American Chemical Society
Susquehanna Valley Section

OCTOBER 2017 NEWSLETTER

The four hundred and fortieth meeting of the American Chemical Society, Susquehanna Valley Section will be held on Wednesday, October 4, 2017 at 7:00 pm in room 107 in Breiseth Hall on the Wilkes University campus in Wilkes-Barre, PA. The speaker will be ROBERT J. STANLEY, Ph.D., Professor of Chemistry at Temple University. The talk will be preceded by a dinner at 5:30 pm in room 102 in the nearby Cohen Science Center.

"*Extremophilic DNA Repair – Some like it hot, and others not*"

Dr. Robert J. Stanley
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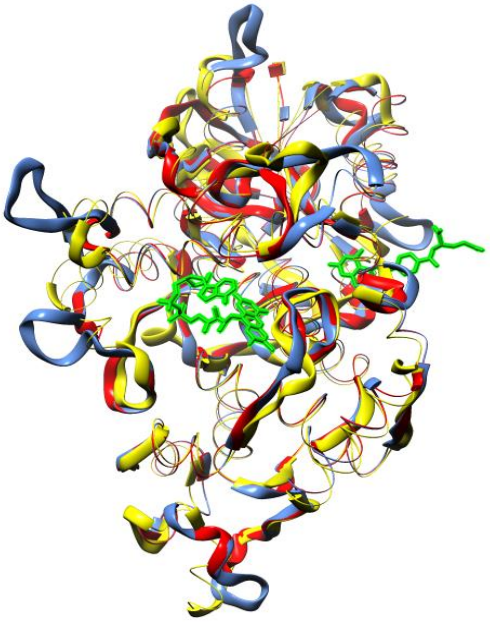
1901 N. 13th St.
Philadelphia PA, 19122

DNA is damaged by ultraviolet light, and its efficient repair is a requirement for life and evolution on Earth. These repair enzymes had to adapt to function over a wide range of habitats. Our study of extremophilic repair proteins is aimed at elucidating the limits over which life might exist both on and outside the Earth. Towards this goal we present our exploration of DNA photolyase, vitamin B_2-based light-driven enzyme, cloned from cold-and hot-adapted extremophiles.

Photolyase is an excellent model protein in which to explore the role of temperature and other environmental parameters in enzymes. At its core is a vitamin B_2 cofactor (flavin adenine dinucleotide, or FAD) which when excited by blue light transfers an electron to the bound UV-damaged DNA dimer substrate. The binding of this substrate, however, is a light-independent process, nicely separating substrate binding and catalysis steps. Since the catalytic step is gated by a photon, the mechanism can be followed in great detail using time-resolved spectroscopy.



Homology model of CpPL (blue) based on StPL (red) and EcPL (yellow). CpPL has more loops suggesting greater flexibility

FAD cycles through several redox states during the reaction and each state has a characteristic UV/vis absorption spectrum. Therefore, we have monitored the electron transfer step and repair mechanism using ultrafast transient absorption spectroscopy. These results, along with steady-state spectroscopic experiments, coupled with site-directed mutagenesis of the protein has allowed us to identify a potential evolutionary "missing link" in the evolution of photolyase to cryptochrome, a homologous protein that plays a variety of roles in different organisms.

BIOGRAPHY OF DR. STANLEY:

Bob Stanley began his scientific journey at the age of 5 in the back of a station wagon. He wondered why the moon was able keep up with the speeding car while adjacent trees whizzed past the window. Convinced he would become an astrophysicist he started studying physics at UC San Diego. After realizing his math abilities would not sustain his dream career he fell down the math ladder and ended up receiving a B.A. in (Physical) Chemistry from UC Berkeley.

Bob worked for a year as an analytical chemist analyzing metals to be used in nuclear reactors, and working at Lawrence Berkeley Labs measuring the water content of oil shale ash. This experience motivated him to apply to graduate school. He entered the University of Colorado at Boulder and then the Pennsylvania State University and received his M.S. in Physical Chemistry working under Prof. A.W. Castleman, Jr. He then spent 5 years in New York City pursuing a career as a professional clarinetist, after which he returned to Penn State to finish his Ph.D. in 1991 on "Ion Dip Spectroscopy of Molecular Clusters".

Following this, he was invited as a postdoctoral fellow into the group of Prof. Steven G. Boxer at Stanford University. There he studied the ultrafast electron transfer reaction in bacterial photosynthetic reaction centers using femtosecond fluorescence upconversion. He was a NIH Postdoctoral Fellow from 1992-95 and was also a Life Science Research Associate at the Stanford Free Electron Laser (FEL). He remained at Stanford until 1996 whereupon he accepted an Assistant Professorship in Chemistry from Temple University.

Stanley was promoted to Associate Professor with tenure in 2001 and Full Professor in 2014. He has received funding from the NSF, American Cancer Society, the Petroleum Research Institute, and most recently from the Exobiology division of NASA. His research centers around the excited state properties of biomolecules and their analogs. These include DNA, UV-damaged DNA and fluorescent base analogs, flavins and synthetic dyads that serve as photosensitizers for artificial photosynthesis. Along the way he and his group are engaged in understanding how flavins like FAD and FMN are synthesized enzymatically.

