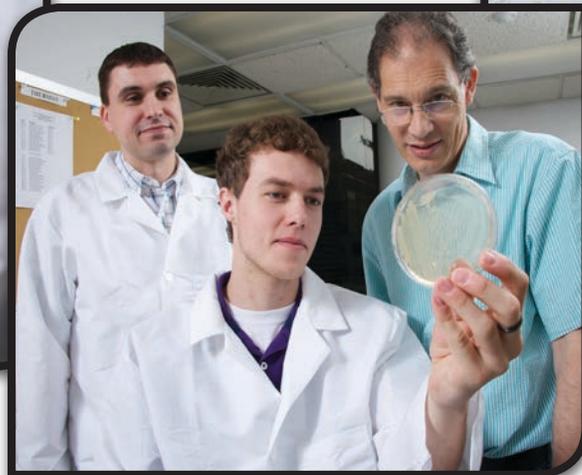
Ryan Bezy, PhD

*Assistant Professor of Biology
FUTURE in Biomedicine Fellow*

"This program taught me a lot; I learned what it is like to work in a lab setting with professionals who are recognized in their field. Most importantly, I learned more about how I learn and what I would like to do after school, and after graduate school."

Jeremy Cline

Student Researcher



UNIVERSITY OF NORTHERN IOWA - CEDAR FALLS, IA

UI Faculty Hosts: Michael Henry, PhD, Associate Professor of Molecular Physiology and Biophysics

Project: Molecular Mechanisms of Prostate Cancer Metastasis

"What I have been intending to do for some time is to gain expertise in the field of mammalian tissue culture of cancer cells, and to test out some hypotheses that were generated by our investigations on pancreatic cancer microarray datasets. The goal was to do these experiments at UNI, which would give our undergraduates valuable research experience. There were two big obstacles to overcome. The first was that it is very difficult to get funding to do research in an area in which one has no prior experience. The second was that even with funding, it is difficult to get a place in a research laboratory, since tissue culture work is highly sensitive to contamination issues, and PI's are reluctant to take in researchers with little experience in the field for a short summer stint.

It would not be an exaggeration to say that the FUTURE program was the only program that was able to solve not one, but both of these issues. I know that Madeline must have used all her persuasive powers to find a place in Dr. Henry's lab for my student Logan and me. As it turned out, the experience was wonderful. Not only did we learn all the intricacies of cell culture, but we also got a lot of "hands on" experience in qPCR and western blotting, two techniques crucial for validation of microarray data.

Apart from these major benefits, there were also many other benefits of the FUTURE program. One of the most important outcomes is that we have now established a collaboration with Dr. Henry, which should lead to more research beyond the summer. I have been at UNI for 8 years, but it is only through the FUTURE program that I was able to establish a meaningful collaboration with faculty members at our fellow regents institution, the University of Iowa. I am also taking with me a lot of very useful information about the graduate programs at UI, which should help me considerably in advising my 20 or so advisees at UNI. This information was obtained primarily through the seminars organized by the FUTURE program, which brought us in contact with the admissions officials of various health-related graduate and clinical programs at the University of Iowa."

Nalin Goonesekere, PhD
Associate Professor of Chemistry
FUTURE in Biomedicine Fellow

"The FUTURE in Biomedicine program has been a wonderful experience. It was a great opportunity to spend time on engaging research outside of my university. The faculty at the University of Iowa help lead you toward your greatest chance at success, both during your summer research and in your academic future."

Logan Poole
Student Researcher



BETTER FUTURES FOR IOWANS

Through the FUTURE in Biomedicine program, the University of Iowa Carver College of Medicine is committed to:

- Fostering closer research collaborations between its faculty and those of primarily undergraduate institutions throughout the state of Iowa.
- Mentoring talented undergraduates who will be our next generation of physicians and biomedical scientists.
- Promoting opportunities to translate biomedical discoveries and methods into educational materials used in Iowa's college classrooms.
- Making its research facilities available to a statewide network of scientist-educators.

