

Reconstructing native American migrations from whole-genome and whole-exome data

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There is great scientific and popular interest in understanding the genetic history of populations in the Americas. We wish to understand when different regions of the continent were inhabited, where settlers came from, and how current inhabitants relate genetically to earlier populations. Recent studies unraveled parts of the genetic history of the continent using genotyping arrays and uniparental markers. The 1000 Genomes Project provides a unique opportunity for improving our understanding of population genetic history by providing over a hundred sequenced low coverage genomes and exomes from Colombian (CLM), Mexican-American (MXL), and Puerto Rican (PUR) populations.

I will explore the genomic contributions of African, European, and especially Native American ancestry to these populations, showing that Native American ancestry in PUR is most closely related to populations surrounding the Orinoco River basin, confirming the Southern America ancestry of the Taino people of the Caribbean. I will present methods to estimate the allele frequencies in the Native American fraction of the populations, and model their distribution using a demographic model for three ancestral Native American populations. These ancestral populations likely split in close succession: the most likely scenario, based on a peopling of the Americas 16 thousand years ago (kya), supports that the MXL Ancestors split 12:2kya, with a subsequent split of the ancestors to CLM and PUR 11:7kya. The model also features effective populations of 62; 000 in Mexico, 8; 700 in Colombia, and 1; 900 in Puerto Rico. Modeling Identity-by-descent (IBD) and ancestry tract length, we show that post-contact populations also differ markedly in their effective sizes and migration patterns, with Puerto Rico showing the smallest effective size and the earlier migration from Europe. If time permits, I will discuss how new coalescent approaches can help further refine the modeling of recent population history.

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