Stanley's current research focuses on the excited state properties of flavoproteins that perform light-driven DNA repair (e.g. photolyases), using everything from ultrafast lasers to lightbulbs to molecular biological approaches. He and his research group are now exploring how Nature adapts functionally identical proteins to different extreme environments.

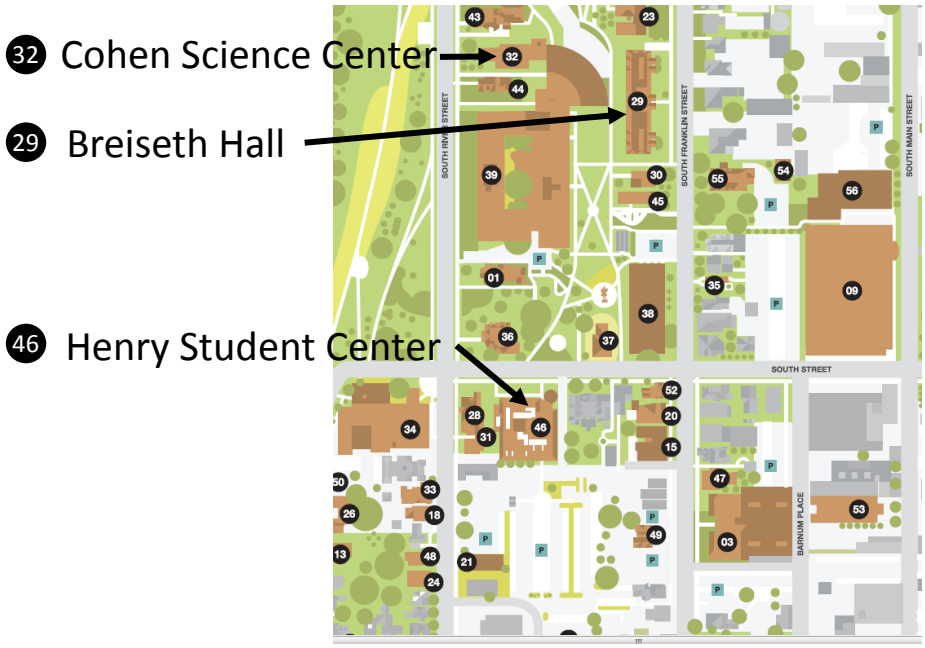
DINNER: The lecture will be preceded by dinner at 5:30 PM in room 102 in the Cohen Science Center. Dinner will be buffet style, including a vegetarian option and dessert. The cost will be $15.00 per person, payable at the dinner. Please RSVP by 4 p.m. on Friday, Sept. 29 to Gennie Singer by email <genevieve.singer@wilkes.edu> or phone (570.408.4750).

DIRECTIONS TO WILKES UNIVERSITY:

Detailed directions can be found at
http://www.wilkes.edu/about-wilkes/campus/directions-to-campus.aspx

An interactive map of the campus can be found at:
http://www.wilkes.edu/about-wilkes/campus/map/index.aspx

Take Exit 3 (River Street Exit), from PA Route 309N then make a left at traffic light. You are now on River Street. Immediately after turning left onto River Street you will encounter the first of 9 traffic lights. Continue on River Street to the 9th light where you will turn left (east) onto South Street. The Henry Student Center will be the second building on your right. Immediately to the left of the building (just after the crosswalk) is a driveway that leads to a parking lot.



The full map above can be found at
http://www.wilkes.edu/about-wilkes/campus/map/_images/map11x17-2015.pdf

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SECTION NEWS:

2018 LOCAL SECTION ELECTIONS:
Nominations, including self-nominations, are due for the position of Chair-elect prior to the October meeting. Voting will take place in November. If interested, please contact Dr. Ron Supkowski at ronaldsupkowski@kings.edu or 570-208-5900x5733.

NATIONAL CHEMISTRY WEEK: October 12 –28, 2017

The Susquehanna Valley Section is once again collecting posters for this year's event. If you know of a student in K-12 who would like to participate please contact Patrick Martino at patrick.martino@bucknell.edu. The deadline for submissions is Wednesday November 1. For further details, see the website.

NATIONAL ACS NEWS:

ACT4CHEMISTRY:

Legislation that may impact the chemical enterprise comes before Congress on a regular basis, and the ACS is committed to keeping its members informed and encouraging them to weigh in on high-priority issues. One of the main ways the ACS does this is through Act4Chemistry. To learn more please visit their website or email advocacy@acs.org.

NATIONAL MEETINGS:

The 2018 spring national meeting will be held in New Orleans, Louisiana from March 18 – 22. A call for papers has been opened with most divisions having a deadline of Monday, Oct. 16. See the website for details.

Susquehanna Valley Section Web Page: http://departments.kings.edu/SusquehannaValleyACS

Please send any comments about the monthly newsletter to Ron Supkowski, Section Secretary
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