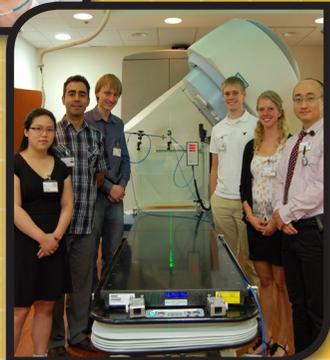




FUTURE

IN BIOMEDICINESM PROGRAM

Fostering Undergraduate Talent -
Uniting Research and Education



2014



UNIVERSITY OF IOWA
CARVER COLLEGE
OF MEDICINE

University of Iowa Health Care

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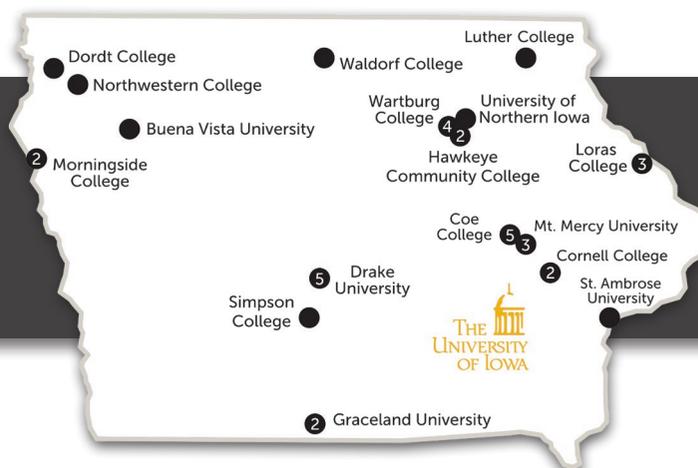
FROM THE DIRECTOR

The FUTURE - Fostering Undergraduate Talent – Uniting Research and Education - in Biomedicine Program of the UI 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 UI Carver College of Medicine with our colleagues at primarily undergraduate institutions.

This annual report describes many of the exciting activities of the 6th Annual FUTURE in BiomedicineSM Program. First-time Faculty Fellows in the class of 2014 came from **Coe College** and **Loras College**. Returning Senior Faculty Fellows were from **Drake University, Hawkeye Community College, Mount Mercy University, and Wartburg College**. This year we had first-time Visiting Fellows from **Drake University** and **Graceland 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 Anatomy and Cell Biology, Biochemistry, Microbiology, and Radiation Oncology hosted participants.

2009-2014 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. Eight awards were made for the Central Microscopy Facility, Genomics for sequencing, Nuclear Magnetic Resonance Facility and High Resolution Mass Spectrometry. Students will participate in sample preparation and 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 UI Carver College of Medicine faculty they met while in residence on our campus. Past Fellows have conducted subsequent sabbatical

Since 2009, FUTURE in BiomedicineSM has now connected 29 fellows at 17 Iowa institutions and continues to expand each year.

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

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 2014 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 2014!

We thank all of the individuals who applied to the FUTURE in BiomedicineSM 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 BiomedicineSM Program.

Sincerely,

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

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

CLASS OF 2014



Above: Carver College of Medicine Dean Debra Schwinn, MD (left) with the Class of 2014 Fellows and Students



COE COLLEGE

FUTURE in BiomedicineSM Fellow:

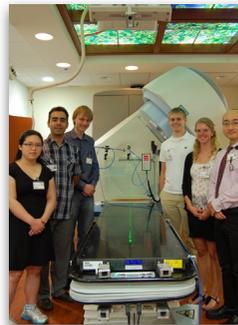
Michael Leonardo, PhD
Associate Professor of Biology

Student Researcher:

Chas Messer

UI Faculty Host:

Linda McCarter, PhD
Professor of Microbiology



COE COLLEGE

FUTURE in BiomedicineSM Fellow:

Ugur Akgun, PhD
Assistant Professor of Physics

Student Researchers:

David Pritchett and Amy Dong

UI Faculty Host:

Dongxu Wang, PhD
Assistant Professor of
Radiation Oncology



DRAKE UNIVERSITY

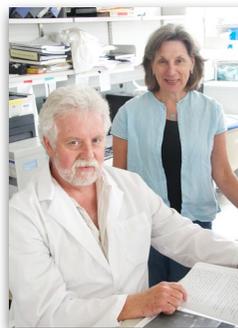
FUTURE in BiomedicineSM

Senior Fellow:

Jerry Honts, PhD
Associate Professor of Biology

UI Faculty Host:

Madeline Shea, PhD
Professor of Biochemistry



HAWKEYE COMMUNITY COLLEGE

FUTURE in BiomedicineSM

Better Futures for Iowans Fellow:

D. Randy Mercer, PhD
Instructor of Natural Sciences

UI Faculty Host:

Wendy Maury, PhD
Professor of Microbiology



LORAS COLLEGE

FUTURE in BiomedicineSM Fellow:

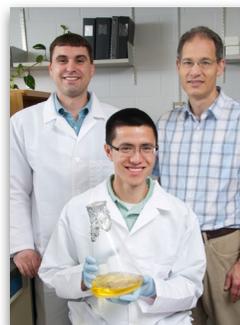
Adam Moser, PhD
Assistant Professor of Chemistry

Student Researcher:

Jason Derby and Alexis Hanson

UI Faculty Host:

Adrian Elcock, PhD
Professor of Biochemistry



MOUNT MERCY UNIVERSITY

FUTURE in BiomedicineSM

Senior Fellow:

Ryan Bezy, PhD
Assistant Professor of Biology

Student Researcher:

David Stanek

UI Faculty Host:

David Weiss, PhD
Associate Professor of Microbiology



WARTBURG COLLEGE

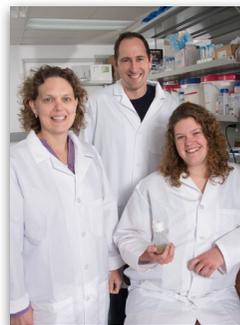
FUTURE in BiomedicineSM

Senior Fellow:

Shawn Ellerbroek, PhD
Otto Professor in Chemistry

UI Faculty Host:

Kris DeMali, PhD
Associate Professor of Biochemistry



WARTBURG COLLEGE

FUTURE in BiomedicineSM

Senior Fellow:

Stephanie Toering Peters, PhD
Associate Professor of Biology

Student Researcher:

Jessa Bidwell

UI Faculty Host:

C. Andrew Frank, PhD
Assistant Professor of Anatomy and Cell Biology

Visiting Fellows



DRAKE UNIVERSITY

FUTURE in BiomedicineSM

Visiting Fellow:

Adina Kilpatrick, PhD
Assistant Professor of Physics



GRACELAND

UNIVERSITY

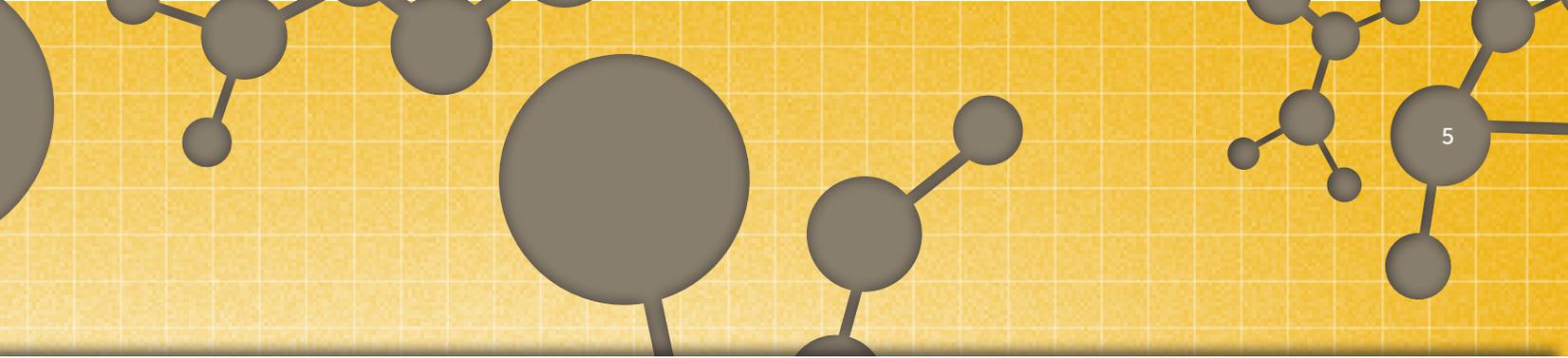
FUTURE in BiomedicineSM

Visiting Fellow:

Mary Shawgo, PhD
Assistant Professor of Biology and Chemistry

SUMMER 2014 FUTURE IN BIOMEDICINE EVENTS & MEETINGS

MAY 28	<p>Orientation Day for the Class of 2014 Welcome and Tours of Research Core Facilities, followed by photos with Host Faculty Lunch with Deans, Host PI's, lab members, Alumni Fellows & Hosts</p>
JUNE 2	<p>UI Graduate Programs in Biomedical Sciences Ms. Jodi Graff, MA, Biomedical Programs Administrator, Assistant to the Associate Dean for Graduate and Postdoctoral Studies</p>
JUNE 4	<p>Biosciences Survival Skills Workshop for Young Researchers</p>
JUNE 7	<p>Iowa Biochemistry Workshop – Computational Biophysics Organized by Associate Professor Ernie Fuentes. Presented in part by FUTURE Fellows Ugur Akgun and Adam Moser.</p>
JUNE 9	<p>Overview of Iowa Institute of Human Genetics - Research, Outreach, Training Internships Dr. Colleen Campbell, PhD, MS, CGC (Genetic Counseling)</p>
JUNE 16	<p>FUTURE Faculty Talks – Senior Fellows present UI Collaborative Research Talks by current Senior Fellows describe projects that are underway with UI laboratories</p>
JUNE 23	<p>Panel Discussion by FUTURE Faculty Fellows – Introducing Schools Followed by a FUTURE in BiomedicineSM dinner in downtown Iowa City</p>
JUNE 30	<p>Panel on Training to be a Physician, Physician Assistant, or Physical Therapist MD - Ms. Kathlene Huebner, Director of Admissions for MD program of the Carver College of Medicine PA - Assistant Dean David Asprey, representing Physician Assistant Program PT - Kelly Sass, representing Physical Therapy and Rehabilitative Science Program</p>
JULY 7	<p>FUTURE Faculty Fellows - Midsummer Research Progress & Alumni Talks Talks by current Fellows concentrate on background material and preliminary findings</p>
JULY 14	<p>Panel Discussion by FUTURE Faculty Fellows on Careers at Liberal Arts Colleges Presented for the benefit of UI Graduate Students and Postdoctoral Fellows</p>
JULY 21	<p>Overview of Medical Scientist Training Program (MSTP) UI MD/PhD program funded by the National Institutes of Health. Program Administrator Leslie Harrington, and MSTP Student representatives</p>
JULY 28	<p>Student Presentations for Research Symposium Students present draft SURC/FUTURE posters as a talk</p>
JULY 30	<p>Summer Undergraduate Research Conference (SURC) Iowa Memorial Union Students present posters at this event organized by the University of Iowa Graduate College</p>
AUGUST 1	<p>Luncheon and Certificates for FUTURE in BiomedicineSM Fellows and Students</p> <p>FUTURE in BiomedicineSM Research Symposium Faculty Fellows talks, and students present posters. FUTURE in Biomedicine Alumni and their current students are invited to present.</p>