Consistent with these commitments, the goal of the Better Futures for Iowans program was to make state-of-the-art core research facilities at the University of Iowa available to academic classes and research projects conducted primarily by undergraduates at 2-year and 4-year institutions in Iowa.

Faculty throughout the state were eligible to apply for small grants to support laboratory-intensive projects involving undergraduate students in "hands-on" inquiry. Students took responsibility for the preparation of samples and analysis of data obtained. All participants were invited to present a poster about their work at the FUTURE in Biomedicine Research Symposium. This activity, which was supported primarily by the Office of the Provost, extended University resources to Iowans and addressed an important goal of the University Strategic Plan—to provide better futures for Iowans.

2013 GRANT RECIPIENTS

COE COLLEGE	Paul Storer, PhD Assistant Professor of Biology	<i>Expression of CGRP and procalcitonin by an astrocyte cell line: implications for migraine</i>
DORDT COLLEGE	Robbin Eppinga, PhD Assistant Professor of Biology	<i>Identification of Myosin Va Interacting Proteins Using a Yeast-Two-Hybrid Assay</i>
DRAKE UNIVERSITY	Abebe Mengesha, PhD Assistant Professor of Pharmaceutical, Biomedical and Administrative Sciences	<i>Thermosensitive monoglycerides blend for local delivery of chemotherapeutic agents</i>
	Adina Kilpatrick, PhD Assistant Professor of Physics	<i>Thermodynamic analysis of the calmodulin – ryanodine receptor interaction using FRET</i>
	Jerry Honts, PhD Associate Professor of Biology	<i>Confocal Laser Scanning Fluorescence Microscopy of GFP-Tgged Cytoskeletal Proteins in Tetrahymena</i>
LUTHER COLLEGE	S. Brookhart Shields, PhD Assistant Professor of Biology	<i>Identification of Receptors Involved in the Autophagic Pathway in Yeast</i>
MOUNT MERCY UNIVERSITY	Alesia Hruska-Hageman, PhD Assistant Professor of Biology	<i>Identifying candidate genes causing glaucoma by protein interactions using a yeast 2-hybrid screen</i>
	Joseph Nguyen, PhD Assistant Professor of Chemistry	<i>Characterizing dual infection and superinfection inhibition with confocal and electron microscopy</i>
SIMPSON COLLEGE	Jackie Brittingham, PhD Professor of Biology	<i>The role of Wnts in axis patterning of Nematostella, the starlet sea anemone</i>
WALDORF COLLEGE	Gary Coombs, PhD Assistant Professor of Biology	<i>Identification of Actinomycetes from Amazon river basin soil samples by 16S rRNA sequencing</i>

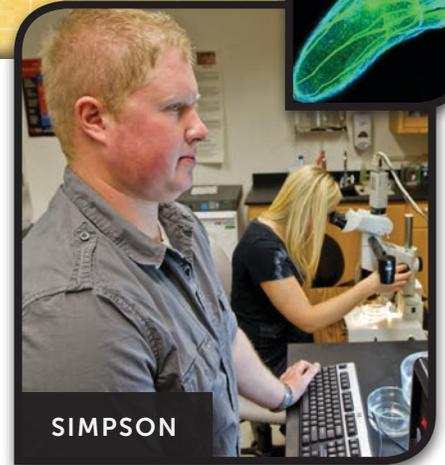


"During the Fall of 2012 and Spring of 2013 undergraduates Maddie Besack and John Greaves investigated the molecular cues directing diploblastic development in the starlet sea anemone, *Nematostella vectensis*. They mastered the unique animal handling techniques, essential elements of the experimental design and data acquisition approaches for investigating the cues responsible for patterning during embryonic development in this interesting novel model organism.

The main goals for the students were to expand their understanding of the embryonic anatomy of this unusual organism and begin to dissect the molecular pathways directing its unique body plan. Confocal microscopy enabled them to understand the three dimensional anatomical complexity of this organism and identify aberrant morphogenic patterns in a manner that was not possible at Simpson College.

