

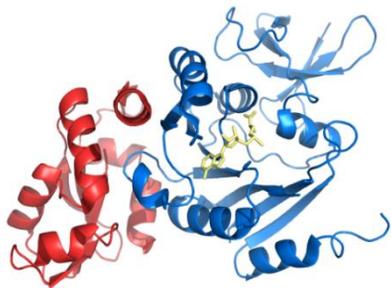
BIOCHEMISTRY ALUMNI ASSOCIATION

Department of Molecular and Structural Biochemistry

North Carolina State University

FALL 2012 NEWSLETTER

2012 Vol 1:1



The Department of Molecular and Structural Biochemistry Establishes The Biochemistry Alumni Association

At the May 2012 Graduation ceremonies, the Biochemistry Faculty announced the formation of the Biochemistry Alumni Association. This May's 2012 graduating class thus became the charter members of our Alumni Association. However, the Biochemistry Alumni Association now includes all past students who have graduated from NC State with either an undergraduate or graduate degree in biochemistry. As a biochemistry alumnus, please expect regular newsletters keeping you up to date on the activities of the department, faculty, and students. And please stay in contact with us. We want to know where you are and what you are doing.

Dr. Ed Sisler Receives the Alex Laurie Award for Research and Education from the Society of American Florists

Dr. Ed Sisler received the 2012 Alex Laurie Award from the Society of American Florists at their annual meeting in September held in Palm Beach, Florida. Dr. Sisler was recognized for his work developing inhibitors against the plant hormone ethylene that delay the ripening process in both plant fruits and flowers, thus extending their shelf life. Each year the Society recognizes one individual who has made a broad scope and long lasting impact on the floriculture industry. Congratulations Ed!



From the Department Head's Desk

We've seen many changes in the past year or so, and we anticipate many more changes in the coming years. Drs. Paul Agris and Carla Mattos accepted positions elsewhere, and Drs. Bill Miller and Ed Sisler are completing their final years of phased retirement. In addition, Dr. Dennis Brown stepped down as department head after fifteen years of service. With many life sciences faculty moving to the new College of Sciences, we hope to grow the department by hiring new faculty and by increasing our graduate and undergraduate enrollments. Currently we are interviewing candidates for a faculty position in X-ray crystallography. There will be many opportunities available for us as the college reorganizes over the next year so stay tuned for more news in the coming months.



Dr. Clay Clark

William V. Esoda and Katyna Borrota-Esoda Graduate Student Travel Award

William Esoda (Business NCSU 1980) and spouse Katyna Borrota-Esoda (Biochemistry NCSU 1984) have established an endowment to provide ongoing financial support for graduate students in their respective former NC State Departments. This award in Biochemistry will support annual travel awards for biochemistry graduate students to attend national and international meetings where they will be able to present their thesis research. The Biochemistry Faculty is most appreciative of this endowment and have awarded the first William V. Esoda and Katyna Borrota-Esoda Graduate Student Travel Award to Christine Cade (Clark lab). Christie recently attended the 26th Annual Gibbs Conference at Southern Illinois University University (September 22-25) where she gave a talk describing her Ph.D. thesis research entitled "Allosteric Pathways of Caspase-3".





Biochemistry Graduation Ceremonies May 2012

At the May 2012 department graduation, Dr. Jim Knopp led the ceremonies and awarded B. Sc. degrees in biochemistry to 61 graduating seniors. Also conferred were 6 Ph.D. and 1 M. Sc. degrees (picture above). The undergraduate students had a graduating GPA of 3.25, one of the highest of any major at NC State University. Approximately 1/3 of the undergraduates graduated with Latin honors. Approximately 2/3 of the graduating seniors are continuing their studies in various professional schools, having been accepted to medical, dental, pharmacy, and graduate schools and physician's assistants programs both in North Carolina and around the country. Congratulations graduating seniors and graduate students!

Faculty Members Drs. Ed Sisler and William Miller Retire

After a combined total of more than 85 years as Faculty members in the Biochemistry Department, Drs. Ed Sisler and William Miller will retire in July 2013 after three years of phased retirement. In addition to their teaching commitments in the department, both had very active research careers. Dr. Miller's research program was focused upon how follicle-stimulating hormone (FSH) produced in the pituitary gland regulated gene expression critical for egg production in follicle cells. His research accomplishments were recognized in 1996 when he became a William Neal Reynolds Professor. Dr. Sisler's research focused on the plant hormone ethylene and the development of ethylene inhibitors (see page 1 and recognition of Ed's work by the Society of American Florists). Upon retirement, both Bill and Ed will become Emeritus Faculty of the Biochemistry Department and NC State University.