SUMMER 2014 BIOSCIENCES PROGRAM UNDERGRADUATE SEMINAR SERIES

MAY 29	Welcome Reception All students participating in biomedical summer research programs attend	
JUNE 5	Tina Tootle, PhD Assistant Professor of Anatomy and Cell Biology	<i>Using Drosophila to Study Human Diseases</i>
JUNE 12	Deborah Dawson, PhD Professor of Pediatric Dentistry	<i>Elements of Design: How Statistics Can Help You Optimize Your Research Efforts</i>
JUNE 19	John Kirby, PhD Professor of Microbiology	<i>Xenobiotics Alter the Human Microbiome</i>
JUNE 26	David Lubaroff, PhD Professor of Urology	<i>Cancer Immunotherapy Research: A Journey Taken from the Lab to the Bedside</i>
JULY 3	Justin Grobe, PhD Assistant Professor of Pharmacology	<i>Identification of Novel Diagnostics and Therapeutic Targets for the Late-Pregnancy Cardiovascular Disorder, Preeclampsia</i>
JULY 10	Andy Russo, PhD Professor of Molecular Physiology and Biophysics	<i>Regulation and Role of the Neuropeptide CGRP in Migraine</i>
JULY 17	Jon Houtman, PhD Associate Professor of Microbiology	<i>The Role of Fak in T Cell Activation: How Being Wrong is Sometimes a Good Thing</i>
JULY 24	Charles Brenner, PhD Professor, Chair and DEO, Department of Biochemistry	<i>Metabolic Control of Gene Expression</i>
JULY 30	Farewell Reception All students participating in biomedical summer research programs attend	
JULY 31	Howard Xue, MD, PhD Associate Professor of Microbiology	<i>Transcriptional Regulation of T Cell Development by Tcf1 and Lef1</i>

FALL 2014 EVENTS

SEPTEMBER 26	Iowa Microscopy Society Meeting
OCTOBER 3	67th Annual Pre-Medical School Conference 6th Annual Biomedical Pre-Graduate School Conference

EVENTS

ORIENTATION DAY

Wednesday, May 28, 2014



UI GRADUATE PROGRAMS IN BIOMEDICAL SCIENCES

Monday, June 02, 2014

Presented by Ms. Jodi Graff, MA, Biomedical Programs Administrator, Assistant to the Associate Dean for Graduate and Postdoctoral Studies



OVERVIEW OF IOWA INSTITUTE OF HUMAN GENETICS

Monday, June 09, 2014

Presented by Colleen Campbell, PhD, MS, CGC (Genetic Counseling)



Personalized Genomic Medicine (PGM) & My Role in the IIHG

- Intersection of Molecular Genetics & Genetic Counseling
 - Unique perspective in the development, implementation and interpretation of whole exome and whole genome genetic tests
- Develop Genetic Counseling Protocols
 - Counseling
 - Education materials
 - Reports
- Develop Education Materials
- Implement Clinical Exome Sequencing Test
- Ethics Policy Findings



EVENTS

PANEL DISCUSSION BY FUTURE FACULTY FELLOWS

Monday, June 23, 2014

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

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

Monday, June 30, 2014

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



CAREERS PANEL

Monday, July 14, 2014

The Careers Panel discussion was presented by the 2014 FUTURE in BiomedicineSM Faculty Fellows and open for UI Graduate Students and Postdoctoral Fellows to attend.



OVERVIEW OF MEDICAL SCIENTIST TRAINING PROGRAM (MSTP)

Monday, July 21, 2014

Presented by Program Administrator Leslie Harrington, and MSTP student representatives



EVENTS

SUMMER UNDERGRADUATE RESEARCH CONFERENCE

Wednesday, July 30, 2014

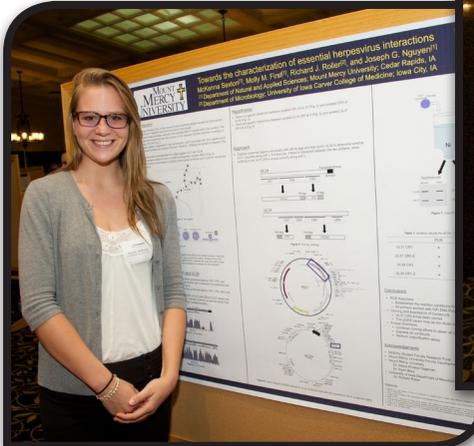
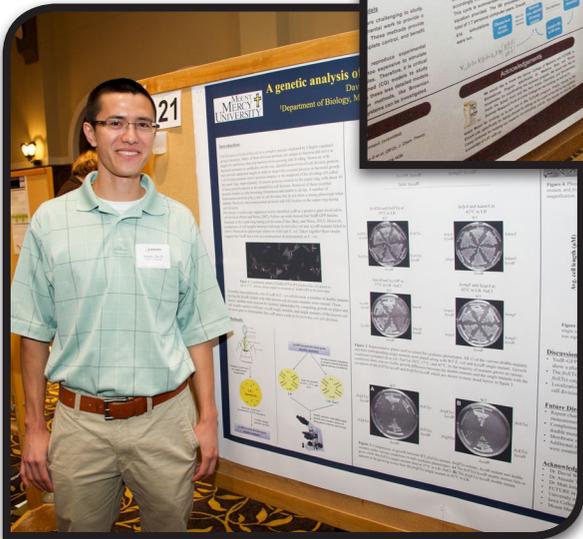
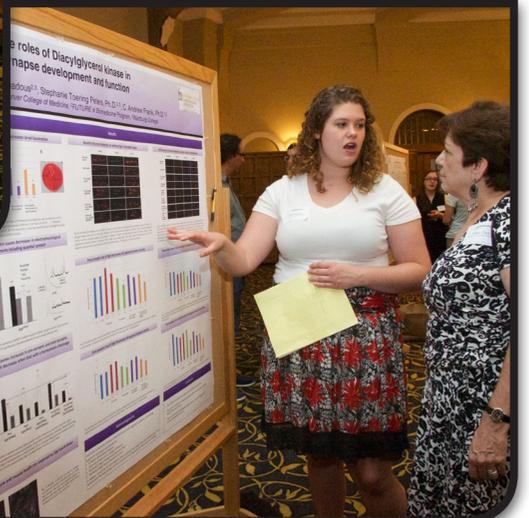
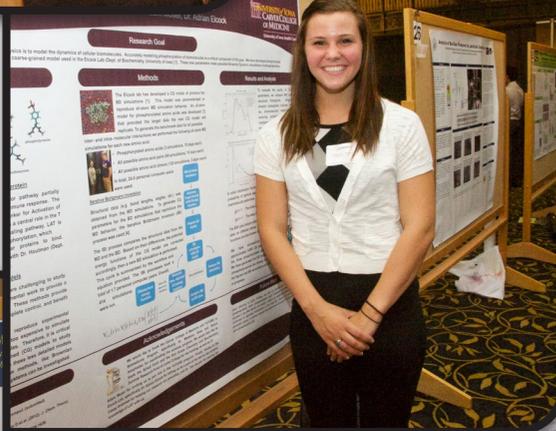
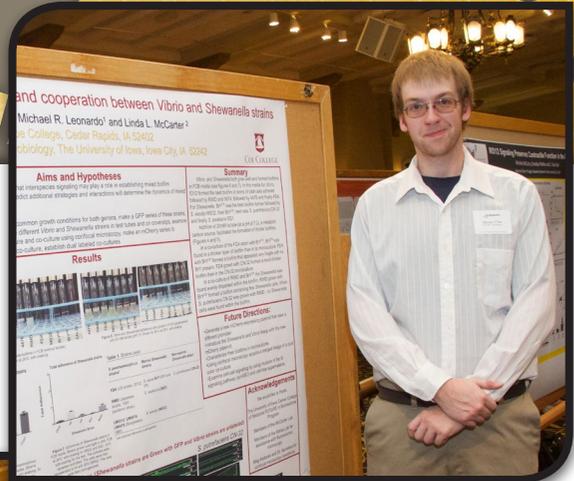
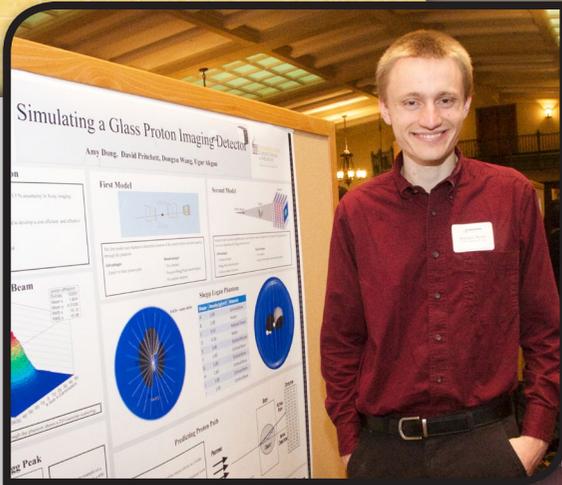
FUTURE IN BIOMEDICINE STUDENTS

COE COLLEGE	Amy Dong and David Pritchett FUTURE in Biomedicine SM Fellow: Ugur Akgun, PhD UI Faculty Host: Dongxu Wang, PhD, Assistant Professor of Radiation Oncology	<i>Simulating a Glass Proton Imaging Detector</i>
	Chas Messers FUTURE in Biomedicine SM Fellow: Michael Leonardo, PhD UI Faculty Host: Linda McCarter, PhD, Professor of Microbiology	<i>Mixed Strain Biofilms: Competition and Cooperation Between Vibrio and Shewanella Strains</i>
LORAS COLLEGE	Jason Derby and Alexis Hanson FUTURE in Biomedicine SM Fellow: Adam Moser, PhD UI Faculty Host: Adrian Elcock, PhD, Professor of Biochemistry	<i>Developing Force Fields for Coarse- Grained Phosphoprotein Simulations</i>
MOUNT MERCY UNIVERSITY	David Stanek FUTURE in Biomedicine SM Senior Fellow: Ryan Bezy, PhD UI Faculty Host: David Weiss, PhD, Associate Professor of Microbiology	<i>A Genetic Analysis of the Role of yedR in Escherichia coli Cell Division</i>
WARTBURG COLLEGE	Jessa Bidwell FUTURE in Biomedicine SM Senior Fellow: Stephanie Toering Peters, PhD UI Faculty Hosts: C. Andrew Frank, PhD, Assistant Professor of Anatomy and Cell Biology	<i>The Roles for Diacylglycerol Kinase in Synapse Development and Function</i>

ONGOING CONNECTIONS WITH THE FUTURE IN BIOMEDICINE NETWORK

The FUTURE in BiomedicineSM 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 BiomedicineSM symposium at the end of the summer. This year, alongside posters presented by students who participated in the FUTURE in BiomedicineSM Program with their Faculty Fellow mentors, posters were presented by students who conducted research at their home institution of Mount Mercy University. Fellows who traveled to Iowa City to conduct research in the Department of Biochemistry of the University of Iowa Carver College of Medicine.

