

# Biochemistry Today

Alumni Newsletter

May 2014

University of Nebraska-Lincoln



## Special points of interest:

- UNL joins the Big Ten
- \$7.9 million in new external funding last year
- Four new faculty
- Teaching and mentoring highlighted
- Undergraduate achievements celebrated

## Inside this issue:

Parkinson's and Algal Biotechnology	2
Significant Grant Activity	3
Promotion, Tenure and New Faculty	4
Department and Student Highlights	5
Undergraduate Awards	6
Undergraduate Updates	7
Alumni Contact	8

## From the Department Chair

The Department of Biochemistry continued to maintain and strengthen its position as one of the most accomplished research units at the University of Nebraska.

We completed our Academic Program Review in April 2011 with very high marks and now look forward to joining the Committee on Institutional Cooperation, the academic arm of the Big Ten.

This past year, four new faculty members joined Biochemistry (page 4). We've made seminal discoveries, resulting in a remarkable record of scholarly publications in top tier biochemistry journals and an impressive level of extramural funding (page 3).

Members of the Department of Biochemistry are shaping the direction of future research both through their individual research programs and collaborative research efforts (page 2).

The teaching mission in the department, likewise continues to be strong with just under 350 undergraduate majors. Our faculty and staff have received awards and accolades of excellence in teaching (page 5), of which we are extremely proud.

The contributions of our faculty have not gone unnoticed as demonstrated by the breadth of awards and honors bestowed upon them locally, nationally, and internationally including **Dr. Donald Weeks** who was named a Fellow of the American Association for the Advancement of Science.

It is indeed an honor to lead the Department of Biochemistry, which continues to be an outstanding academic unit on the basis of a rigorous and student-focused curriculum, the quality of research conducted, and the caliber of our graduates.

You are a part of our rich and successful history and we hope to hear from you regarding your current career endeavors. Please visit the department website, [biochem.unl.edu](http://biochem.unl.edu), click on Alumni and send us an update.



- Dr. Paul Black

## Parkinson's Research

UNL biochemist **Mark Wilson** studies a protein believed to play a critical role in causing mitochondrial abnormalities leading to Parkinson's and some cancers. He's expanding his research with a recent \$1.35 million grant from the National Institutes of Health's National Institute of General Medical Sciences.

Scientists now know that inheritable forms of Parkinson's disease develop from mutations in genes found in the mitochondria, the "cellular power plants" that perform a variety of functions within an organism's cells. For example, a genetic mutation that alters the DJ-1 protein disrupts the mitochondria's response to oxidative stress, an imbalance in molecular reactions that can damage cells and lead to diseases such as Parkinson's, Alzheimer's and ALS.



Scientists know that DJ-1 is an essential protein for maintaining the balance between helping cells survive oxidative stress and initiating cell death when cancer would otherwise form. But many questions remain about how it works and the effect of mutations.

Scientists know that DJ-1 is an essential protein for maintaining the balance between helping cells survive oxidative stress and initiating cell death when cancer would otherwise form. But many questions remain about how it works and the effect of mutations.

**Wilson** uses X-ray crystallography to determine DJ-1's three-dimensional structure in its normal and mutated forms to better understand how the protein contributes to neurodegenerative diseases.

## FACULTY NEWS

"The hope is that it will give us the ability to biochemically characterize the pathways that go amiss in these rare forms of Parkinson's," **Wilson** said. "Cancer and Parkinson's disease don't obviously have a lot in common, but they do have this protein in common. Our hope is that this protein connects a variety of serious human diseases to a common biochemical pathway."

Greater understanding of that pathway and its molecular components may one day lead to treatments against cancer and neurodegenerative diseases, he said.

- Gillian Klucas

## Algal Biotechnology receives \$7 million



**Paul Black** with algae samples

**Donald Weeks**, James Van Etten, Heriberto Cerutti, **Robert Spreitzer**, **Edgar Cahoon**, **Paul Black**, **Concetta DiRusso**, Thomas Clemente and **Cheryl Bailey** are UNL faculty who recently received a \$7 million dollar NSF EPSCoR Research Infrastructure Improvement grant for the Nebraska Coalition for Algal Biology and Biotechnology.

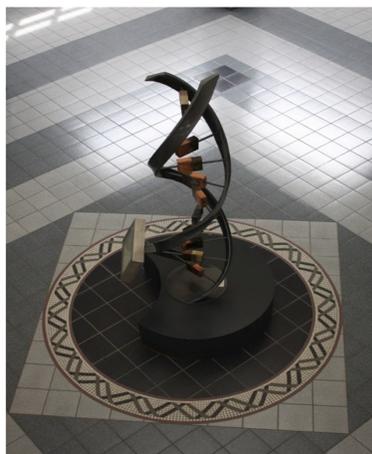
The project will expand on UNL's research in developing algal compounds of high value to society, such as specialty chemicals and drugs for humans or animals. While the coalition seeks applications in the algal biofuels arena, they are also interested in "identifying new molecular tools for molecular pathway engineering in order to alter the pathways in useful ways," **Weeks** said.

