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JUIL.
2014

de 11h à 12h

SÉMINAIRE

Modelling competition and dispersal in a statistical phylogeographic framework

Stéphane Guindon
computational Evolution, Auckland, NZ

Competition between organisms influences the processes governing the colonization of new habitats. As a consequence, species or populations arriving first at a suitable location may prevent secondary colonization. While adaptation to environmental variables (e.g., temperature, altitude, etc.) is essential, the presence or absence of certain species at a particular location often depends on whether or not competing species co-occur. For example, competition is thought to play an important role in structuring mammalian communities assembly. It can also explain spatial patterns of low genetic diversity following rapid colonization events or the ``progression rule" displayed by phylogenies of species found on archipelagos. Despite the potential of competition to maintain populations in isolation, past quantitative analyses have largely ignored it because of the difficulty in designing adequate methods for assessing its impact. We present here a new model that integrates competition and dispersal into a Bayesian phylogeographic framework. Extensive simulations and analysis of real data show that our approach clearly outperforms the traditional Mantel test for detecting correlation between genetic and geographic distances. But most importantly, we demonstrate that competition can be detected with high sensitivity and specificity from the phylogenetic analysis of genetic variation in space.Joint work with L. Ranjard, D. Welch and M. Paturel.