MOUNT MERCY UNIVERSITY	McKenna Sexton Advisor: Joseph Nguyen, PhD, Assistant Professor of Chemistry	<i>Towards the Characterization of Essential Herpesvirus Interactions</i>
	Zachary Fritz Advisor: Joseph Nguyen, PhD, Assistant Professor of Chemistry	<i>Optimizing Preparation Conditions of Live Samples for Transmission Electron Microscopy</i>



EVENTS

RESEARCH SYMPOSIUM

Friday, August 1, 2014

1:00 PM	Introductory Remarks - Madeline A. Shea, PhD, Director	
1:15 PM	Ryan Bezy, PhD , Assistant Professor of Biology Mount Mercy University, Cedar Rapids, IA <i>UI Faculty Host: David Weiss, Associate Professor of Microbiology</i>	<i>Characterization of YedR, a Novel Cell Division Protein in Escherichia Cell</i>
1:35 PM	Shawn Ellerbroek, PhD , Associate Professor of Biochemistry Wartburg College, Waverly, IA <i>UI Faculty Host: Kris DeMali, Associate Professor of Biochemistry</i>	<i>Coupling Actin to Cell Adhesions</i>
1:55 PM	Break	
2:05 PM	Randy Mercer, PhD , Instructor of Natural Sciences Hawkeye Community College, Waterloo, IA <i>UI Faculty Host: Wendy Maury, Professor of Microbiology</i>	<i>Variability in Wolbachia Infections of Mosquitoes: a Key to Invasion Success?</i>
2:25 PM	Stephanie Toering Peters, PhD , Associate Professor of Biology Wartburg College, Waverly, IA <i>UI Faculty Host: Andy Frank, Assistant Professor of Anatomy and Cell Biology</i>	<i>Loss of Dgk Impairs Synapse Function and Structure</i>
2:45 PM	Poster Presentations - Undergraduate Researchers and Alumni	
3:20 PM	Adam Moser, PhD , Assistant Professor of Chemistry Loras College, Dubuque, IA <i>UI Faculty Host: Adrian Elcock, Professor of Biochemistry</i>	<i>Simulating Phosphoproteins Using Coarse Grain Models</i>
3:40 PM	Jerry Honts, PhD , Associate Professor of Biology Drake University, Des Moines, IA <i>UI Faculty Host: Madeline Shea, Professor of Biochemistry</i>	<i>Tetrahymena Tcb2 protein: a Novel Calcium-Binding Protein that Forms a Contractile Assembly</i>
4:00 PM	Break	
4:10 PM	Michael Leonardo, PhD , Associate Professor of Biology Coe College, Cedar Rapids, IA <i>UI Faculty Host: Linda McCarter, Professor of Microbiology</i>	<i>Control of Vibrio Parahaemolyticus Biofilm Formation by Intra- and Interspecies Communication</i>
4:30 PM	Ugur Akgun, PhD , Assistant Professor of Physics Coe College, Cedar Rapids, IA <i>UI Faculty Host: Dongxu Wang, Assistant Professor of Radiation Oncology</i>	<i>Proton Imaging with a High Density Scintillating Glass Calorimeter</i>
4:50 PM	Closing Remarks - Madeline A. Shea, PhD, Director	

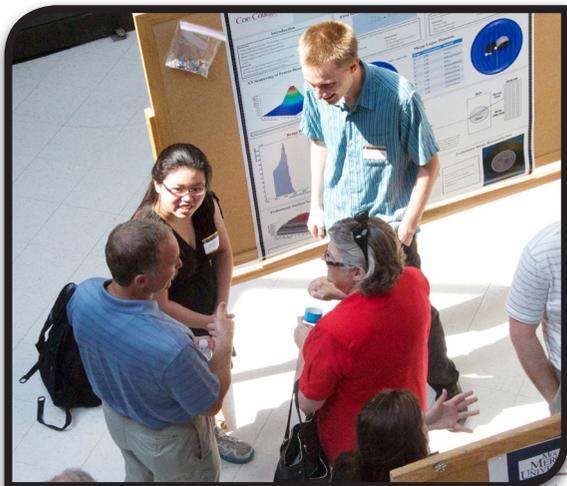
EVENTS

RESEARCH SYMPOSIUM POSTER PRESENTATIONS

Friday, August 1, 2014

UNDERGRADUATE RESEARCHERS, CLASS OF 2014

COE
COLLEGE**Amy Dong and David Pritchett**FUTURE in BiomedicineSM Fellow: Ugur Akgun, PhD
UI Faculty Host: Dongxu Wang, PhD, Assistant Professor
of Radiation Oncology*Simulating a Glass Proton
Imaging Detector***Chas Messers**FUTURE in BiomedicineSM Fellow: Michael Leonardo, PhD
UI Faculty Host: Linda McCarter, PhD, Professor of Microbiology*Mixed Strain Biofilms: Competition
and Cooperation between Vibrio and
Shewanella Strains*LORAS
COLLEGE**Jason Derby and Alexis Hanson**FUTURE in BiomedicineSM Fellow: Adam Moser, PhD
UI Faculty Host: Adrian Elcock, PhD, Professor of Biochemistry*Developing Force Fields for Coarse-
Grained Phosphoprotein Simulations*MOUNT MERCY
UNIVERSITY**David Stanek**FUTURE in BiomedicineSM Senior Fellow: Ryan Bezy, PhD
UI Faculty Host: David Weiss, PhD, Associate Professor
of Microbiology*A Genetic Analysis of the Role of yedR
in Escherichia coli Cell Division*WARTBURG
COLLEGE**Jessa Bidwell**FUTURE in BiomedicineSM Senior Fellow: Stephanie Toering Peters, PhD
UI Faculty Hosts: C. Andrew Frank, PhD, Assistant Professor
of Anatomy and Cell Biology*The Roles for Diacylglycerol Kinase in
Synapse Development and Function*



EVENTS

BIOMEDICAL PRE-GRADUATE SCHOOL CONFERENCE

Friday, October 3, 2014

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
- Free Radical and Radiation Biology
- Genetics
- Human Toxicology
- Immunology
- Microbiology
- Molecular and Cellular Biology
- Molecular Physiology and Biophysics
- Neuroscience
- Pharmacology



SCHEDULE OF EVENTS

9:00AM	Welcome, Registration, and Continental Breakfast - <i>Information Tables with Literature and Liaisons from PhD Training Programs</i>
9:45AM	Unique Research Opportunities at The University of Iowa - <i>Amy Lee, PhD, Assistant Dean for Scientific Affairs and Associate Professor of Molecular Physiology and Biophysics</i>
10:00AM	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>Daniel Tranel, PhD, Associate Dean for Graduate and Postdoctoral Studies and Professor of Neurology</i>
10:45AM	Break
11:00AM	Admissions Procedures from A-Z - <i>Jodi Graff, MA, Biomedical Programs Administrator, Assistant to the Associate Dean for Graduate and Postdoctoral Studies</i>
11:25AM	I got an interview for grad school: What do I do? - <i>Madeline Shea, PhD, Director of the FUTURE in the Biomedicine Program and Professor of Biochemistry</i>
12:05PM	Closing Remarks
12:15PM	Lunch with UI Graduate Students
1:15PM	Informal Q&A with Admissions Committee Members
1:40PM	Informal Q&A with Admissions Committee Members
2:00PM	Research Core Facility Tour or Laboratory Tour with a Graduate Student
2:30PM	Additional Opportunity - <i>Research Core Facility Tour or Laboratory Tour with Graduate Student</i>
3:00PM	Event concludes

REFLECTIONS FROM PARTICIPANTS

COE COLLEGE - CEDAR RAPIDS, IA

UI Faculty Host: Dongxu Wang, PhD, Assistant Professor of Radiation Oncology

Project: Development of Proton Beam Imaging in Radiation Therapy of Cancer

“My participation in the FUTURE in BiomedicineSM Program is a good example of the high level of interdisciplinary research in the University of Iowa Carver College of Medicine. I am an experimental high-energy physicist, and my main research focus is to develop novel glass detectors for various applications such as particle physics, homeland security, and medical applications. I had been a trainee and instructor at the University of Iowa for more than a decade before moving into my position at Coe College, and I already have ongoing collaborations with various faculties in the University of Iowa. Participating the Future in BiomedicineSM Program gave me an amazing opportunity to work with the Department of Radiation Oncology in a concentrated way.

I had already been working on a novel detector design for proton imaging systems for more than a year, and I was eager to collaborate with Dr. Dongxu Wang from the Carver College of Medicine. Our proton imaging detector design requires a high-density, scintillating glass, which is being made at state-of-the-art glass laboratories of the Coe College Physics Department. Two students, Amy Dong and David Pritchett, and I have been simulating the detector performance with Geant4 software. However, we needed the support of an expert to help us add 2D- and 3D-image reconstruction abilities to our detector model.

Dr. Wang is one of the leading specialists on proton imaging, and it is a great opportunity to be able to work with him. This summer we have developed the image reconstruction scripts, and detector simulation model. Dr. Wang's vision of switching from single proton tracking to proton bunch might well open new doors in our research. We will continue to produce data. This fall, we plan to submit an NIH grant application for building the prototype.

The FUTURE in BiomedicineSM Program not only offers collaborative opportunities on scientific projects, but also creates great chances for Liberal Arts College students to breathe the Research University atmosphere. Weekly talks and panels helped us to learn about the medical and biological science programs in the University of Iowa Carver College of Medicine. This will surely allow me to advise my students better on their graduate or medical school applications.

I would also like to mention that the FUTURE program helped me to meet faculty from other Liberal Arts College science departments, and learn about their research interests, which might help me initiate new collaborations.

Finally, I cannot thank enough Professor Madeline Shea for accommodating everything for my students, and me. Her gracious support has helped us to improve our medical imaging knowledge tremendously. I am very excited to continue my collaboration with Dr. Dongxu Wang in years to come.”

Ugur Akgun, PhD

*Assistant Professor of Physics
FUTURE in BiomedicineSM Fellow*

“This was the first summer, as well as my first time, doing any work like research. The whole process has had a lot of frustrating moments but those few moments where things work or I figure out what was wrong has made all the frustration worth it. The feeling of having that light bulb in your head go off is amazing. I would love to continue this project in the coming year (after I complete my sophomore courses) if I am given the opportunity.”

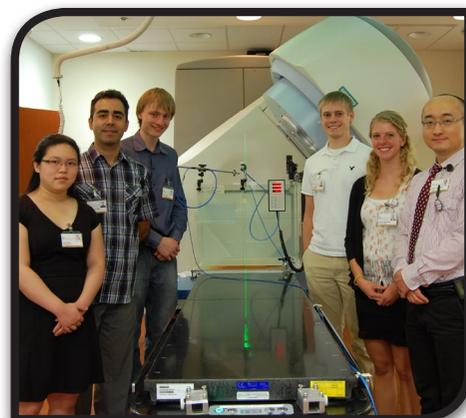
Amy Dong

Student Researcher

“The FUTURE in BiomedicineSM Program has been extremely helpful to me this summer in a couple of ways. First off it has provided me with a job in my desired field as opposed to being a cart retriever at Walmart, or some other similar job. It has shown me what it is like to be a scientific researcher and I am now considering it as a career path as I continue in my college education. If I have the opportunity, I will likely accept a position doing this or a similar job next summer after my sophomore year.”