Without a doubt, the BFFI grant and the access to the CMRF facilities at the University of Iowa were key to enabling John and Maddie to characterize never-before seen morphogenetic changes in this organism in response to powerful disruptors of development. These results were not only exciting to the members of my research laboratory, but have the potential to be of significance to other work in this discipline.

The BFFI grant allowed two very motivated undergraduate students the opportunity to not only learn the basics of confocal microscopy, but also provided them with the opportunity to dream about how this technology might direct their future research. They now understand how to design experiments that can exploit the powers of confocal microscopy to visualize the morphology of embryos during both normal and abnormal development."



Jackie Brittingham, PhD
BFFI Awardee, Simpson College

"Maddie and I made a great team for this project. We are both very motivated students and together we were very successful and got a lot accomplished. I would have to say my most exciting moment of the project was getting to use the confocal microscope at the University of Iowa, but a close second was presenting at the Simpson Symposium in front of my peers and the faculty members. Thank you very much!"

John Greaves
Undergraduate Researcher, Simpson College



"This research project focused on identifying the proteins that are required for the autophagy in yeast. Autophagy, or 'self-eating,' is the process in which a cell engulfs cytosol or organelles within a vesicle that then fuses with the vacuole, the same organelle as the mammalian lysosome. Once within the vacuole, the vesicles and their contents are broken down and recycled for reuse by the cell.

The BFFI grant provided important support in the beginning stages of this project. The grant funded the sequencing of several of the necessary plasmids that are the foundation of the project. Additionally, the grant was used to purchase DNA oligonucleotides used to construct and sequence plasmids.

Two students, Julia Mandsager and Sarah Floden, have been involved in all aspect of this project. Both students were surprised by how quick it was to get such large volumes of data from the DNA Facility. It has taken quite a bit of time to analyze the data obtained but both students are now quite proficient at it"

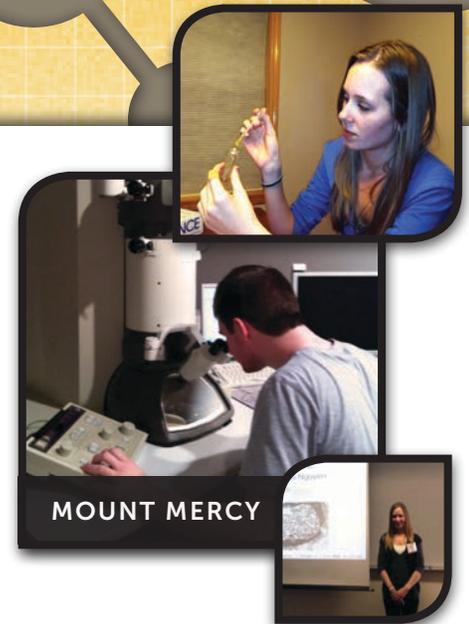
S. Brookhart Shields, PhD
BFFI Awardee, Luther College

BETTER FUTURES FOR IOWANS

"The purpose of this project was to study and characterize dual infection and superinfection inhibition of cells using scanning confocal microscopy and transmission electron microscopy. Hosts can be infected with multiple herpesviruses, known as superinfection; however, superinfection of cells is rare due to the phenomenon known as superinfection inhibition.

Superinfection is believed to be one factor that has helped many viruses to become more virulent, especially to vaccinations. If we can understand the role that dual infection and superinfection has on the viral replication cycle, we can see how it has led to greater virulence over a short period of time. Thus, characterizing and understanding dual infection and superinfection inhibition of cells is an essential first step to better understand how MDV is evolving as to increase the effectiveness of vaccines.

Recently, fluorescently tagged viruses were developed so they can be tracked in the feather follicle epithelial skin cells for easy identification. However, it is essential to better identify the viruses infecting the feather follicles using transmission electron microscopy (TEM). Thus, it is important for us to be able to correlate the information obtained from confocal microscopy with those obtained with electron microscopy, and our work is one of the first attempts to correlate information from both techniques."



