IMSA Great Minds Program ®

Leon M. Lederman Frontiers of STEM Symposium on Climate Change

April 2, 2013

Breakout Sessions 1:30-2:40

Dr. Fredric Janzen ~ IMSA Auditorium

Title: **Climate Change and Temperature-dependent Sex Determination in Turtles**

Abstract: Turtles globally are increasingly imperiled, primarily by anthropogenic processes. Now, rapid climate change stands to exacerbate these problems, since so many of these species also have temperature-dependent sex determination (TSD). To illuminate this pressing matter, I will present findings obtained from a quarter of a century of study of populations of turtles with TSD, focusing on the sensitivity of sex ratio to climatic variation and the inheritance of key traits underpinning TSD. Can these iconic, long-lived animals adapt fast enough to match ongoing climate change or will they fail by evolving at a turtle's pace instead?

Bio: Dr. Fredric Janzen has been a Professor in the Department of Ecology, Evolution, & Organismal Biology at Iowa State University since 1994. Before then, he received his Ph.D. from the University of Chicago and completed postdoctoral work at the University of California-Davis. In addition to teaching, mentoring, and outreach awards and recognition, he has received the Young Investigator Prize from the American Society of Naturalists. He has also authored more than 135 scientific publications since 1986 and served on multiple editorial boards. He has conducted integrative biological research for over 25 years to connect processes working at the molecular level all the way to those operating globally and at time scales from the imminent future to the pre-dinosaur past. In particular, he has contributed to a broader understanding of ecological, evolutionary, and genetic concepts, typically employing sex determination in reptiles as a model system.

Dr Beth Shapiro ~ IMSA Lecture Hall

Title: **Ligers, tigons and bears (Oh My!): The genomic consequences of inter-species hybridization**

Abstract: What makes a species? Driven largely by our natural inclination to categorize, we tend to think of all living things in discrete units – *species* – related to each other in a clearly defined taxonomic hierarchy into which every one fits neatly. New species emerge as evolutionary changes accumulate within one, leading to reproductive barriers that eventually split that one species into two. Hybrids, however, challenge this notion. As more and more genomes are sequenced, scientists are beginning to discover how common hybridization is in the wild, and that speciation may not be the directional – and irreversible – process we thought we understood. Through the remarkable and complex story of the evolution of the polar bear, I will discuss how hybridization may help to shape genomic diversity in wild populations, including aiding the survival of species during periods of dramatic environmental change. I will ask the question: is there really such a thing as a brown bear?

Bio: Dr Beth Shapiro is an evolutionary biologist who uses genomics to better understand the complex relationship between environment and the evolution of species. A pioneer in the young field called "ancient DNA," Beth travels extensively in the Arctic collecting bones of long-dead creatures including mammoths, horses, and extinct giant bears. Using DNA extracted from these remains, she hopes to learn how environment drives evolution, and why some species may be more susceptible than others to extinction. Currently an Associate Professor in the Department of Ecology and Evolutionary Biology at the University of California Santa Cruz, she received her undergraduate degree in ecology from the University of Georgia in 1999, and a D.Phil in Zoology from Oxford University in 2003. She has been widely recognized for her research, including honors such as being selected as a MacArthur Fellow, Packard Fellow, Searle Scholar, and a National Geographic Emerging Explorer. Her scientific articles have appeared in such journals as *Science*, *Nature, Molecular Biology and Evolution*, and *PLoS Biology*.