David Pritchett

Student Researcher



COE COLLEGE - CEDAR RAPIDS, IA

*UI Faculty Host: Linda McCarter, PhD, Professor of Microbiology
Project: Colonization Strategies of Food-Borne Pathogen Vibrio Parahaemolyticus*

"The FUTURE in BiomedicineSM Program has been all that I was hoping it would be. It has allowed me to make important and useful connections with faculty and staff at the University of Iowa and with my fellow educators from other small Iowa colleges. We were able to discuss common issues at institutions such as ours, compare notes on various ideas and teaching pedagogy to improve our instructional skills.

The program has also allowed me to expand my scientific knowledge by delving into a field of microbiology with which I had limited experience previously. The education of my student, Chas Messer, was enhanced by giving him an opportunity to practice the skills and techniques he used in his lab courses at Coe College, but at the pace he will face in a graduate laboratory. The opportunities offered by this experience were beneficial to both of us, and have allowed us to broaden our knowledge base, network with other professionals, and create a new vision of opportunities for the future.

The program allowed me to make a wonderful connection with Professor of Microbiology Linda McCarter, Ph.D. who studies the regulation of biofilms by the gastro-intestinal pathogen *Vibrio parahaemolyticus*. Microorganisms from the genus *Shewanella*, which I study, have a set of genes that are homologous to those that play a role in regulating biofilm synthesis in some *Vibrio* species. Based on this observation, our project has focused upon the possible interactions between the two genera. The initial results from our summer of research show the potential for interspecies communication and we plan on continuing the project here at the University of Iowa and at Coe College in the future.

The impact of the FUTURE in BiomedicineSM Program is so much more than simple collaborations between the Fellows, their students and the host laboratories. It provided an opportunity for us to return to a vigorous research-oriented situation similar to my days as a post-doctoral fellow. The program has allowed me to refresh and expand my knowledge, techniques, and expertise and to reenergize my passion for doing scientific research. This experience will enrich the curriculum at Coe College now - and into the future - by transfusing the experiences into the courses I teach.

In addition, Chas learned about the graduate and professional programs offered at the University of Iowa and potential career paths to consider for his future. Chas will be an



ambassador for the University of Iowa in that other Coe students who are interested in earning an advanced degree can discuss his experiences in the FUTURE program with him.

In summary, the FUTURE in BiomedicineSM Program allowed me to strengthen my scientific background, meet a great cohort of professional scientists from around the state, and provide an opportunity for my student to gain research experiences we typically cannot provide. It has been a great experience for Chas and me. We anticipate, and look forward to, a continued relationship with the University of Iowa into the future."

Michael Leonardo, PhD

*Associate Professor of Biology
FUTURE in BiomedicineSM Fellow*

"The FUTURE in BiomedicineSM Program has been a wonderful experience. It showed me what graduate school lab work is like as well as answered many questions about applying to graduate school and presenting information. These answers have really influenced my decision about applying to grad school. I would strongly recommend this program to anyone interested in grad school or research.

Over the course of the summer I learned many things about research, from getting a better idea of the mindset of a practicing scientist to finding out the best ways to answer certain questions experimentally. It was great to learn all of the new protocols and to see some modifications to others. By seeing these modifications, the ideas behind the procedures became more apparent and offered a paradigm shift in experimental design. This program has been a great source of examples for lessons that I was taught in classes. These examples drive home the importance of those lessons and open one's eyes to some of the practical issues of lab work."

Chas Messers

Student Researcher

REFLECTIONS FROM PARTICIPANTS

DRAKE UNIVERSITY - DES MOINES, IA

*UI Faculty Host: Madeline Shea, PhD, Professor of Biochemistry
Structural Studies of Tetrahymena Calcium-Binding Proteins*

“Participation in the FUTURE program has made it possible for me to take my research program to the next level. Returning as a Senior Fellow this summer, I have been able to take advantage of an array of high-value scientific instrumentation, which is only available at a top-tier research university like the University of Iowa. I have used instruments in the Central Microscopy Facility, the CCOM Protein Crystallography Facility and the CCOM NMR Facility. This access has enabled me to initiate structural studies on a calcium-binding protein that is central to my research interests.

By receiving invaluable practical training on instrumentation from the staff in these facilities, I will be better able to use these facilities over the next year as I pursue grant-funded research. Having access to the specialized knowledge and instrumentation in the laboratory of my host (Madeline Shea) has likewise made it possible for me to make rapid progress toward my specific research goals.

I definitely recommend the FUTURE in BiomedicineSM Program to friends and colleagues throughout the state. Three other Drake faculty (Dao, Christensen and Kilpatrick) have participated in the program, and it seems likely that others might be able to do so in the future.

The FUTURE program has helped me and other participants from Drake in that it provides our administrators insight into what we actually do as scientists. Deans and provosts at primarily undergraduate institutions, many of whom are trained in the humanities, do not have a good idea of what physical and intellectual resources it takes to effectively conduct a program of original research, especially in terms of the importance of collaboration and access to instrumentation. Much of their scholarship is done on an individual basis.

The FUTURE program has been a benefit to the University of Iowa and Iowa's private college and universities in that it shows the kind of synergy that can be achieved in Iowa's higher education community, since the program brings together the strengths of public and private institutions. Faculty research at private institutions is enhanced, which helps recruit students to outstanding post-baccalaureate opportunities in basic science and medical training programs at the University of Iowa.

The program has had a very positive impact on my own research. Based on previous studies conducted as part of the FUTURE program in 2009, I have been able to acquire several small grants, which will support and extend the project initiated this summer as a Senior Fellow.

I returned this year as a Senior Fellow because I am making a key transition in my research program, and this opportunity to come back with the support given to Senior Fellows could not have come at a better time. Even though I have had serious training in structural biology during my post-doctoral fellowship and my first sabbatical leave, the methods for carrying out this kind of research continue to evolve. Through my conversations with faculty and staff in the research facilities, I have a much better idea of the current state of the art, in terms of techniques and instrumentation for structural studies. I would not have received this kind of “refresher course” had I not participated in the program this summer.

I had planned to bring a very talented Drake student with me, but at the last minute his summer plans had to be modified because of personal circumstances that kept him in Des Moines. However, I have brought the student with me to Iowa City on several occasions to attend symposia and use the Central Microscopy Facility. He has had the chance to meet other Goldwater Scholars here in Iowa City, and I hope that he will spend a summer at the University of Iowa in a subsequent year.”

Jerry Honts, PhD

*Associate Professor of Biology
FUTURE in BiomedicineSM Senior Fellow*



HAWKEYE COMMUNITY COLLEGE - WATERLOO, IA

UI Faculty Host: Wendy Maury, PhD, Professor of Microbiology

Project: Prevalence of Parasitic Bacteria Wolbachia in Endogenous Mosquito Species

"It was a great opportunity to be a FUTURE Fellow during the summer of 2012. I worked with an outstanding student from Hawkeye Community College and we were both graciously welcomed into the laboratory of Professor Wendy Maury in the Department of Microbiology.

Therefore, when I had the opportunity to return to the FUTURE in BiomedicineSM Program during 2014 as a Senior Fellow, I gratefully accepted. In addition to the typically outstanding job that Prof. Madeline Shea and Ms. Sonya Housholder do for all Fellows, they went out of their way to include me in the FUTURE Program.

I was again welcomed into the Maury lab. Besides the opportunity to move forward with my own research, I have enjoyed attending lab meetings and following the progress of graduate students.

I have received considerable encouragement and advice on moving my project forward, with access to facilities and literature resources that would not have been available otherwise. I have also enjoyed talking science and learning about the graduate student programs in the Carver College of Medicine. I will continue to encourage our diverse student body to take advantage of opportunities at the University of Iowa.

I would encourage other community college instructors to participate in the FUTURE in BiomedicineSM Program. Although research is not a primary responsibility for community college faculty, the opportunity to carry out research can be personally gratifying and professionally rewarding.

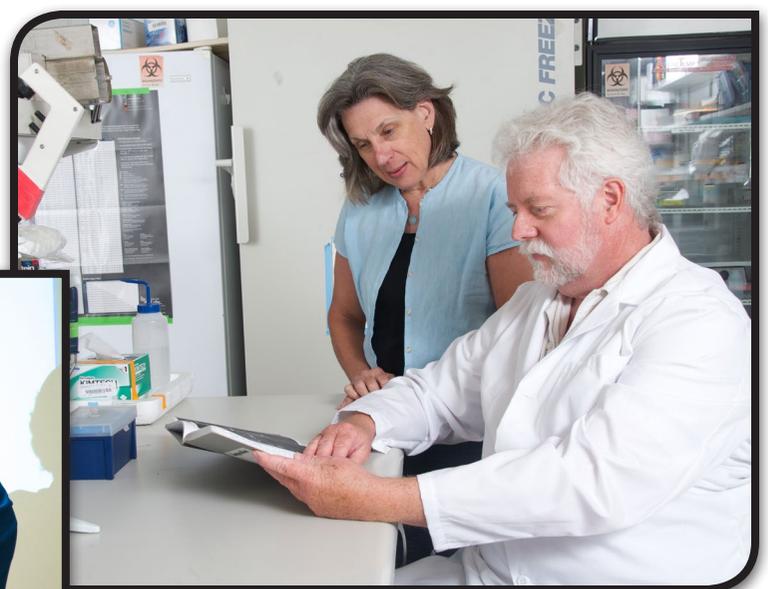
Students benefit from direct involvement in the FUTURE in BiomedicineSM Program or from hearing about research outcomes and state-of-the-art advancements experienced by their instructors. Likewise, information on career planning can be passed on to administrators and academic counselors.

I hope my colleagues will consider fulfilling their research "itch," establishing new professional relationships and collaborations, and benefiting their students and community colleges by participation in the FUTURE in BiomedicineSM Program in coming years."

D. Randy Mercer, PhD

Instructor of Natural Sciences

FUTURE in BiomedicineSM Better Futures for Iowans Fellow



REFLECTIONS FROM PARTICIPANTS

LORAS COLLEGE - DUBUQUE, IA

*UI Faculty Host: Adrian Elcock, PhD, Professor of Biochemistry
Project: Computational Studies of Macromolecular Interactions*

“Participating in the FUTURE in BiomedicineSM Program has been an outstanding experience. The program combines so many opportunities: research collaboration, information on University of Iowa programs, networking with other undergraduate professors, exposure to new techniques, access to powerful resources, and research experience for undergraduates.

Personally, it has been refreshing to be able to focus on research and make significant strides on a project this summer. Working in Dr. Elcock’s group has been an energizing experience and I have been able to support their work as well. My students have had a special experience working alongside the graduate students and post-docs. The collaboration forming between Dr. Elcock and myself is one that will persist after the program is over and I expect it to be very fruitful.

