The Bernard Axelrod Lectures 2007

DEPARTMENT OF CHEMISTRY, BIOCHEMISTRY, MOLECULAR BIOLOGY & CELL BIOLOGY AT NORTHWESTERN UNIVERSITY

~Brief Biography~

DR. OLKE UHLENBECK

Uhlenbeck is an enthusiastic practioner of SCIENCE, whose biophysical studies of nucleic acids have spanned the range from simple duplexes to catalytic RNAs and ribosomes. He received his BS in Biophysics from the University of Michigan and his PhD in Biophysics from Harvard University before pursuing postdoctoral research at the University of California, Berkeley with Professor Ignacio Tinoco, Jr. Olke established his first independent laboratory in the Department of Chemistry at the University of Illinois where he was quickly promoted to Full Professor. In 1986, he accepted the position of Biochemistry Division Head within the Department of Chemistry & Biochemistry at the University of Colorado, Boulder. He has recently moved back to the Midwest, where he is now the Board of Trustees Professor of Chemistry and Biochemistry, Molecular Biology and Cell Biology at Northwestern University, Evanston. Olke's research accomplishments have resulted in recognition throughout his scientific career. He has been honored by an NIH Career Development Award, an NIH-MERIT Award, Election to the National Academy of Science and a Lifetime Service Award from the RNA Society.

"Tuning tRNAs for Translation"

April 30 - 3:30PM
PFEN
Deans Auditorium

The ribosome can be considered to be an enzyme which changes its substrate specificity at each step in the protein polymerization reaction. The 46 different aminoacyl-tRNA substrates of translation in *E. coli* show considerable structural diversity that is conserved among bacteria. Each tRNA not only possesses its characteristic anticodon and esterified amino acid, but has a specific sequence and array of post-ranscriptional modifications. Recent experiments suggest that this structural diversity "tunes" each tRNA to function uniformly at each translational sub-step. Thus, the sequence of each tRNA has evolved idiosyncratically in order to offset the intrinsic kinetic and thermodynamic variation caused by the differing chemical and physical properties of the anticodon and esterified amino acid. Carefully designed aa-tRNA chimeras can be used to understand how each aa-tRNA is tuned to be uniform. Aminoacyl-tRNAs appear to require uniform intrinsic rates in translation in order to maximize translational accuracy.

"Less isn't Always More: The Hammerhead Ribozyme"

May 1 - 4:00PM
PFEN
Deans Auditorium

The hammerhead is an RNA motif that is embedded in the genomes of plant pathogenic RNAs that promotes self-cleavage as part of their replication pathway. Its small size and efficient cleavage *in vitro* makes the hammerhead an interesting example of a catalytic RNA or ribozyme for mechanistic studies. However, experiments measuring the cleavage rates of hammerheads containing conservative chemical modifications failed to locate active site residues and did not agree with the X-ray crystal structure. The resolution of this dilemma has recently emerged and illustrates an interesting pitfall in relating RNA structure to function.