Joseph Nguyen, PhD
BFFI Awardee, Mount Mercy University

"Undergraduate students were utilized to process cultured C8-D1A astrocytes (ATCC) for fluorescent immunocytochemistry targeting proteins responsible for the uptake and maintenance of glutamate levels in the extracellular space. The effect of estrogen treatment on the levels of these proteins was determined in an effort to elucidate the neuroprotective influence of estrogen in conditions of traumatic injury and neurodegeneration.

These students were involved with all levels of protocol, starting from the establishment of the sterile cultures to the final analysis. The students are trained to master skills and protocols and then consequently be able to work in an independent manner to analyze results and present results in various form. The work they did on the confocal microscope at CMRF was the culmination of weeks of training and independent research that really gave these students a unique experience that we feel is so special here at Coe College."



Paul Storer, PhD
BFFI Awardee, Coe College

"The three dimensional tool that took pictures of various slices of the cells also aided us in visualizing the cells and understanding the results received from the microscope at Coe College. The opportunity to visit the University of Iowa and use the confocal microscope was a great experience that allowed us to enjoy learning new techniques that we could then use to aid in our research later."

Haley Sandoe
Undergraduate Researcher, Coe College

"Using the confocal microscope at the University of Iowa was a great experience. We had made slides with NIH-3T3 Fibroblasts and astrocytes, staining with Connexin and anti-Actin antibodies; these slides were viewed on the microscope, and the images we were able to capture were very good."

Ryan Lechtenberg
Undergraduate Researcher, Coe College

"The goal of this project was to understand the energetics of interaction between the calcium-binding protein calmodulin (CaM) and the calmodulin-binding domain of the ion channel ryanodine receptor (RyR). The equilibrium constants of CaM binding to various sequences in the RyR CaM-binding domain are determined using FRET (Fluorescence Resonance Energy Transfer) in a biosensor containing yellow and cyan fluorescent proteins."

Adina Kilpatrick, PhD
BFFI Awardee, Drake University



"This year was my first true research experience and it was cool to be part of a team that is just starting a project. This project aims to develop a system to analyze calmodulin recognition of the ryanodine receptor using Fluorescence Resonance Energy Transfer (FRET) in a biosensor construct. Once a construct is developed, we can use FRET to determine how calmodulin interacts with the ryanodine receptor in abnormal situations, such as when there is a mutation in the calmodulin sequence. Without the generous Better Futures for Iowans grant for the biosensor, we would not have been able to start this project."

Amanda Marwitz
Undergraduate Researcher, Drake University

"Before this past semester, I had no experience in a research setting. What I enjoyed most about this experience was being able to use things that I'd learned in other classes and apply them in the research setting. Concepts and techniques taught in class are sometimes hard to picture in a real world setting, so it was cool to see them put to use. It was also interesting to see that using these techniques is not always as easy as they sound. There is a lot of trial and error involved in research that I didn't expect."

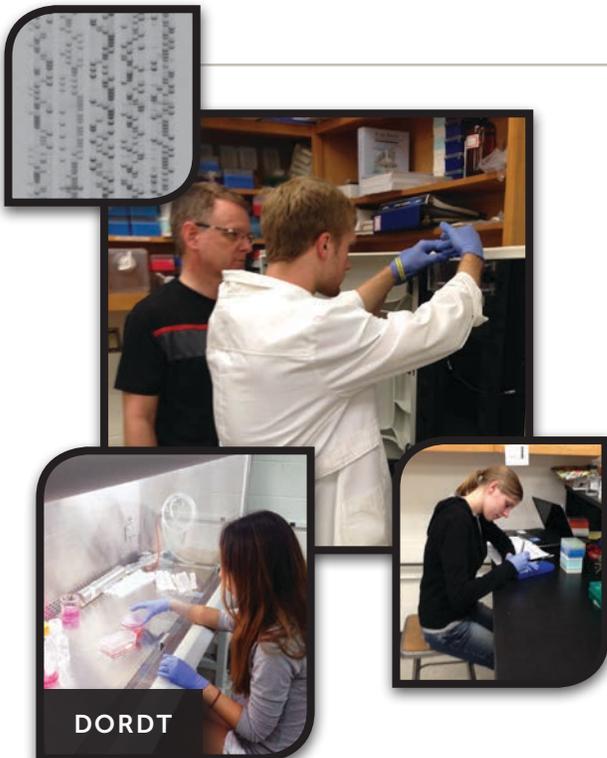
Alex Wagner
Undergraduate Researcher, Drake University