As a faculty member at a primarily undergraduate institution who sends many students to the University of Iowa for professional or graduate training, developing a strong relationship between our schools is important. The FUTURE program has been supportive in every way. I feel fortunate to have been involved and I strongly encourage others to participate.”

Adam Moser, PhD

*Assistant Professor of Chemistry
FUTURE in BiomedicineSM Fellow*

“The FUTURE in BiomedicineSM Program has been an amazing and eye-opening experience in which I’ve benefited from in many ways. The program allowed me to be fully immersed in a research environment for my very first research experience and get a feel for what full-time research can be like. The lab resources we had access to were great, but even more importantly the UI Faculty Host and other researchers in the lab were welcoming, interactive, and friendly. This gave me a great introduction to learning to talk about my research and listening to what others were doing research on. I saw a much more collaborative environment than I envisioned research to be.

Outside the lab, the FUTURE Program seminars were invaluable and gave me access to University of Iowa professors, students, and staff who most undergraduate students never get the chance to talk to. I learned admissions information as well as student-descriptions of what life is like in programs from PA, PT, and MD

all the way to PhD, and even something in between! In fact, I found Iowa’s MD-PhD program really interesting and will consider it in the future.

Overall, it has been an incredible summer and anyone that gets a chance to come and be a part of the FUTURE in BiomedicineSM Program in the coming years should jump at the opportunity. I had a great summer and look forward to continuing my research!”

Jason Derby
Student Researcher

“When I was invited to be a part of the FUTURE program by my professor Dr. Adam Moser, I had no idea what to expect. Research was never on my radar and all I was interested in was becoming a good candidate for medical school. As plans fell into place, the FUTURE program seemed to be the best of my options for the summer so I thought I’d give it a try. Although I cannot say that I am set on research as a career, this summer experience has opened my eyes to so many new pathways in medicine. I am now thinking about applying to the Medical Scientists Training Program and I have a well-developed research project that I can take back to school with me and continue to work on. Having an intense research experience like this one where I can work all day on a project is something I would have never had the chance to do at my school.

I have also learned so much through this program because of the weekly seminars that were provided for us. I am so glad I learned so much information about medical school in general, and specifically learning about the Carver College of Medicine. Becoming familiar with the environment and practices at the University of Iowa, I am now considering applying to medical school here. This summer has given me a meaningful research experience that I could not have received through many other programs and it has made me even more excited and proactive about my future in medicine.”

Alexis Hanson
Student Researcher



MOUNT MERCY UNIVERSITY - CEDAR RAPIDS, IA

*UI Faculty Hosts: David Weiss, PhD, Associate Professor of Microbiology
Project: Genetic Analysis of Bacterial Cell Division*

"For faculty at small universities and colleges around the state, I cannot recommend the FUTURE program more highly. The FUTURE program represents a unique opportunity that brings both faculty and undergraduates students together to participate in an intensive research program that benefits both in many ways.

For students, this program greatly enhances their education by applying many of the things learned in the classroom in daily hands-on experiences. This day in and day out work cannot be replicated in a classroom and is filled with challenges that will result in a mastery of topics that cannot be achieved otherwise.

For the faculty members, the chance to collaborate and work with a faculty member at the University of Iowa who is an expert in their field comes with many learning experiences as well. Faculty members are able to further their own knowledge by working in depth on their projects, with their collaborators, and by meeting and talking with other FUTURE Fellows or faculty members at the University of Iowa. This knowledge goes beyond the research project they are involved with and into the expansion of their teaching and their ability to advise their students on how to prepare for professional programs after undergraduate school.

I have had the wonderful opportunity of participating in the FUTURE program for a second summer in a row. This has allowed me to set up a productive collaboration with Dr. David Weiss, the results of which have been presented at professional meetings and will hopefully result in a publication in the near future. These past two summers have been very exciting, challenging and have gone by only too fast, as this program allows for research at a pace that is often not possible at small undergraduate institutions."

Ryan Bezy, PhD

*Assistant Professor of Biology
FUTURE in BiomedicineSM Senior Fellow*

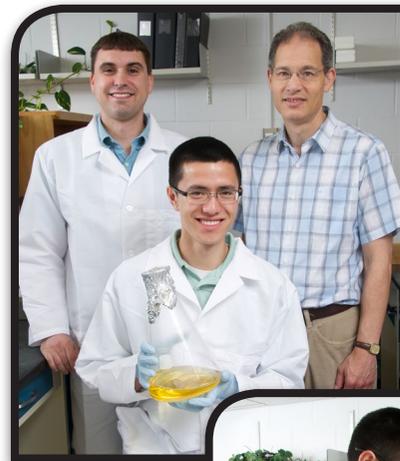
"It truly has been a great summer and all of the hard work from everyone involved in the program is greatly appreciated.

The FUTURE in BiomedicineSM Program this summer has been a wonderful experience. It has allowed me to apply my classroom knowledge in a way that I never thought was possible. Participating in a program like this, and working right next to graduate students and PhDs, has allowed me to experience a true understanding of what research is really like.

Weekly seminars have opened up my eyes to the many options available after undergraduate studies and have helped me narrow down what I would like to do with my future. I've learned a lot both inside and outside of the research lab this summer and am truly grateful to Dr. Madeline Shea and everyone else involved with the program for providing me with this wonderful opportunity."

David Stanek

Student Researcher



REFLECTIONS FROM PARTICIPANTS

WARTBURG COLLEGE - WAVERLY, IA

UI Faculty Host: *Kris DeMali, PhD, Associate Professor of Biochemistry*

Project: *Vinculin-Dependent Actin Branching and Bundling Coordinate Cell Adhesion and Migration*

“The experience of returning as a Senior Fellow in the FUTURE in BiomedicineSM Program has provided an opportunity to catch-up on new biochemical technique and ideas, which immediately translates into a better education for my students.

I am on a four-to-five year publication cycle out of my college, so this summer experience also offered me a chance to publish more. My host and I have already published one co-authored manuscript, and submitted a second one this summer. This satisfaction is important to me as a scientist. I have also played a role as a mentor to a postdoctoral research scientist in my host lab who would like to pursue a career path similar to mine.

The FUTURE in BiomedicineSM Program also provides visible evidence of the collegiality between the University of Iowa and regional liberal arts colleges, such as my own. Being able to sit down and meet with directors of post-grad programs popular with my undergraduates has shed light on the positives these programs offer and the nature of their application processes. I came away from these meetings more knowledgeable about why we should recommend the University of Iowa to our most well trained and ambitious students. Some of my former students have entered UI Ph.D. programs or pursued M.D. training in Iowa City.

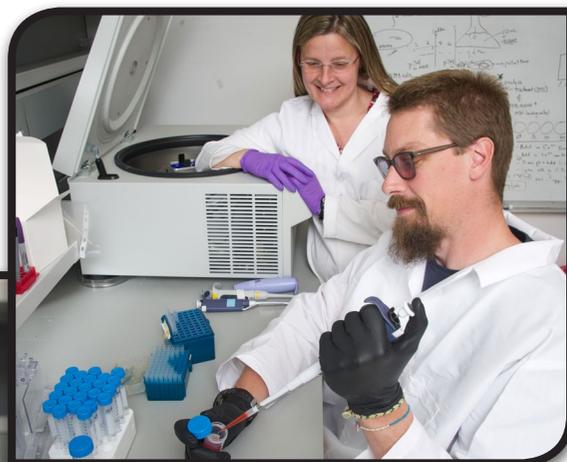
But, information gleaned at the weekly sessions and individual meetings will help me do a better job of preparing my students for matriculation and subsequent success.

Having the FUTURE program offer Senior FUTURE fellowships fosters long-term collaborative success between the fellow and his or her mentor. I came back as a Senior Fellow because doing so would strengthen my personal relationship with my host, Dr. Kris DeMali, and the additional time spent in her lab offered the opportunity to conclude our original project while starting a new investigation.

I would absolutely recommend the FUTURE in BiomedicineSM program to a friend, and I have already.”

Shawn Ellerbroek, PhD

*Associate Professor of Chemistry
FUTURE in BiomedicineSM Senior Fellow*



WARTBURG COLLEGE - WAVERLY, IA

*UI Faculty Hosts: C. Andrew Frank, PhD, Assistant Professor of Anatomy and Cell Biology
Project: Roles for Diacylglycerol Kinase in Synapse Development and Function*

"This year, I returned to Iowa as a FUTURE Senior Fellow. After my initial FUTURE Fellowship in 2011, Andy Frank and I have continued to collaborate on our project looking at the role of Dgk in the structure and function of the neuromuscular junction (NMJ) in *Drosophila*. Undergraduate students at Wartburg have participated in this research; Islam Qadous completed locomotion assays with multiple strains of Dgk flies, and my Developmental Biology course completed an RT-PCR experiment to test the expression levels of Dgk in these animals.

As our work progressed, it became clear that the project required resources at Iowa to move forward. Thus, I returned this summer with two very specific goals: to examine the structure of the NMJ in Dgk-deficient flies using confocal microscopy and to extend the results from my Dev Bio lab to determine the expression level of the Dgk gene in these flies. These projects required the use of equipment (the Zeiss 700 confocal microscope), software (Imaris to analyze images), and expertise (the RT-qPCR knowledge of Doug Brusich, one of Andy's graduate students) that I do not have access to at Wartburg College.

This summer's work has been incredibly successful. My student, Jessa Bidwell, and I have generated a huge amount of data in a very short period of time. We could not have done this without the resources here at Iowa, and the support of the FUTURE program. I am most grateful for the fact that the FUTURE program supports housing for me and my family. I do not think I would choose to come to work at Iowa full time if I could not bring my family with me. Additionally, I appreciate the opportunity to bring a student of my choosing to campus with me; this both increases the amount of work we can get done and helps me fulfill my primary role as an educator at an undergraduate institution.

We believe the results we have generated this summer are sufficient to begin working on a paper for publication. Publication of our work will obviously benefit both Andy and I in our careers, and it is entirely due to the FUTURE program that this body of work exists. I anticipate that Andy and I will continue to collaborate, and I hope our future collaboration will be as fruitful as what has come so far."

Stephanie Toering Peters, PhD
*Associate Professor of Biology
FUTURE in BiomedicineSM Senior Fellow*

"The FUTURE program at the University of Iowa this summer has been an invaluable opportunity for me. It has opened the doors to new opportunities by allowing me to network with faculty, staff, and the graduate students of the university as well as undergraduate students from other schools who participated in FUTURE. This experience has challenged me to think about career paths that I had previously disregarded and it has taught me that there is a hidden side of science, the side that is behind the doors of the lab and in the hands of normal people who simply have a passion for science.

As I have gone through the summer in the Frank lab, the FUTURE program has helped me decide my career path and given me much respect for other science careers. Although I am more suited to a clinical career in healthcare, I now have a healthy respect for the time, effort, and money that is required for research.

Science is not perfect, and working in the lab has shown me that there is more than one way to do things and that messing up is part of the way we learn and grow. Working on my project with my professor and watching the graduate students work on theirs has taught me that you must have patience, be willing to think about creative ways to solve problems, and how necessary it is to ask questions of your peers and mentors in order to succeed. The researchers in my lab were more than willing to help each other with new questions and solutions to problems; without them, my professor and I would not have been able to get as far on our project as we did.