Dennis Brown Steps Down as Department Head and Returns to Teaching and Research

On July 1, Dr. Dennis Brown stepped down as department head and returned to research and teaching. Dennis came to NCSU in 1999 from UT Austin where he was Director of the Cell Research Institute and Chair of the Division of Biological Sciences. At NC State, Dennis led the department's initiative to build in the area of structural biology with the hiring of six junior and one senior faculty members. This initiative established centers in X-ray crystallography, NMR spectroscopy, and mass spectrometry, the acquisition of several million dollars in research instruments, and the hiring of three managers to oversee the day-to-day operations of these centers. During Dennis' 15 years as department head, the faculty have published over 400 research papers, been granted 21 patents, and been awarded more than 47 million dollars in grant funding. On the academic side during Dennis' tenure, the Biochemistry Department graduated almost 1300 B.Sc., 32 M. Sc., and 62 Ph.D. students. The undergraduate program, under the dedicated direction of Dr. Jim Knopp, has now grown to over 400 majors, making it one of the largest undergraduate biochemistry programs in the nation. The faculty and students are pleased that Dennis is remaining as a member of the department, continuing both his teaching efforts and his research program developing vaccines for infectious diseases in conjunction with his company Arbovax. Thanks Dennis for all your hard work on our behalf!

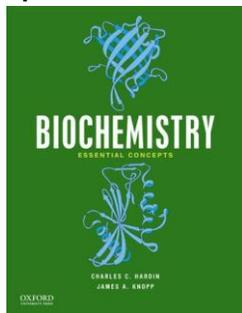


In the Classroom.....

Drs. Charles Hardin and James Knopp Publish a New Textbook: 'Biochemistry - Essential Concepts'

Drs. Chuck Hardin and Jim Knopp recently published a new textbook/workbook with Oxford University Press (2012, ISBN 97 80199 765621). The forward describes this new textbook as "This 'field manual' is intended as an efficient, pared-down aid to help students assimilate the key ideas. It presents a self-contained 16 week course, at a level that will help students proceed successfully to professional and medical school course work".

The 316 pages contain over 800 figures and graphs designed to help students master the fundamental principles of introductory Biochemistry. It is presently being used in BCH 351: Introductory Biochemistry.



BCH 495: Introduction to Biochemistry.
A new course for incoming biochemistry freshmen and new biochemistry transfer students.

A new course, BCH 495 is being taught for the first time this fall semester. It is entitled "Introduction to Biochemistry" and is offered to our incoming freshmen and transfer students entering biochemistry. The class is replacing the old ALS 103 and is specifically designed for our biochemistry majors. Dr. Cindy Hemenway is teaching this class which will cover general topics designed to help students navigate the requirements of the biochemistry curriculum and academic life at NC State in general. Topics covered will include an overview of library resources, University resources and policies, curriculum planning and time management skills. Enrolled students will also hear guest speakers and get to meet many of the biochemistry faculty. Overall, BCH 495 (eventually BCH 103) will help to engage students as biochemistry majors in the department sooner and help begin their preparation for careers in biochemistry.

BCH Faculty Promoted to Research Assistant Professors

Drs. Paul Swartz and Ben Bobay were recently promoted to Research Assistant Professors. Paul directs the department's x-ray crystallography facilities and Ben is an investigator working in the department's NMR facilities. Congratulations to both!

Alumni Corner

Our featured alumnus this fall is Dr. Elizabeth Tran, an Assistant Professor in the Department of Biochemistry at Purdue University. Beth received her Ph.D. at NC State University in 2004 and then worked as a postdoc at Vanderbilt University in the laboratory of Dr. Susan Wentz until 2009. Along the way Beth's research was recognized with the Anne A.J. Work Award for Outstanding Graduate Research (NCSU 2003) and the Outstanding Postdoctoral Fellow of the Year Award in the Department of Cell and Developmental Biology (Vanderbilt University Medical Center 2009). Beth has now established her own research group at Purdue where she is investigating the role of RNA helicases in nuclear-cytoplasmic mRNA transport and the involvement of long non-coding RNAs in this process. She is presently supported by a 5 year NIH grant entitled "The Role of DEAD Box Proteins in Gene Regulation." Her lab's first publication recently appeared in the Journal of Biological Chemistry where it was featured as Paper of The Week. In recognition of her accomplishments, the Biochemistry Department designated Beth Outstanding Alumnus of Biochemistry and the College of Agriculture and Life Sciences in 2010.



BCH Faculty and Students On the Move

This past summer Dr. Linda Hanley-Bowdoin and Fulbright Scholar Dr. Leandro de Leon traveled to Uganda and Tanzania giving talks on DNA sequences that enhance geminivirus disease symptoms at the Global Cassava Partnership Conference in Kampala, Uganda. Linda then traveled by Land Rover over 1700 km with collaborator Dr. Joseph Ndunguru of the Mikocheni Agricultural Research Institute (see photo) visiting local farmers in Tanzania. During their travels, all three even managed to cross the equator.



Drs Clay Clark and Sara MacKenzie attended the Gordon Research Conference on cell death held in Barga, Italy this past July.

Dr. John Cavanagh recently visited and gave seminars at The University of Maryland, Iowa State University, and the National Oceanic and Atmospheric Administration and was symposium chair at the Vanderbilt University NMR Meeting.

Dr. Clay Clark completed his 4 year term of service on the National Institutes of Health Macromolecular Structure Grants Panel.

Dr. Linda Hanley-Bowdoin served as a grants panel member on the Plant Genome Research Panel in May at the National Science Foundation in Washington.