"Our undergraduate students studied a collection of clones from an initial Y2H screen for proteins that interact with a myosin protein. Each student was assigned 3 clones in yeast, which they characterized by doing plasmid isolation from yeast, transformation of *E. coli*, plasmid isolation and quantitation, restriction analysis, DNA sequencing (conducted at the University of Iowa DNA Core), and BLAST analysis to identify and characterize the clones.

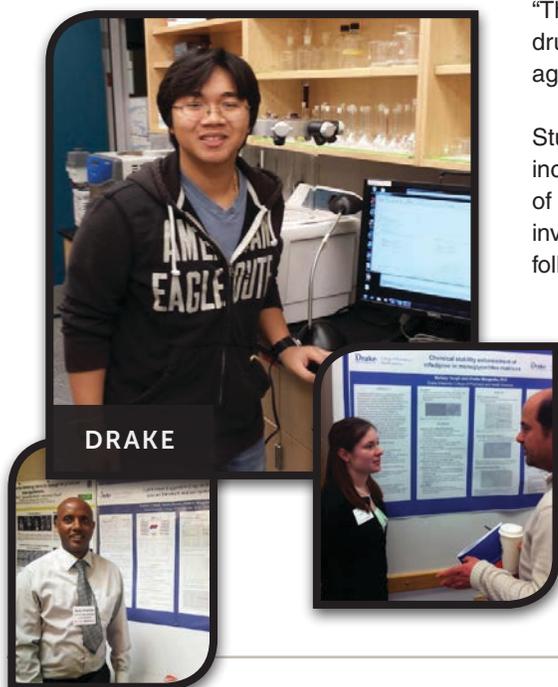
The students operated in teams, using the lab space on a staggered schedule depending on their level of experience. This approach allowed them to take ownership of their projects, troubleshoot problems, and learn techniques independently. By staggering the use of lab space and facilities, more of them could work on their own, while less experienced students could use the regular time block with more instructor availability.

This lab was a positive learning experience. The students got a better feel for the nature of scientific research, gained independence in the lab and were more invested in obtaining results than in a standard undergraduate 3-hour laboratory exercise."

Robbin Eppinga, PhD
BFFI Awardee, Dordt College



BETTER FUTURES FOR IOWANS



DRAKE

"The goal of the project was to design a stimuli-sensitive, monoglycerides-based local drug delivery system that can be triggered externally to release the chemotherapeutic agents 'on-demand' so as to improve treatment and reduce toxicities.

Students have actively and meaningfully participated in various areas of the project including: evaluation of the matrix for thermo-responsive properties; characterization of polymorphism and crystal behavior; assessment of the phase behavior; and investigation of the effect of drugs, excipients and moisture on those properties. The following Drake undergraduate students were involved in the project: Mallory Tough, Natalie Benson, Hannah Stonewall, Paul Choeun.

Student Paul Choeun worked in the lab using differential scanning calorimetry (DSC) equipment. Student Mallory Tough presented a poster at DUCURUS. The poster was also presented at IAS 2013, Future in Biomedicine Symposium 2013 and AAPS 2013. I participated and presented a poster at the FUTURE in Biomedicine symposium."