Without this program, I would have never met some of the awesome people from other liberal arts colleges around the state as well as University of Iowa faculty. The weekly seminars that this program offers have benefited me immensely by giving me valuable information required for my post-graduate plans. The FUTURE program has given me a taste of the real-world research experience, helped me finally decide what I want to do for a career, and taught me many invaluable lessons and skills. I would definitely recommend this program to others who want to gain experience and learn more about science and post-graduate opportunities."

Jessa Bidwell
Student Researcher



BETTER FUTURES FOR IOWANS

Through the FUTURE in BiomedicineSM 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 BiomedicineSM 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.

2014 GRANT RECIPIENTS

DRAKE UNIVERSITY	Maria Bohorquez, PhD , Windsor Professor in Science and Chemistry Department Chair	<i>Fluorescence and Electron Microscopy of Protein Components of a Membrane-Associated Contractile Fabric from the Ciliated Protozoan Tetrahymena</i>
	Jerry Honts, PhD , Associate Professor of Biology	
	Debora Christensen, PhD Assistant Professor of Biology	<i>Determination of EDCs in Drinking Water</i>
	Adina Kilpatrick, PhD Assistant Professor of Physics	<i>Structural Studies of the Tetrahymena Calcium-Binding Protein Tcb2</i>
DORDT COLLEGE	Abebe Mengesha, PhD Assistant Professor of Pharmaceutics	<i>Lipid Crystallization and Effect of Moisture on Crystalline Arrangement of Monoglycerides in Smart Drug Delivery System</i>
	Jeffrey Ploegstra, PhD Assistant Professor of Biology	<i>The Evolution of Glyphosate Resistance in Soil Bacteria from Northwest Iowa</i>
GRAND VIEW UNIVERSITY	Michael LaGier, PhD Assistant Professor of Biology	<i>Annotation and Characterization of Genes from the Bacterium <i>Deinococcus maricopensis</i> that Allow for Extreme Resistance to Ionizing Radiation, Desiccation, and Oxidative Stress</i>
GRINNELL COLLEGE	Clark Lindgren, PhD Professor of Biology	<i>The Role of Glial Cells in Neurotransmitter Release at the Vertebrate Neuromuscular Junction</i>
MOUNT MERCY UNIVERSITY	Joseph Nguyen, PhD Assistant Professor of Chemistry	<i>Optimizing Preparation Conditions for Live Samples for Transmission Electron Microscopy</i>

DRAKE UNIVERSITY

"Fluorescence and Electron Microscopy of Protein Components of a Membrane-Associated Contractile Fabric from the Ciliated Protozoan Tetrahymena"

*Grant Recipients: Maria Bohorquez, PhD and Jerry Honts, PhD | Undergraduate Researchers: Robert Sterner and Alexandra Howland-Lopez
UI Core Facility: Central Microscopy Research Facility*

We have engineered the expression of the four major protein components of a contractile fabric associated with the cortical membrane systems of the ciliated protozoan *Tetrahymena* (Tcb2, Epc1, Epk1, and Mrn1). We have GFPtagged versions of each of the proteins to study their distribution in living cells. We would use this facility grant to do the following: (1) We have used fluorescence microscopy to look at the distribution of three of these proteins using the confocal laser scanning microscope in the Central Microscopy Research Facility, but we have not yet imaged the 3D distributions of the Mrn1 protein and two closely related homologs (Mrn2 and Mrn3). All three of these MORN-domain proteins are hypothesized to function as adaptors that link the fibrous portion of the ciliate membrane skeleton to cortical membrane systems (the plasma membrane and closely apposed alveolar sacs). We propose to use one 3-4 hour session at the Central Microscopy Research Facility to complete these studies. (2) In addition, we had carried out electron microscopic studies of negative stained filaments of the Tcb2 protein this summer. We propose to use the electron microscope in the Central Microscopy Research Facility to image at high resolution the assembled structures formed by Tcb2 and Epc1 proteins. We suspect that two of these proteins (Epc1 and Tcb2) constitute distinct filamentous systems that bind to each other to form a contractile fabric, and that this interaction may be regulated by calcium ions. We propose to use one 4-hour session at the Central Microscopy facility to image negatively stained protein filaments formed by the Tcb2 and Epc1 proteins, both separately, and in combination. If time permits, we would also look at the effect of Epk1-mediated phosphorylation of the assemblies formed by these proteins. We have purified the kinase domain of Epk1, a Ser/Thr-specific protein kinase that co-purifies with these proteins when they are extracted from *Tetrahymena* cells. Phosphoproteomics studies indicate that Epc1 and Tcb2 proteins are each phosphorylated at several sites by a Ser/Thr-specific protein kinase.

DRAKE UNIVERSITY

"Determination of EDCs in Drinking Water"

Grant Recipient: Debora Christensen, PhD | Undergraduate Researcher: Matt Wright | UI Core Facility: High Resolution Mass Spectrometry Facility

In summer 2013, our lab began a transgenerational study to investigate the effects of naturally administered endocrine disrupting chemicals (EDCs) on growth and reproduction in multiple generations of zebra finch offspring. To do so, we administered drinking water to paired zebra finches via either glass bottle (negative control), glass bottle supplemented with water-soluble estrogen (E2+ positive control), plastic bottle suspected of containing BPA (baby bottle, BPA+), or a plastic bottle claiming to be BPA-free (FIJI water bottle). Bottles were hand-washed daily with regular dish washing liquid and hot water. Nearly all food- and beverage-safe plastics tested have been found to leach EDCs into the contents, so we wish to determine the extent to which that has occurred in our study. While we have collected and continue to collect measurements on the offspring, we also collected water samples from each of these delivery vessels twice per week. We wish to use the High Resolution Mass Spectrometry Core facility to determine if our bottles leached EDCs into the drinking water and, if so, the identity and quantity of each of the compounds that leached into the water. Drake students have already been extensively involved in this project. Matt Wright has been working with chemistry and pharmacy departments at Drake and have determined that equipment available on campus is not sensitive enough for our purposes. Matt and I will work together to communicate with core facility staff and travel to the University of Iowa to perform water analysis.

BETTER FUTURES FOR IOWANS

DRAKE UNIVERSITY

“Structural Studies of the Tetrahymena Calcium-Binding Protein Tcb2”

Grant Recipient: Adina Kilpatrick, PhD | UI Core Facility: Nuclear Magnetic Resonance Facility

The cytoskeleton of the ciliated protozoan *Tetrahymena thermophila* is remarkably complex, but little is known about the molecular and structural bases of its organization and regulation. Several proteins have been recently identified during proteomic analysis of calcium-dependent contractile fibers isolated from this cytoskeleton. These include a putative calcium-binding protein (Tcb2), a filament-forming structural protein (Epc1), and a protein kinase (Epk1), among others. The function of these proteins is unclear, but it has been proposed that they play regulatory and structural roles in the calcium-dependent regulation of ciliary movement. The goal of this project is to investigate the structure of the calcium sensor Tcb2. The full-length protein forms filamentous structures and becomes insoluble in the presence of calcium and/or upon concentration, but its C-terminal domain is highly soluble and amenable to structural characterization. We propose to use NMR spectroscopy to probe the calcium-binding properties of this domain, and to investigate its structure and dynamics. We will express isotopically labeled protein in bacterial cells, and purify it using standard chromatography methods. NMR titrations will enable us to quantify its interaction with calcium. We will also acquire three-dimensional NMR experiments in order to achieve the sequential assignment of all backbone and sidechain resonances of the labeled polypeptide chain. Structure determination will be performed with the program CSRoetta or by using additional NMR distance constraints. This research will enable us to explore the structure-function relationship in Tcb2, and provide insights into the molecular basis of calcium sensing during ciliary movement in *Tetrahymena*.

DRAKE UNIVERSITY

“Lipid Crystallization and Effect of Moisture on Crystalline Arrangement of Monoglycerides in Smart Drug Delivery System”

Grant Recipient: Abebe Mengesha, PhD | UI Core Facility: Central Microscopy Research Facility

The phase behavior of amphiphilic lipids and surfactants at various relative humidity levels and water content is of great interest for many technical and pharmaceutical applications. Lipid matrices containing mixtures of glyceryl monooleate (GMO) and glyceryl monostearate (GMS) have been evaluated for their potential application as magnetically induced thermo-responsive local drug delivery systems. However, the presence of excess moisture or hydrophilic additives such as ethanol is reported to influence the phase behavior of monoglycerides. Aims: The aims of this study are to investigate the thermal properties of GMO and GMS, determine the phase behavior of various monoglycerides blends, and investigate the effect of moisture on the crystallization of GMO:GMS matrices at 25, 37, and 42 degrees Celsius. Various compositions of GMO:GMS matrices will be prepared by a fusion method and characterized using differential scanning calorimetry (DSC) and scanning electron microscopy (SEM). We will determine the phase behavior of the monoglyceride blends and study the crystallization behaviors such as melting point, glass transition and heat of energy. Those properties are directly influenced by polymorphism and influenced by several external factors such as temperature, rate of crystallization and impurities. The DSC and SEM results will provide the best composition of GMO:GMS matrix for the monoglycerides-based thermal responsive drug delivery systems and evaluate the effect of moisture on the crystalline arrangement of the system.

DORDT COLLEGE

“The Evolution of Glyphosate Resistance in Soil Bacteria from Northwest Iowa”

Grant Recipient: Jeffrey Ploegstra, PhD | UI Core Facility: IIHG Genomics Division

Historically, Iowa had more than 12.5 million hectares of prairie. Currently less than a tenth of 1% remains—the majority of that land has been converted to row crops. With the advent of Round-up ready technology, Glyphosate, the active ingredient in the product, is now being sprayed over a large majority of the land area in Iowa. The commonly accepted mechanism of action of glyphosate is the interruption of the Shikimate pathway through competitive inhibition of 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase. This pathway is lacking in mammals but used by plants in the synthesis of aromatic amino acids. This seems to make it an ideal herbicide. However, bacteria and fungi also utilize the shikimate pathway. Field assessments have been conducted investigating the effect of glyphosate application on soil microbial community composition and overall microbial activity but the ability of specific soil bacteria to develop resistance to glyphosate has not been assessed. As a part of the advanced Cell and Molecular biology class at Dordt College, we would like to screen soil microbes from local fields for resistance to glyphosate, and sequence the EPSP synthase gene to look for patterns of variation in resistant strains. Organisms known to be inherently resistant will be excluded.

GRAND VIEW UNIVERSITY

"Annoation and Characterization of Genes from the Bacterium Deinococcus maricopensis that Allow for Extreme Resistance to Ionizing Radiation, Desiccation, and Oxidative Stress"

Grant Recipient: Michael LaGier, PhD | UI Core Facility: Genomics Division

Funds are requested to support an undergraduate project to clone a putative catalase from the bacterium *Deinococcus maricopensis*. *D. maricopensis* has potential as a bioremediation agent due to its natural resistance to environmental stressors including oxidative damage, dessication and ionizing radiation. The genome of the bacterium has recently been sequenced as part of the GEBA (Genomic Encyclopedia of Bacteria and Archaea) project headed by the Joint Genome Institute of the Department of Energy. A goal of GEBA is to provide undergraduates an opportunity to contribute to genomics research, through the MGAN (Microbial Genome Annoation Network, supported by the National Science Foundation) network. Grand View is part of the MGAN network, and as part of this group, has access to bioinformatics tools geared at genome annotations. I am currently working with undergraduate mentees to more closely examine the genomic content of *D. maricopensis*. In particular, we are collecting and annotating genes believed to be related to stress tolerance phenotypes observed for *D. maricopensis*. The funding requested here will help support these efforts, by providing a means to validate our *in silico* findings through "wet-lab" work.