Two new coalition faculty members will be hired into UNL's Department of Biochemistry, Center for Plant Science Innovation and School of Biological Sciences, in part, with funding to the coalition from the NSF EPSCoR grant.

- Kelly Bartling

# Current Grant Activity

- **Donald Weeks, Edgar Cahoon, Paul Black, Cheryl Bailey, Robert Spreitzer, Concetta DiRusso** NSF \$7,000,000 EPSCoR Research Infrastructure Improvement: Algal biology and biotechnology
- **Jiri Adamec** NSF \$402,285 GEPR/LiT: Genetic and genomic approaches to understanding long-distance transport and carbon partitioning in plants
- **Cheryl Bailey** NSF \$478,850 Promoting concept driven teaching strategies in biochemistry and molecular biology
- **Cheryl Bailey** NSF \$456,412 Undergraduate research in microbial genome annotation
- **Gilles Basset** NSF \$440,000 Phylloquinone Biosynthesis in Plants: Enzyme discovery and pathway flux control
- **Edgar Cahoon** NSF \$550,355 Probing the metabolic and physiological significance of sphingolipid long-chain base desaturation in plants
- **Edgar Cahoon** NSF \$695,986 Biochemical Genomics: Quizzing the chemical factories in oilseeds
- **Donald Weeks** NSF \$935,998 Bicarbonate transport in Chlamydomonas
- **Donald Becker, Joseph Barycki, Mark Wilson, Jaekwon Lee** NIH \$10,800,000 NCCR Center of Biomedical Research Excellence - Nebraska Redox Biology Center
- **Joseph Barycki** NIH \$1,093,775 Structural insights into redox homeostasis
- **Donald Becker** NIH \$1,097,641 Role of proline in redox homeostasis and apoptosis
- **Donald Becker** NIH \$1,118,800 Coordination of functions by proline metabolic enzymes
- **Donald Becker** NIH \$546,343 The Redox Biology Center spectroscopy core
- **Jaekwon Lee** NIH \$1,075,850 Mechanistic insights into homeostatic copper acquisition
- **Melanie Simpson** NIH \$1,081,590 Role of hyaluronan matrix in prostate cancer progression
- **Mark Wilson** NIH \$1,607,141 Redox regulation of DJ-1 function
- **Paul Black, Concetta DiRusso, Donald Weeks** Dept of Energy \$1,903,000 Research for developing renewable biofuels from algae
- **Edgar Cahoon, Concetta DiRusso, Donald Weeks** Dept of Energy \$9,000,000 Algae Centers of Excellence: Consortium for algal biofuels commercialization
- **Edgar Cahoon** Dept of Energy \$1,412,772 Energy Frontiers Research Center: Center for advanced biofuels
- **George Oyler, Donald Weeks** Dept of Energy \$1,808,704 Algal biofuel research consortium
- **Robert Spreitzer** Dept of Energy \$495,000 Role of the Rubisco small subunit
- **Edgar Cahoon** USDA \$500,000 Production of bio-based lubricants in a dedicated industrial oilseed crop
- **Gautham Sarath, Madhavan Soundararajan** USDA \$1,181,866 The Hunt for Green Every April: Factors affecting fitness in switchgrass
- **Edgar Cahoon** Bill and Melinda Gates Foundation \$595,000 BioCassava Plus



*Grants listed only include those above \$400,000*

# FACULTY FOCUS

**Tomas Helikar** joins the faculty from a ..... postdoctoral research position at the University of Illinois Urbana-Champaign. She works to understand the physiological function of genes in anaerobic prokaryotes using methanogens as a genetically tractable model system. Her lab examines redox-active molecules and secondary metabolites that may have pharmacological or industrial utility, including applications to biofuels and abrogating global warming. Three undergraduates currently work in her lab and she is the faculty advisor for the



**Oleh Khalimonchuk** ..... examines mechanisms of endocytosis in eukaryotes, specifically in heparin/Hyaluronan/Chondroitin sulfate endocytosis and turn-over in addition to receptors that cycle through the cell regulating process. Ed was a Research Assistant Professor of Biochemistry and Molecular Biology at the University of Oklahoma Health Sciences Center. One graduate student and two undergraduates currently work in his lab.



## Jonathan Markham

..... focuses on developing cutting edge technologies that focus on proteomic and metabolomic approaches to Systems Biology and their application to biological problems involving recognition and identification of molecular entities leading the response of cells and organs to stress from the environment and disease. Jiri has two graduate students and two undergraduate research students. He previously was a Research Associate Professor at Purdue University as well as an Executive Board Member of the Bindley Bioscience Center and a co-founder of Intelimmune, LLC.



