Forest Landscapes and Global Change

New Frontiers in Management, Conservation and Restoration

Abstracts

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Symposium 5: Landscape genetics

A LANDSCAPE GENETICS APPROACH TO UNRAVEL THE COMPLEX EVOLUTIONARY HISTORY OF THE IBERIAN HONEY BEE HYBRID ZONE

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While landscape genetics is in its infancy, it is a rapidly growing research field in part owing to the increasing availability of powerful molecular and analytical tools. By integrating landscape ecology, spatial statistics and population genetics, landscape genetics is allowing an unprecedented understanding of the microevolutionary processes shaping genetic variation, which has important implications for the advance of ecological and evolutionary knowledge. The Iberian honey bee provides a great model system to address evolutionary questions using a landscape genetics framework. First, previous studies suggest that the Iberian honey bee has a hybrid origin and hybrid zones have been favored by evolutionary biologists as powerful natural laboratories to study evolutionary processes. Second, with the publication of the honey bee genome and development of high-density SNP markers, powerful tools are now available to dissect the relative importance of neutral and adaptive forces in shaping the Iberian honey bee hybrid zone, a goal of central importance as it leads to more robust inferences of demographic history and to identification of adaptive divergence. Herein, we will present an ongoing research project on the Iberian honey bee hybrid zone where the tools of landscape genetics and population genomics will be combined to unravel the challenging evolutionary history of the Iberian honey bee.

Symposium 4: Network theory to conserve and reconnect forested landscapes

SPATIAL GRAPH THEORY TO ASSESS ANIMAL MOVEMENT AND LIMIT DISEASE SPREAD IN FRAGMENTED LANDSCAPES

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There are several ways to characterize landscape spatial heterogeneity. For conservation purposes, the quantification of the amount of fragmentation (e.g., delineating spatial homogeneous patches) or its dual, that is, the degree of landscape connectivity (e.g., identifying potential paths, corridors, between resource patches) is a paramount. These two different properties of landscape spatial heterogeneity can be quantified using spatial graph theory. Here I present how graph theoretic and computational geometric methods can help assess landscape spatial heterogeneity effect on animal movement. Specifically, I describe how spatial graph theory encompasses previous graph-based methods such as those developed to detect boundary (e.g., triangulation-wombling algorithm and categorical-wombling algorithm) and to characterize boundary properties using boundary statistics (e.g., boundary width, boundary length, boundary width) as well as spatial graph-based methods allowing to quantify habitat connectivity (minimum planar graph network, least-cost paths) and algorithm to rank patch according to their importance to maintain landscape connectivity. For illustration, I apply these methods to study woodland caribou habitat in Canada to show how they can help to define reserve networks and prevent disease spread.