Abebe Mengesha, PhD
BFFI Awardee, Drake University

"The goals of the project were to identify candidate genes causing glaucoma by identifying potential proteins that interact with the protein SH3PXD2B by performing a yeast two-hybrid screen. My student, James Estipona, and I discussed how to design a cloning strategy with the plasmids we had from the yeast two-hybrid kit and the plasmids containing sequences from Kacie Meyer, a postdoc in Michael Anderson's lab at the University of Iowa. James designed primers to use for the cloning and upon confirmation, they were ordered and he began cloning the bait plasmid for the yeast two-hybrid screen.

He designed and began cloning two different bait plasmids that would contain two different SH3 domains of SH3PXD2B and mutations of these domains. James performed all the steps in the cloning strategy and we periodically discussed progress, any trouble shooting to try, and he was always asked to interpret his results. Ligation reactions produced plasmids that were transformed into bacteria, minipreps were prepared, and James checked for the insert in the plasmid by restriction enzyme digest. Once we had confirmation of the insert, James prepared reactions for DNA sequencing at the University of Iowa DNA facility.

James has presented his research as an oral presentation at Mount Mercy University's Scholarship festival this spring 2013. He will be presenting a poster on his new findings on Aug. 2nd at the FUTURE in Biomedicine Research Symposium. James has funding from the R. J. McElroy Trust to continue to work on this research project during the school year and will present any new findings at their spring 2014 symposium and at the Annual Iowa Academy of Science meeting in April 2014."

Alesia Hruska-Hageman, PhD
BFFI Awardee, Mount Mercy University



MOUNT MERCY

"A portion of the funds awarded were used to sequence 16S rRNA genes from novel microorganisms and a collection of actinomycetes isolated from soil collected in the Amazon River basin, Pacaya Samiria National Reserve, Peru. These soil microbe studies were directed by Ashley Lutrick, as a senior research project. Students enrolled in the Spring 2013 Genetics course (Anson Frederick, Jessica Godwin, Andrew Hudson, and Delroy Nichols) participated as well.

These students tested several methods of purifying genomic DNA samples for PCR of each microbe's 16S rRNA gene. Ashley used the sequencing data from the University of Iowa DNA facility to conduct searches in NCBI Blast, and tentatively identify each species or most closely related species. One actinomycete isolated in these studies is of particular interest. It is white, or cream colored, and secretes a water soluble orange pigment. In screens for antibacterial activity, it was found to kill or inhibit growth of a methicillin resistant strain of *Staphylococcus aureus*, and to kill or inhibit growth of *Streptococcus pyogenes* with exceptionally high potency by the Kirby Bauer assay.

The remaining funds were used to sequence 16S rRNA genes from anaerobes isolated from soil samples also collected in the Amazon River basin, Pacaya Samiria National Reserve, Peru. These samples were collected by Samantha Sylvara from locations that span a range of altitudes within a flood plain. All PCR reactions were successful and 48 sequences were submitted for sequencing. BLAST searches and analyses are currently underway."



Gary Coombs, PhD

BFFI Awardee, Waldorf College

"Using mass spectrometry, we have identified the genes encoding about three dozen different proteins in the membrane-associated cytoskeleton of the ciliated protozoan *Tetrahymena*. Of these, more than half have been engineered to be tagged with variants of Green Fluorescent Protein. While all of these have been analyzed by means of conventional epifluorescence microscopy, it is often difficult to assess the full distribution of protein within these large cells at high magnification because of the narrow focal plane. High resolution 3D imaging of a cell can be accomplished by means of confocal laser scanning fluorescence microscopy.

To do this we used the Bio-Rad Radiance 2100 MP (Carl Zeiss Microimaging Inc.) mounted to a Nikon E800 microscope in the Central Microscopy Research Facility in the Eckstein Medical Research Building. Initial data from this study was presented at the Midwest Protozoology meeting at Bradley University in late April. This data was also presented at FUTURE in Biomedicine symposium in July and at the ASCB national meeting in December. An invited talk based on this research was given at the Iowa Microscopy Society meeting in Iowa City in October."

