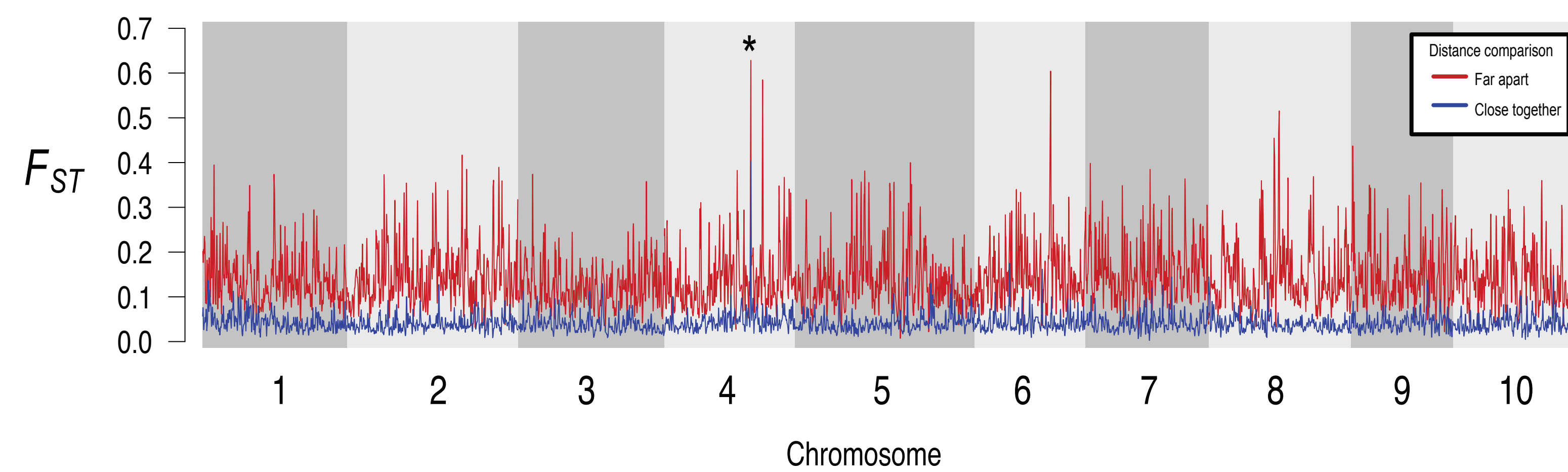


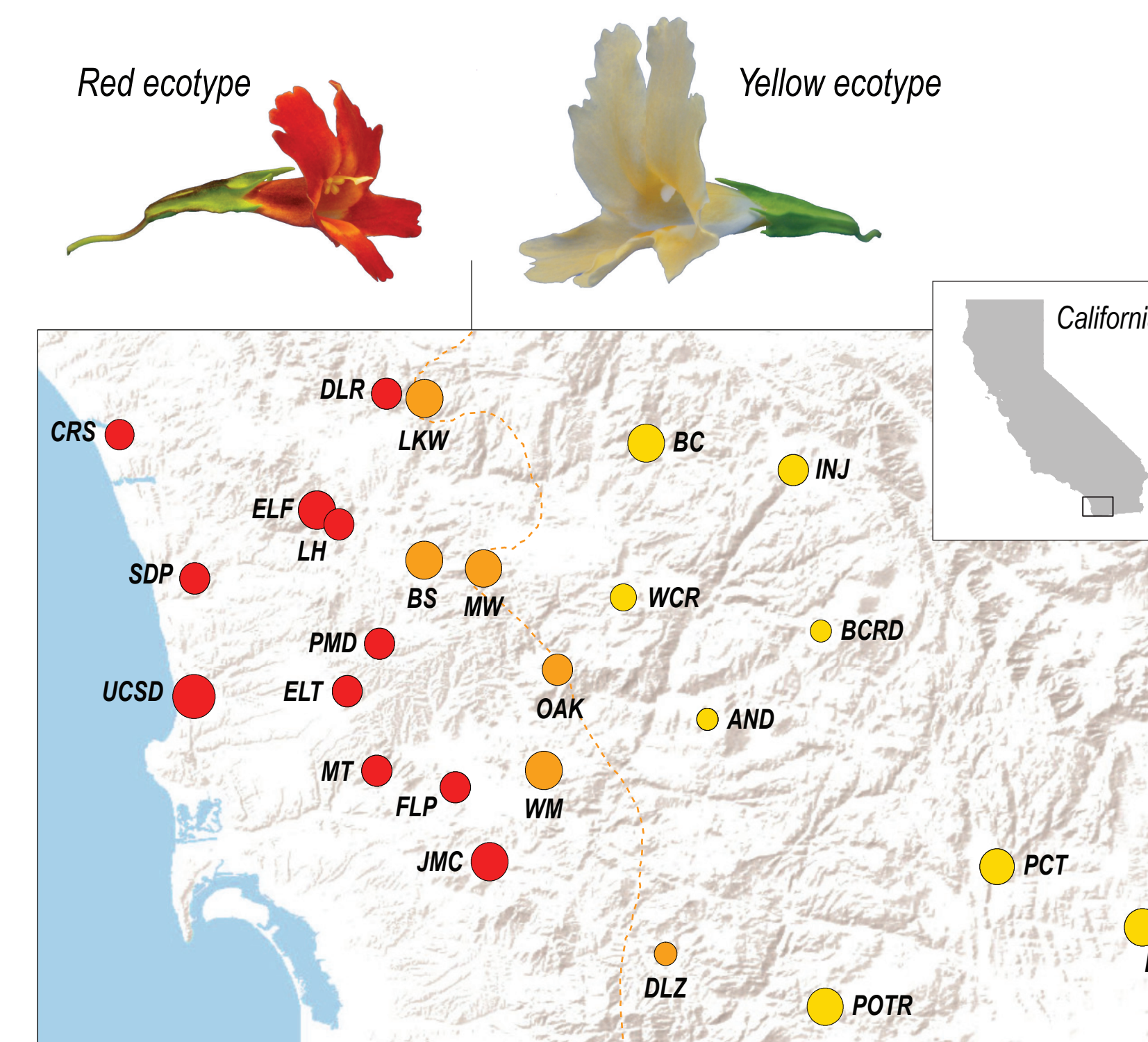
# How do geography and natural selection shape genome-wide variation in the bush monkeyflower?

Connor Lane, Sean Stankowski, and Matt Streisfeld

Genomes show complex, heterogeneous patterns of divergence during speciation



The bush monkeyflower is an excellent system for studying the processes that drive genomic divergence



