Challenges and Opportunities in Mathematical and Theoretical Epidemiology

Carlos Castillo-Chavez

Mathematical, Computational and Modeling Sciences Center

Arizona State University, Tempe, AZ 85287

ccchavez@asu.edu

Sir Ronald Ross (physician) built a novel mathematical epidemiological framework for the study of the transmission dynamics and control of human diseases, over a century ago. His model and modes of thinking are still in use. In fact, Ross like frameworks are being used in identifying transmission disease mechanisms and in evaluating and ranking competing or co-supportive population-level intervention strategies in the context of communicable, vector born, sexually transmitted diseases and a number of socially transmitted processes that can be thought of as the result of contagion mechanisms. In this presentation, mathematical model formulations in the presence of various levels of heterogeneity are introduced and used to illustrate the evolution and transmission dynamics of communicable disease like influenza or tuberculosis.