NIMBioS
National Institute for Mathematical and Biological Synthesis

NIMBioS Interdisciplinary Seminar

3:30 p.m.*, Tuesday, February 10, 2015

Dr. Michael Lynch

Biology, Indiana Univ. Bloomington

NIMBioS Postdoctoral Fellows Invited Distinguished Visitor

Mutation, Drift and the Origin of Subcellular Features

Understanding the mechanisms of evolution and the degree to which phylogenetic generalities exist requires information on the rate at which mutations arise and their effects at the molecular and phenotypic levels. Although procuring such data has been technically challenging, high-throughput genomic sequencing is rapidly expanding our knowledge in this area. Most notably, information on spontaneous mutations, now available in a wide variety of organisms, implies an inverse scaling of the mutation rate (per nucleotide site) with the effective population size of a lineage. The argument will be made that this pattern naturally arises as natural selection pushes the mutation rate down to a lower limit set by the power of random genetic drift rather than by intrinsic molecular limitations on repair mechanisms. This drift-barrier hypothesis has general implications for all aspects of evolution, including the performance of enzymes and the stability of proteins. The fundamental assumption is that as molecular adaptations become more and more refined, the room for subsequent improvement becomes diminishingly small. If this hypothesis is correct, the population-genetic environment imposes a fundamental constraint on the level of perfection that can be achieved by any molecular adaptation, and indeed all adaptations. Additional examples consistent with this hypothesis will be drawn from recent observations on the transcription error rate and on the evolution of the oligomeric states of proteins.

Location: Tom Hallam Auditorium, Room 206 at NIMBioS, Claxton Education Bldg, 1122 Volunteer Blvd.

**Join us for refreshments at 3 p.m. in the Auditorium.*

The National Institute for Mathematical and Biological Synthesis (NIMBioS) brings together researchers from around the world to collaborate across disciplinary boundaries to investigate solutions to basic and applied problems in the life sciences. NIMBioS is sponsored by the National Science Foundation, the U.S. Department of Homeland Security, and the U.S. Department of Agriculture with additional support from The University of Tennessee, Knoxville.

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