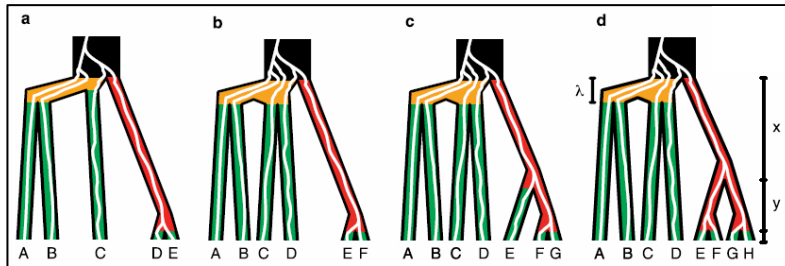


Mathematical models in evolution and genetics

The genotypes of individuals in a population contain signals of past evolutionary events. Because of a complex interplay of evolutionary forces such as population divergence, migration, admixture, natural selection, and changes in population size, it is a challenging statistical problem to extract information from DNA sequences about the factors important in the evolutionary history of a particular sample. Our lab works on mathematical models of evolutionary processes and on statistical methods for analysis of genetic variation data, accounting for the processes that have given rise to observed DNA sequences. Research in the lab relies on a combination of mathematical modeling, computer simulations, and statistical inference.

- Mathematical models of multi-species gene genealogies



This figure illustrates examples in which the most likely gene tree to evolve along the branches of a species tree can have a topology that differs from that of the species tree

- Inference of human evolutionary history from genetic markers

This figure gives a schematic map of human evolution. Alleles are represented by colored circles in each geographic region. The diagram reflects trends we have observed of decreasing genetic diversity moving outward from Africa towards the Americas, an excess of “private” alleles in Africa, and relatively few common alleles not present among Africans.

