

EDITORIAL

Synthesizing ecology and evolution for the study of invasive species

This special volume is a compilation of papers from a workshop on *Synthesizing Ecology and Evolution for the Study of Invasive Species*, held in March 2009 at Lake Tahoe, CA, USA. The goal of this workshop was to bring together a diverse group of scientists to discuss gaps in research pertaining to invasion biology and outline research objectives for the future, with an emphasis on synthesizing the ecology and evolution of invasive species. Discussion among the participants exposed several areas that warrant additional data, experimentation, model development, and theoretical integration. For example, a substantial portion of the discussion was devoted toward examining the implications of theoretical models of invasive populations that couple ecological and evolutionary dynamics, including themes such as gene ‘surfing’ tracking waves of invasion, the evolution of Allee thresholds, and the importance of details of genetic architectures underlying traits undergoing selection during invasions. Discussion also focused on factors that have received inadequate attention in the field, such as the role of trans-generational plasticity (TGP) in promoting invasive success, coevolution between invasive and native species, and evolution of host–pathogen interactions during invasions. During the discussion, the possibility was raised that epigenetic changes might be important in promoting rapid evolution during invasions. Participants also discussed methodological advances that are enhancing the types of data available to analyse invasions, such as genomic approaches that could identify loci underlying critical traits that limit invasions. Several investigators noted the paucity of data from the native range of invasive populations, which is unfortunate, given that such information can illuminate the specific habitats that foster potentially invasive populations, and provide insights into

the evolutionary history of such populations. Finally, information from the literature on biological control could be mined more intensively to extract predictions on colonization success of invasive species, as the determinants of success in deliberate introductions should provide insight into comparable factors that accompany successful accidental introductions. The wide-ranging discussions that took place at this workshop will continue into the future and pave the way for a deepening of our understanding of the coupled ecological and evolutionary dimensions of invasions. In this special issue, we provide a sampler of the discussions on the theoretical, conceptual, and empirical integration of evolution and ecology that permeated the Lake Tahoe workshop, as well as some lucid and compelling case studies of rapid evolution during invasions.

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