**Jing Zhang** ..... shares a joint appointment in Biochemistry and the Forensic Science Program. Her lab focuses on the development of assays for use in forensic DNA analysis and she works closely with law enforcement so that results are immediately transferable to operational crime laboratories. She teaches Elements of Biochemistry as well as Forensic Biochemistry and currently has three undergraduate research assistants. Ashley was an Adjunct Professor at Florida Institute of Technology prior to joining us at UNL.

**Dr. Jiri Adamec** was promoted to Associate Professor

**Dr. Jaekwon Lee** was promoted to Full Professor

**Dr. Mark Wilson** was promoted to Associate Professor with Tenure

**Dr. Donald Becker** was promoted to Full Professor

**Dr. Edgar Cahoon** was promoted to Full Professor

## Department Highlights and News

- **Concetta DiRusso** was selected as a Jefferson Science Fellow for 2014-2015. It includes work in Washington, D.C., and abroad.

- **Donald Weeks** received the ORCA (Outstanding Research and Creative Activity) Award for 2014.

- **Paul Black** was selected by the UNL Chapter of Sigma Xi to receive the Outstanding Scientist Award, which is based on lifetime achievements in research.

- **Ashley Hall** was awarded

the Junior Faculty Holling Family Award for Teaching Excellence.

- **Britta Osborne** received a “Certificate of Recognition for Contributions to Students” from the Parents Association/Teaching Council.

- **Donald Weeks** was named a fellow of the National Academy of Inventors, an honor given to esteemed innovators and inventors.

- **Concetta DiRusso** and **Charles Wood** were named Fellows of the American Association for the Advancement of Science.

ciation for the Advancement of Science.

- **Concetta DiRusso** was presented the 2013 Award for Outstanding Service to the UNL Postdoctoral Community.

**Nicole Milkovic** (Molecular Mechanisms of Disease Predoctoral Trainee) received two awards.

- National Association of Colleges and Teachers Agriculture (NACTA) Graduate Student Teaching Award of Merit Certificate

- College Reading & Learning Association's (CRLA) International Tutor Training Program Certification Level 1.



# GRADUATE STUDENT FOCUS

## PhD Degrees – December 2013 and May 2014

### December 2013:

**Ben Arentson**—Postdoctoral Researcher with Dr. Don Becker, UNL

**Drew Brueggeman**—Postdoctoral Researcher at Monsanto, St. Louis, MO

**Tom Plucinak**—Postdoctoral Research Associate at National Jewish Health, Denver, CO

### May 2014:

**Maxim Gerashchenko**—Postdoctoral Researcher with Dr. Vadim Gladyshev, Brigham and Women’s Hospital, Boston, MA

**Annastasia Hyde**—Post-doc with ??? At ???

**Caitlin O’Hare McAtee**—Postdoctoral Researcher with Dr. Melanie Simpson, UNL

## Graduate Degrees 2013-2014

### Ph.D

**Ben Arentson**

**Drew Brueggeman**

**Tom Plucinak**

**Maxim Gerashchenko**

**Annastasia Hyde**

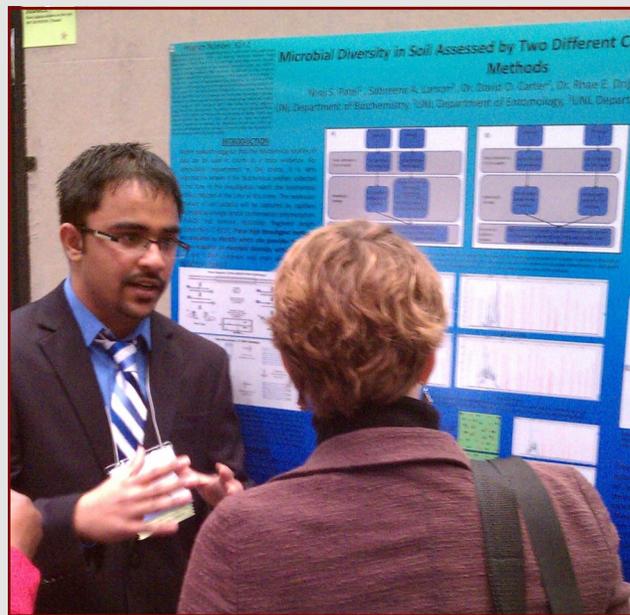
**Caitlin O’Hare McAtee**



# UNDERGRADUATE FOCUS

## Research Awards

The Undergraduate Creative Activities & Research Experience (UCARE) program continues to match undergraduate students seeking research experiences and faculty mentors in the research arena. In 2010-2011, 39 students were active in UCARE research within Biochemistry.