GRINNELL COLLEGE

"The Role of Glial Cells in Neurotransmitter Release at the Vertebrate Neuromuscular Junction"

Grant Recipient: Clark Lindgren, PhD | Undergraduate Researcher: Allie Byrne | UI Core Facility: Central Microscopy Research Facility

The purpose of this research project is to determine whether perisynaptic Schwann cells (PSCs), the glial cells at the neuromuscular junction (NMJ), modulate neurotransmitter release. Although there is growing consensus that glial cells play an essential role in synaptic plasticity in the CNS, it is not yet clear whether PSCs play an analogous role at the NMJ. Previous work has shown that synaptic activity increases calcium levels in the PSCs in a frequency dependent manner. This calcium increase depends on the binding of acetylcholine (ACh) or ATP to receptors on the PSCs, suggesting that a feedback mechanism exists by which ACh and/or ATP released from motor terminals activates PSCs. The activated PSCs may then signal back to the nerve terminal, reducing the subsequent release of neurotransmitter. To test this idea Allie and I are measuring high frequency synaptic depression in muscles in which the PSCs have been immunologically ablated. In parallel with these experiments, we are attempting to confirm that the ablation has abolished calcium signals in the PSCs. Surprisingly, we still observe "PSClike" calcium signals in muscles with ablated PSCs. Since the calcium indicator we are using, Fluo-4 AM, loads into both the PSCs and the nerve terminal, these anomalous calcium signals may be originating in the nerve terminals. Unfortunately, our spinning disk confocal microscope lacks sufficient sensitivity and resolution to distinguish fluorescence originating from PSCs vs. nerve terminals. We propose using a confocal microscope at the University of Iowa to resolve Fluo-4 signals originating from these two components and determine the extent to which calcium signals have been lost or altered at NMJs with ablated PSCs.

MOUNT MERCY UNIVERSITY

"Optimizing Preparation Conditions for Live Samples for Transmission Electron Microscopy"

Grant Recipient: Joseph Nguyen, PhD | UI Core Facility: Central Microscopy Research Facility

The purpose of the project is to optimize preparation conditions for live samples for transmission electron microscopy. Standard procedures have been established to prepare tissue culture samples for transmission electron microscopy sample preparation. However, standardization of procedures for live samples is more difficult because live samples are not as concentrated and require different chemicals for processing. We are focused on optimizing preparation conditions for feather follicles infected with Marek's disease virus (MDV), which is an excellent pathogen-host model. MDV is an excellent host because the early and late stages of infection of chickens with MDV largely mimic those of varicella-zoster virus, which commonly causes chicken pox in children and adults. It is essential to prepare these live samples for TEM because it will help us confirm and identify that a live host can be infected with multiple herpesviruses. The infection of a host with multiple herpesviruses, known as superinfection is rare due to the phenomenon known as superinfection inhibition. However, we hypothesize the superinfection is the cause of the increased virulence to MDV in chickens. Thus, confirmation of the dual infection of cells can help us better understand pathogenic principles of human herpesvirus disease.

VISITING FELLOWS

DRAKE UNIVERSITY - DES MOINES, IA

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

Project: Biophysical Studies of Calmodulin Recognition of the Ryanodine Receptor

"I very much appreciate the opportunity to return to the Shea lab in the summer of 2014 to continue my research on calcium-binding proteins. Related to my studies of calmodulin binding to the ryanodine receptor, we were able to complete a manuscript which was published in *Biophysical Chemistry*. I also continued to explore the thermodynamics of molecular recognition between the two biomolecules using fluorescence-based experiments. In particular, I analyzed the interaction between wild-type or mutated ryanodine receptor sequences and calmodulin mutants with non-functional calcium-binding sites. To complement the energetics studies and obtain residue-specific information of the binding interface between the two proteins, I am currently undertaking solution NMR studies of isotopically labeled calmodulin (wild-type and calcium-binding mutants) in the absence and presence of various ryanodine receptor sequences.

Being in the Carver College of Medicine again also allowed me to use instruments in the Protein Crystallography core to purify a protein that I am studying with Jerry Honts, a colleague in the Biology Department at Drake University. I am contributing my expertise in NMR to determine the calcium-induced conformational changes and the atomic-resolution solution structure of TCB-2, a *Tetrahymena* protein involved in motility.

When I had the opportunity to work in Iowa City as a Visiting Fellow, I used both the CCOM Protein Crystallography Core and the CCOM High Field NMR Core. The research I completed was included in two abstracts submitted for the 59th Annual Meeting of the Biophysical Society held in Baltimore, MD. I was invited to present work done with my Drake collaborator Jerry Honts and a Drake student, Robert Sterner, as a poster in the session on Cytoskeletal Assemblies and Dynamics. I was invited to present my UI collaborative study with UI professor Madeline Shea and her student Liam Hovey in the platform session on Calcium Signaling. The titles are below.

Poster:

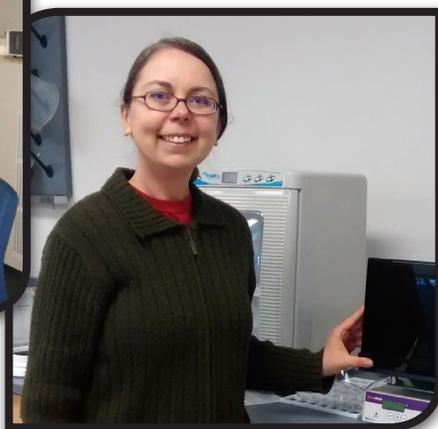
Fluorescence Microscopy And Solution NMR Studies of Cytoskeletal Proteins From Tetrahymena.

Robert Sterner, Jerry Honts, **Adina Kilpatrick**

Talk:

Thermodynamic And Structural Analysis Of Calmodulin Interaction With The Skeletal Muscle Ryanodine Receptor.

Adina M. Kilpatrick, Liam Hovey, Madeline A. Shea"



Adina Kilpatrick, PhD
 Assistant Professor of Physics
 FUTURE in BiomedicineSM Visiting Fellow

GRACELAND UNIVERSITY - LAMONI, IA

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

Project: Genetic Regulation of Microbial Communities by a Biofilm Destroyer

"Last summer, the Kirby lab, Chris Chambers and I made ~6,000 *Myxococcus xanthus* mutants through transposon mutagenesis. *M. xanthus* is known to be a predator of a variety of different bacteria and yeast. We identified ~250 mutants that had altered predation phenotypes using *Bacillus subtilis* wild type strain NCIB3610 as prey. Those mutants are being sequenced to determine the specific site of transposon insertion within the genome. One mutant has been mapped and was found to have a mutation in a gene encoding myxoprincomide, a secondary metabolite which is a class of molecules known for antimicrobial activities. This mutant strain showed decreased predation, implicating a role for myxoprincomide during predation, but did not display phenotypes associated with any other aspect of the *M. xanthus* lifecycle. Currently, it is not known which factors regulate production of secondary metabolites.



To examine myxoprincomide regulation, the Kirby lab cloned the promoter for the myxoprincomide biosynthetic gene cluster into a reporter plasmid to determine when myxoprincomide is expressed. This August, we further examined the expression of myxoprincomide under a variety of conditions, nutrient versus starvation and with or without prey (*Bacillus subtilis*). Myxoprincomide gene expression was quantified in relation to cell growth for each condition. Our preliminary results indicate that myxoprincomide is made throughout growth, starvation and predation and appears to be constitutively produced. Therefore, we conclude that myxoprincomide production is critical for survival of the bacterial predator and highlights the importance of predation during all aspects of the *M. xanthus* life cycle."

Mary Shawgo, PhD

Assistant Professor of Biology and Chemistry
FUTURE in BiomedicineSM Visiting Fellow

"A small university is what best suited my personality and has many advantages, but it is not without drawbacks like research opportunities. The myxo research allows me to experience a research project that has meaning beyond the classroom giving me a more rounded education and appreciation for the field."

Darcy Volz

Student Researcher



Dr. Shawgo's students are shown working on research in their laboratory at Graceland.

Over the last six years, the FUTURE in BiomedicineSM Program has had outstanding results. The program has hosted 29 Faculty Fellows from 17 Iowa colleges, and 33 undergraduate research assistants. It has contributed to the success of \$2.1 million in NSF and American Hearts Association grants, and provided 17 PUI Faculty grants for “hands-on” inquiry using the research core facilities of the University of Iowa. Fellows have published 8 peer-reviewed papers and made more than 35 conference presentations. The program has had a “Ripple Effect” throughout Iowa. The FUTURE in BiomedicineSM Program helps to train the next generation of research scientists and clinicians who ultimately will conduct the cutting-edge research that will provide Iowans with better healthcare at a reasonable cost.



MORNINGSIDE COLLEGE

“The FUTURE in BiomedicineSM Program is a wonderful program allowing students, interested in research, the opportunity to gain research experience at a scale otherwise not possible at their college/university. In my case, Dr. Rachel Robson (my faculty mentor) and I were able to bring a project we had been working on at Morningside College in Sioux City, IA, to the University of Iowa Carver College of Medicine. Through this program, we were able to collect ten times more data than possible at our college. With the collection of this data, we were able to present at the Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC) in Denver, CO, September 2013, which is very prestigious international conference in which undergraduates rarely attend let alone present at. This opportunity was made possible because of the FUTURE in BiomedicineSM Program and the work we were able to do throughout experience.

The FUTURE in BiomedicineSM Program Program not only allowed me to do research on a larger scale but it also gave me exposure to many different career and educational opportunities. I was able to see guest speakers, presentations, discussion forums, and many other things that allow me to learn more about science, research, and the many opportunities available at the University of Iowa. These opportunities through the FUTURE in BiomedicineSM Program Program were extremely beneficial. Throughout my experience I was able to speak with faculty members in both the College of Pharmacy and the College of Public Health, which led me to where I am in today. Currently I am a first year pharmacy student at the University of Iowa College of Pharmacy. I also will be getting my Masters in Public Health through the joint degree program, Pharm.D./MPH, at the University of Iowa College of Public Health.

I chose to further my education at the University of Iowa due to the exposure I had through the FUTURE in BiomedicineSM Program. I was extremely pleased with everyone involved in the program and the research experience I had. Even though I chose a path in education not directly associated with the type of bench top research I did in the program, it allowed me to learn about research as a whole and now I am enhancing my education in other aspects of research through the department of public health.

Once again, I would like to thank Dr. Madeline Shea and her colleagues for the wonderful experience though the FUTURE in BiomedicineSM Program.”

