2021 Herty Medal Reception

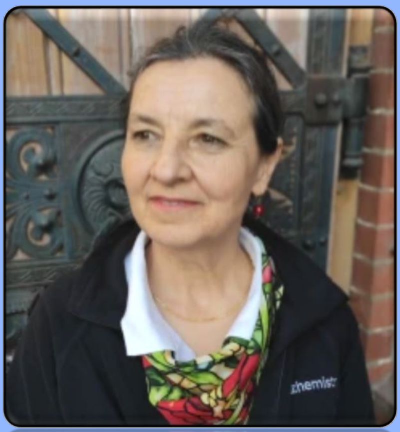
Flavins - From the Dawn of Life to Bright Futures

Prof. Anne-Frances Miller

University of Kentucky
2021 Herty Award Medalist

All living organisms must expend energy to repair and replicate themselves. Many of the reactions involved are redox reactions. These are commonly mediated by metal-containing enzymes, especially when single-electron transfers are required. However, many redox enzymes with deep evolutionary roots employ pterins or flavins, which are organic cofactors we obtain in our diets as vitamins. As mankind undertakes an urgent transition to a less environmentally costly lifestyle, we can turn to flavins again. Ancient lineages of bacteria harness favorable electron transfer reactions to drive unfavorable electron transfers. Thus, they perform the feat of producing a stronger reducing agent based on a weaker one. These reactions are bio-electrochemistry's version of having one's cake and eating it too. They adhere to the laws of thermodynamics yet allow bacteria to produce high-value energy based on cheap abundant fuel.
The electron transfer flavoproteins that accomplish this employ flavins to do so. However, the two chemically identical flavins display contrasting reactivities! Clearly, aspects of their different protein environments cause them to behave very differently. By learning how the protein environment entrains each of two flavins to different reactions, we seek to learn how to expand and optimize the reactivities of man-made dyes as well, by engineering their environments. The principles employed in proteins offer lessons on how new materials may be able to modulate the reactivities of dyes to improve the versatility and efficiency with which we capture and deploy electrochemical energy.

ACS Local Section
Georgia



Georgia Tech Hotel & Conference Center
Atlanta, GA

Thursday, September 30, 2021

6:30 PM Social
7:00 PM Dinner
8:00 PM Herty Award Program

$20 per person for in person Dinner and Reception

Join us in Person or Virtually