Dr. Clay Clark and lab group attended the 26th Annual Gibbs Conference at Southern Illinois University In September where his graduate student Christy Cade gave a research talk entitled "Allosteric Pathways of Caspase-3" (see front page).

Dr. John Cavanagh recently served on the National Institutes Of Health Macromolecular Structure Grants Panel

Dr. Flora Meilleur attended the American Crystallography Association Meeting in Boston, MA in July where she gave a Talk entitled "Locating hydrogen atoms in enzymes using neutron protein crystallography".

Dr. Linda Hanley-Bowdoin and Dr. Joseph Ndunguru attended The National Science Foundation BREAD (Basic Research Enabling Agricultural Development) conference for Principal Investigators held in Washington D.C. This past July. Dr. Ndunguru was then able to spend two weeks in Linda's lab after this meeting working on their collaborative research investigating geminiviruses that infect the cassava plant.

Undergraduate Research in the Spotlight

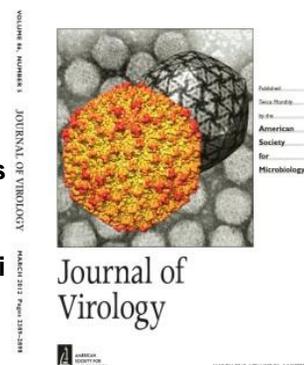
Our featured undergraduate researcher is Charles Zogras, a senior in our biochemistry program. Charles spent this past summer working at Argonne National Laboratories. He applied for and received last spring a Department of Energy Student Undergraduate Laboratory Internship (SULI) that enabled him to work for 10 weeks in the Biosciences Division under the direction of Dr. Phillip Liable. The Liable research group is investigating the reaction center located in the membrane of the purple bacterium *Rhodospirillum rubrum*. This highly complex reaction center (RC) is composed of numerous proteins is responsible for photosynthesis in this organism. Charles' research involved an examination of the photosynthetic efficiencies of various RC component proteins that were mutated and their function examined. Specifically, Charles

spent the summer constructing different mutant proteins via site-directed mutagenesis of their genes, culturing and expressing these recombinant proteins, and then purifying them using several affinity chromatography techniques. Knowledge from these investigations has implications allowing for the creation of sophisticated biometric devices and biological switches, all governed by the power of a photon of light.



In the Research Lab.....

The thesis research of Ph.D. student Ricardo Vancini (Brown laboratory) and his discovery of a new Birnavirus was featured on the cover of the Journal of Virology in March 2012. (see the Vancini et al (2012) reference below)



A new 700 MHz Bruker NMR spectrometer with cryoprobe was installed in the department's NMR facility in September. The department now has two 700 MHz instruments along with a 600 MHz and 500 MHz high-field NMR spectrometers. This makes our NMR facility one of the best in North Carolina.

Recent Publications:

Vancini, R. et al. (Brown lab) (2012) Journal of Virology **86**: 2390. "Espirito Santo Virus: a new Birnavirus that replicates in insect cells".

Gagnon, K. et al (Maxwell lab) (2012) Journal of Biological Chemistry **287**: 19418. "Structurally conserved Nop 56/58 N-terminal domain facilitates archaeal box C/D ribonucleoprotein guided methyltransferase activity".

MacKenzie, S. et al. (Clark lab) (2012) Death by Caspase Dimerization, in Protein Dimerization in Biology, Landes Bioscience, p 55-73.

Walters, J. et al. (Clark lab) (2012) Bioscience Reports **32**: 401. "Allosteric modulation of caspases through mutagenesis".

Miles, D. et al (Meilleur lab) (2012) J. Applied Crystallography 45: 686. "Neutron protein crystallography at ultra-low temperatures".

He, L. et al. (Meilleur and Brown labs) (2012) Journal of Virology 86: 1982. "Conformational changes in Sindbis Virus induced by decreased pH revealed by small-angle neutron scattering".

Munshi, P. et al. (Meilleur lab) (2012) Acta Cryst. 68: 35. "Rapid visualization of hydrogen positions in neutron crystallography structures".

Bobay, B. et al. (Cavanagh lab) (2012) FEBS Letters "Structural insights into the calcium-dependent interaction between calbindin-D28K and caspase".

Bobay, B. et al. (Cavanagh lab) (2012) Biomolecular Concepts 3: 175. "Dynamics and activation in response regulators: the $\beta 4$ - $\alpha 4$ loop".

Stowe, S. et al. (Cavanagh lab) (2012) Drug Chem Toxicology 35: 310. "Evaluation of the toxicity of 2-aminoimidazole antibiofilm agents using both cellular and model organism systems".

Olson, A. et al. (Cavanagh lab) (2012) Biomol NMR Assign. 6: 95. "H, C, and N resonance assignments and secondary structure prediction of the full-length transition state regulator AbrB from Bacillus anthracis".

FRONT COVER: The *M. jannaschii* Nop56/58 (red) -- fibrillar (blue) protein dimer assembled in archaeal box C/D sRNP complexes is bound with S-adenosyl-methionine cofactor (yellow) to direct nucleotide methylation of rRNA nucleotides. See Gagnon et al. (2012) JBC 287: 19418.