Jerry Honts, PhD

BFFI Awardee, Drake University

"The opportunity to use the confocal microscope at the University of Iowa was a privilege. This experience allowed me to use a piece of equipment which is too costly for other universities. Confocal microscopy is an imaging technique which increases resolution through the blocking of background light. This gives confocal microscopy several advantages over other types of microscopy.

To obtain high quality images, I had to learn and understand what to tweak on the program. I developed an understanding of when to change the gain, pin hole, iris, and laser strength to collect quality data. These adjustments really made me apply the concepts that I learned during training. Through the use of the microscope, I left with a much clearer view of the distribution of different cytoskeletal proteins in *Tetrahymena thermophila*. The data that was collected then was used to make movies and three dimensional models through Imaris."

Robert Sterner

Undergraduate Researcher, Drake University



CELEBRATING FIVE YEARS

Partnerships with the University of Iowa's FUTURE in Biomedicine have included professors of chemistry, biology, and psychology at some of the state's leading institutions. Since 2009, FUTURE in Biomedicine has now connected 25 fellows at 17 Iowa institutions and continues to expand each year.

PAST PARTICIPANTS

2009

Coe College

Randy Christensen, PhD
Brandon Hoffer
Anton McCaffrey, PhD

Drake University

Jerry Honts, PhD
Madeline Shea, PhD

Graceland University

Dan Pratt, PhD
Ryan Sheehy
Ray Hohl, MD, PhD

Loras College

David Speckhard, PhD
Sujan Devbhandari
Rob Piper, PhD

Luther College

Jodi Enos-Berlage, PhD
