



# NIMBioS

National Institute for Mathematical  
and Biological Synthesis



## NIMBioS Interdisciplinary Seminar

**Dr. Russell Lande\***

**Royal Society Research Professor  
Natural Sciences, Imperial College**

*\*NIMBioS Postdoctoral Fellows Invited Distinguished Visitor*

**3:30 p.m.\*\* , Tuesday, February 28, 2012**

**NIMBioS, Blount Hall, 1534 White Ave, 4<sup>th</sup> floor**

### **“Adaptation to an extraordinary environment by evolution of phenotypic plasticity and genetic assimilation”**

Adaptation to a sudden extreme change of environment, beyond the usual range of background environmental fluctuations, is analyzed using a quantitative genetic model of phenotypic plasticity. Generations are discrete, with time lag  $\tau$  between a critical period for environmental influence on individual development and natural selection on adult phenotypes. The optimum phenotype, and genotypic norms of reaction, are linear functions of the environment. Reaction norm elevation and slope (plasticity) vary among genotypes. Initially, in the average background environment, the character is canalized with minimum genetic and phenotypic variance, and no correlation between reaction norm elevation and slope. The optimal plasticity is proportional to the predictability of environmental fluctuations over time lag  $\tau$ . The first generation in the new environment the mean fitness suddenly drops and the mean phenotype jumps toward the new optimum phenotype by plasticity. Subsequent adaptation occurs in two phases. Rapid evolution of increased plasticity allows the mean phenotype to closely approach the new optimum. The new phenotype then undergoes slow genetic assimilation, with reduction of plasticity compensated by genetic evolution of reaction norm elevation in the original environment.

*\*\*Join us for refreshments in the NIMBioS Lobby on the 4th floor at 3 p.m.*

For more information about this and other NIMBioS Seminars, visit

<http://www.nimbios.org/seminars>

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