Quinton Behlers

*P1 Student Pharmacist, University of Iowa College of Pharmacy
2013 FUTURE in BiomedicineSM Student Researcher*

FUTURE Faculty Mentor: Rachel Robson, PhD | UI Faculty Hosts: Dan Diekema, MD and Tara Smith, PhD



GRACELAND UNIVERSITY

"I participated in the FUTURE in BiomedicineSM Program in the summer of 2009 when I was a student at Graceland University. I joined my chemistry professor, Dr. Dan Pratt, to work in the Hohl laboratory in Pharmacology. When I arrived in Iowa City, I was pursuing a double major in chemistry and math, and thinking that chemical engineering might be the right path for me. When I was here for the summer, I learned a lot from the weekly meetings that let me meet directors of admission from several programs, and learn about many career options. I decided to apply to the University of Iowa for graduate school, and after rotations in several laboratories, I selected the Hohl group for my PhD work.

During my training in Iowa City, I have participated in several events of the FUTURE in BiomedicineSM Program. It has given me the chance to stay in touch with faculty and other students at Graceland. I have also appreciated the chance to attend panels that the FUTURE in Biomedicine program offers each summer on Careers at Liberal Arts Colleges, where the current Faculty Fellows share their professional paths. I am committed to this path myself as my future career goal is to teach Pharmacology. The FUTURE program helped me choose the University of Iowa for training, and it is helping me prepare for the next steps in my career."

Ryan Sheehy

*Graduate Student, Pharmacology, University of Iowa
2009 FUTURE in BiomedicineSM Student Researcher*

FUTURE Faculty Mentor: Daniel Pratt, PhD | UI Faculty Host: Ray Hohl, PhD



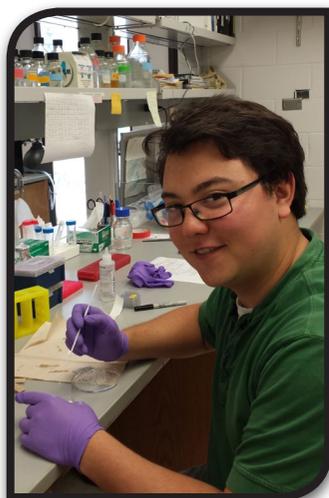
UNIVERSITY OF IOWA

"For two summers, I worked with Professor Barbara Christie-Pope from Cornell College and her students when they came to our lab to join our efforts in investigating mutations that cause birth defects. I enjoyed exploring new topics and finding solutions to problems with her and her students who were enthusiastic and very willing to learn. My long-term career goal is to become a professor at a liberal arts college such as Cornell and I learned more about that career from Dr. Christie-Pope. I was honored to be invited to visit Cornell and give a lecture on my PhD thesis work that centers on understanding the functions of an ion channel called Transient receptor potential, melastatin-like 7 (Trpm7). I was glad that Dr. Christie-Pope took an interest in my professional development. I also

attended a panel of the FUTURE in BiomedicineSM fellows, and learned about the different paths those individuals have taken to their current careers. By visiting Cornell College on multiple occasions, I have had the chance to learn more about Dr. Christie-Pope's work which allows me to understand how to navigate into my desired profession. Thus, the FUTURE in BiomedicineSM Program has been a great asset in my own career advancement."

Amanda Decker

*Graduate Student, Anatomy and Cell Biology, University of Iowa | UI Faculty Mentor: Robert Cornell, PhD
Worked with FUTURE in BiomedicineSM Fellow Barbara Christie-Pope, PhD, Cornell College*



CORNELL COLLEGE

"I am a recent graduate of Cornell College in Mt. Vernon, Iowa, where I majored in Biochemistry and Molecular Biology. I'm currently working in the laboratory of Assistant Professor Sheila Baker in the Department of Biochemistry in the UI Carver College of Medicine. I initially joined her laboratory in the summer of 2013 as a Cornell College Dimensions Fellow in Research.

I was invited to join her group through a network of connections made through the FUTURE in Biomedicine program. Professor Christie-Pope at Cornell had been a Faculty Fellow in the program, Dr. Baker had been a host in the program, and Dr. Shea, the director, helped connect us. In the Baker laboratory, I worked with Yuan Pan, a Ph.D. student, and Joe Laird, a research assistant. I jumped into the research, and gained many specific techniques including: designing primers and cloning DNA constructs, generating transgenic frogs via REMI reactions and microinjecting oocytes, processing and cryosectioning tissues for immunohistochemistry(IHC), and processing microscopy image data for scientific publication. Most importantly, I learned how these tools and techniques can advance biomedical research.

While I spent the summer of 2013 in Iowa City, I also participated in many of the professional development opportunities of the FUTURE in Biomedicine program which helped broaden my horizons about careers in research, and the road to graduate school or clinical training. I presented my results in poster sessions alongside the FUTURE in Biomedicine students and Fellows.

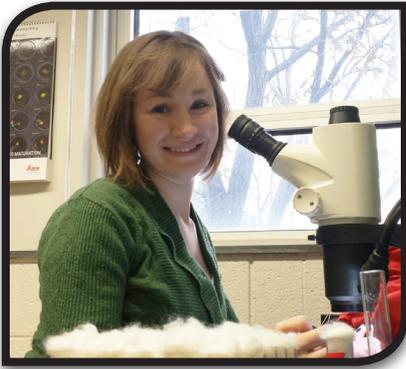
I enjoyed that first summer so much that I wanted to continue contributing to the research in Dr. Baker's laboratory. Fortunately, the "one course at a time" block structure at Cornell College allowed me to spend a month at a time in Dr. Baker's lab and be truly immersed in her research projects. I then returned in the summer of 2014, supported by the Biochemistry Summer Undergraduate Fellowship (BSURF) program.

I was honored to have my contributions to the Baker lab research program recognized by earning a place as a co-author on a peer-reviewed publication titled, "A di-arginine ER retention signal regulates trafficking of HCN1 channels from the early secretory pathway to the plasma membrane," published in *Cellular and Molecular Life Sciences* in 2014. We studied these channels in the retina, but this family of channels is also found in other critical areas such as brain and heart.

The FUTURE in Biomedicine program catalyzed opportunities for me to find my passion for doing research, and helped prepare me to accept a position as a full-time member of a research laboratory."

David Yamaguchi

*Baker Lab Research Assistant, University of Iowa Carver College of Medicine
2014 Biochemistry Summer Undergraduate Research Fellow | UI Faculty Mentor: Sheila Baker, PhD*



ST. AMBROSE UNIVERSITY

“During the summer between my junior and senior year at St. Ambrose University, I was selected for the Biochemistry Summer Undergraduate Research Fellowship. My St. Ambrose Biology professor, Dr. Shannon Mackey, had told me about exciting research she had begun in a laboratory the prior summer as a Fellow in the FUTURE in Biomedicine Program. I decided to join Dr. Mackey in continuing the work she began in the laboratory of Professor Lori Wallrath in the Department of Biochemistry in the Carver College of Medicine at the University of Iowa.

The Wallrath group uses the power of *Drosophila* genetics to study processes that are essential for all animals to control the packaging of chromosomes and expression of genes. With my background in biology and chemistry, I was well prepared for this work and found that I enjoyed genetics very much. I applied to the UI Interdisciplinary Graduate Program in Genetics

and matriculated in 2011. Since coming to Iowa, I joined the Llopart laboratory in the Department of Biology, and continue to interact with Dr. Wallrath through the Genetics PhD program.

During my undergraduate years, the FUTURE in Biomedicine program helped introduce me to the University of Iowa and to the model organism *Drosophila*, which I continue to work with on a daily basis. Since joining the Genetics program, I have realized that I enjoy teaching undergraduates and my ultimate goal is to share my knowledge and excitement for research with students at a liberal arts college. The FUTURE program is one of the very few programs that aid in helping graduate students like me prepare for a career as a faculty member at a liberal arts college. This is an exciting career path, and getting the “straight scoop” from current faculty at these schools in our region provides practical advice that will help me prepare for that next stage of my own professional development.”

Danielle Herrig

*Genetics PhD Candidate, University of Iowa Carver College of Medicine
2010 Biochemistry Summer Undergraduate Research Fellow | UI Faculty Mentor: Lori Wallrath, PhD*

CELEBRATING SIX YEARS

Partnerships with the University of Iowa's FUTURE in BiomedicineSM have included professors of chemistry, biology, and psychology at some of the state's leading institutions. Since 2009, FUTURE in BiomedicineSM has now connected 29 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





2013

Cornell College

Barbara Christie-Pope, PhD
Brianna Christensen
Robert Cornell, PhD

Drake University

Adina Kilpatrick, PhD
Amanda Marwitz
Madeline Shea, PhD

Graceland University

Mary Shawgo, PhD
Christopher Chambers
John Kirby, PhD

Morningside College

Rachel Robson, PhD
Quinton Behlers
Dan Diekema, MD
Tara Smith, PhD

Mount Mercy University

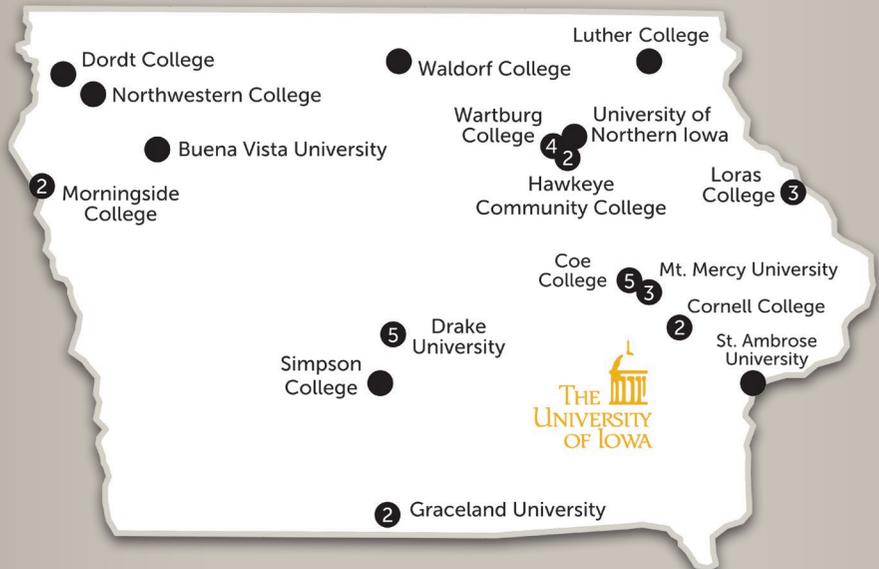
Ryan Bezy, PhD
Jeremy Cline
David Weiss, PhD

University of Northern Iowa

Nalin Goonesekere, PhD
Logan Poole
Michael Henry, PhD



2009-2014 PARTICIPANTS



ONGOING CONNECTIONS

The FUTURE in BiomedicineSM Program encourages all fellows and students to extend the spirit of collaboration beyond the laboratory by sharing accomplishments and successes through the Ongoing Connections Update. Our goal is to foster a community of partnership that continues to benefit everyone involved in the program.

TO SEND US AN UPDATE, VISIT US ONLINE AT:
www.medicine.uiowa.edu/future



Learn more about FUTURE of Biomedicine events and programs
online at www.medicine.uiowa.edu/future.



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