Aimee Villard
Linda McCarter, PhD

Northwestern College

Karissa Carlson, PhD
Alex Menning
Marc Wold, PhD

St. Ambrose University

Shannon Mackey, PhD
Lori Wallrath, PhD

2010

Drake University

Chinh Dao, PhD
Randi Rumbold
Fred Quelle, PhD

Loras College

K. Mac McLaughlin, PhD
Stephen Brandt
Natalie Denburg, PhD

Morningside College

Rachel Robson, PhD
Johan P. Conradie
Alexander Horswill, PhD

Wartburg College

Shawn Ellerbroek, PhD
Molly Wernli
Kris DeMali, PhD



2011

Buena Vista University

Kristy McClellan, PhD
Caitlin Hof
Pamela Geyer, PhD

Coe College

Maria Dean, PhD
Katelyn Marshall
Sheila Baker, PhD

Cornell College

Barbara Christie-Pope, PhD
Federica Ot'alora-Roselli
Robert A. Cornell, PhD

Mount Mercy University

Joseph Nguyen, PhD
Molly First
Richard Roller, PhD

Waldorf College

Gary Coombs, PhD
Cody Barnes
Dawn Quelle, PhD

Wartburg College

Stephanie Toering Peters, PhD
Islam Qadous
C. Andrew Frank, PhD

2012

Coe College

Paul Storer, PhD
Molly Schlichenmayer
Andrew Russo, PhD

Dordt College

Kayt Frisch, PhD
Lee Veldkamp
Eric Hoffman, PhD

Drake University

Debora Christensen, PhD
Kristin Dahlem
Deborah L. Segaloff, PhD

Hawkeye Community College

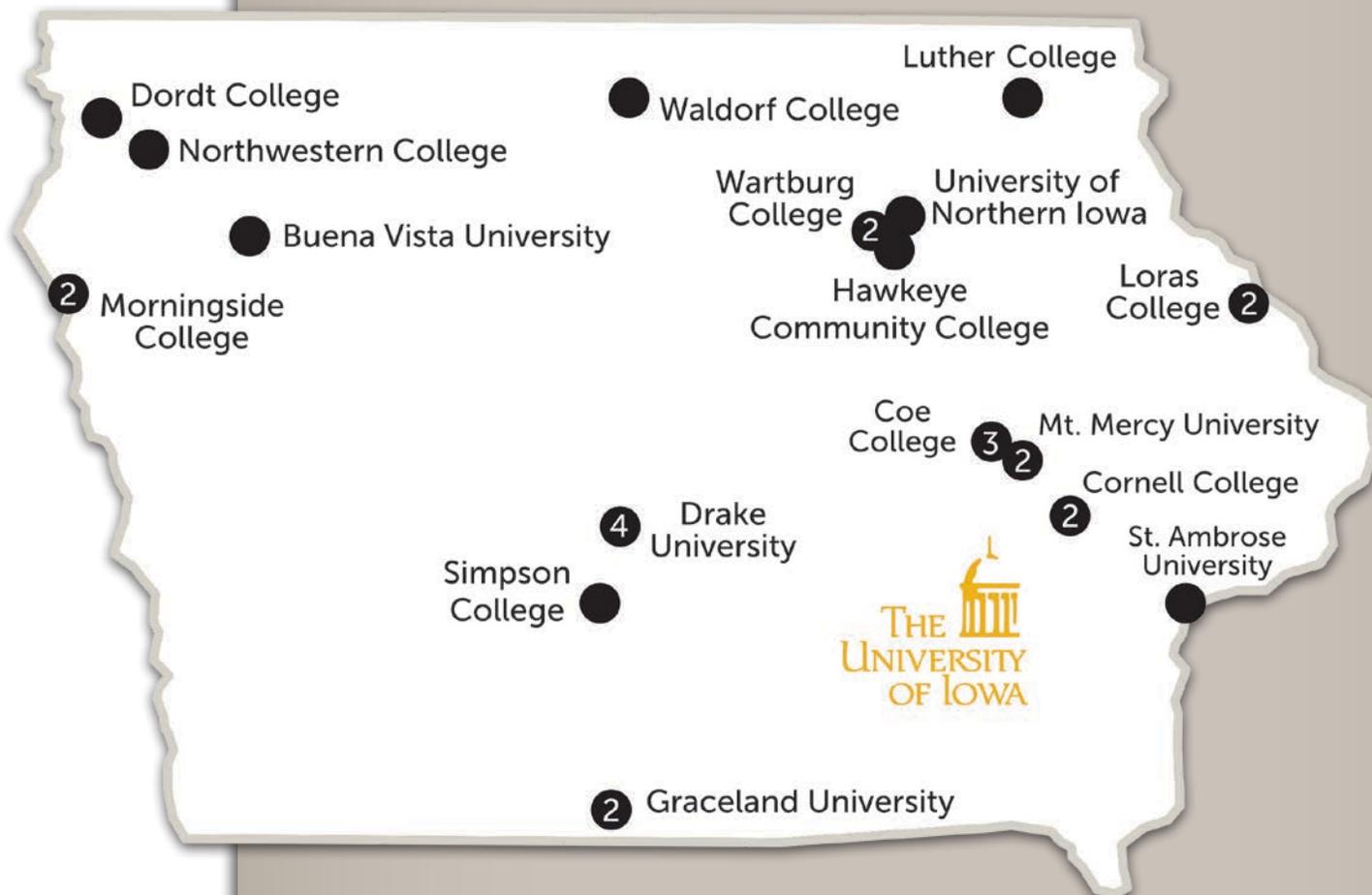
D. Randy Mercer, PhD
Quynh Nguyen
Wendy Maury, PhD

Simpson College

Justin Brown, PhD
Emily Magers
Kathleen A. Sluka, PhD, PT



2009-2013 PARTICIPANTS



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UNIVERSITY OF IOWA
CARVER COLLEGE
OF MEDICINE

University of Iowa Health Care

University of Iowa
Roy J. and Lucille A. Carver College of Medicine
Office of the Dean
200 Medicine Administration Building
Iowa City, IA 52242

(319) 335-8587
www.medicine.uiowa.edu/future