*Above* **Niraj Patel** presented at the 2011 American Society of Biochemistry and Molecular Biology, Washington D.C.. He won the 2011 Outstanding UNL Undergraduate Research Fair Poster Presentation for the junior class (\$250 prize). He also is a Roscoe C. Abbott and a Milton E. Mohr Scholarship winner.



*Left* **Laura Purcell** is a Chancellor's Scholar, UCARE participant (Weeks Lab) and a Roscoe C. Abbott Scholarship winner.

*The May 2011 class included two Chancellor's Scholars—indicating they earned a 4.0 GPA for all four years of their study. Both students completed an honors thesis and graduated with Highest Distinction.*

*Congratulations to Laura Purcell and Nick Wohlgemuth!*

## Scholarship Winners 2014-2015

The Dr. Benjamin M. Sahagian Scholarship Award recipients: ???, ???, and ???.

The Roscoe C. Abbott Scholarship was awarded to ???, ??? and ???.

The Donald P. Weeks Scholarship was given to ???. This award was established in 2010 by cur-

rent faculty member **Donald Weeks** and his wife Rita to reward rural students who display exceptional academic ability and strong community leadership.

The Milton E. Mohr Scholarship for students in the sciences of biotechnology and engineering recognized several Bio-

chemistry undergraduates: **Sara K. Christianson, Amanda K. Hare, Shelby J. Koenig** and **Boqiang Tu.**

**Andrew Keralis** won the 2011 Outstanding Student Leader award from the College of Agricultural Sciences and Natural Resources.



Phi Beta Kappa inducted **Brian Coburn, Matthew Kelly, Reed Stubbendieck, Jason Vitek, and Nicholas Woghlgemuth**

**Matthew Kelly** and **Lukas Mueller** were inducted to The Innocents Society & **Daniel Chilcote** and **Tom Brockhoft** to Mortar Board for their outstanding scholarship, leadership and service.



***Kayla Stram** is just one of our many student athletes in Biochemistry. She poses here with the 2009 NCAA Bowling Championship Trophy.*



**2010-2011 Club Officers** *Back: Mike Stewart, Bryant Keller, Nick Wohlgemuth, Tom Brockhoft* *Front: Anya Sen, Megan Hatfield, Cara Wogsland*

## Biochemistry Club

The most popular event this year was the Beadle Center Lab Tours where several faculty members opened their labs and gave personal tours to the students. 75 students attended this event and pizza wasn't even involved!

Other activities included designing and administering the Chemistry portion of the Nebraska Science Olympiad high school competition, bowling, UNMC tour, Advice Night, Senior Send-

Off Cookout, and more.

The students designed a new T-shirt this year filled with science humor revolving around the enzyme helicase.

The Club was nominated for several categories during the CASNR Celebration Week, including Outstanding Organization, Philanthropy, and Officer (**Cara Wogsland** for her leadership with Science Olympiad).

## Summer Research Experience for Undergraduates

**REU 2010 Summer Program in Redox Biology.** Twelve students participated in this year's 10-week undergraduate research program sponsored by the National Science Foundation and the Department of Defense (PI: **Don Becker**, co-PI: **Julie Stone**).

If you know a student that would be interested in a great summer research experience, encourage them to apply to our program.

The NSF Summer REU grant was renewed for another three years in 2010.



*Front: Heather Talbott, Asma Ashraf, Cassi Johnson, Erin Sanders, **Don Becker*** *Middle: Grant Pierre, Eboni Chambers, Emily Brown, Alexis Paspalof, Danielle Smithen* *Back: **Julie Stone**, Michael Schwartz, Matthew Zmudka, Jacob Peterson*



Department of Biochemistry  
University of Nebraska-Lincoln  
N200 Beadle Center  
1901 Vine Street  
Lincoln, NE 68588-0664



**Dr. Eric Moellering** (BS '04) presented the 2011 Annual Alumni Seminar (shown here with **Paul Black**). Eric is a Scientist at Synthetic Genomics, Inc. and discussed lipid remodeling in plants and algae in response to environmental stress.

## What's new with you?

*Want to recommend an outstanding graduate? Got a promotion? Established your health care career? Finished that Masters or Ph.D.? Have you published recently? Let us know your updated information. We wish to stay connected with our alumni!*

*Simply visit the department website (<http://biochem.unl.edu>) and choose Alumni to send us an update.*

You've always said someday you'll give something back to the college that gave you so much.

How about now?

To make a donation, please contact Ann Bruntz, IANR Director of Development, University of Nebraska Foundation, 402-458-1176. Or go to [abruntz@unfoundation.org](mailto:abruntz@unfoundation.org)



*The University of Nebraska-Lincoln does not discriminate based on gender, age, disability, race, color, religion, marital status, veteran's status, national or ethnic origin, or sexual orientation.*