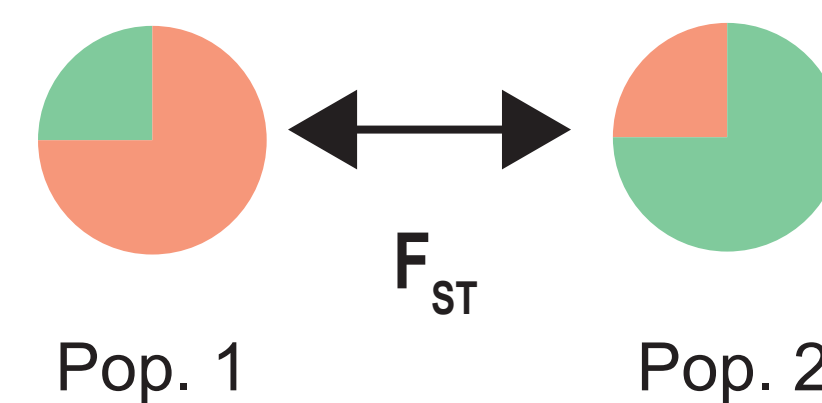
- Red and yellow ecotypes have broad geographic distributions across San Diego County
- Natural selection by pollinators has caused divergence of floral traits
- Hybridization allows for gene flow between ecotypes

## Methods

- Examined genome-wide variation using an existing Single Nucleotide Polymorphism (SNP) dataset

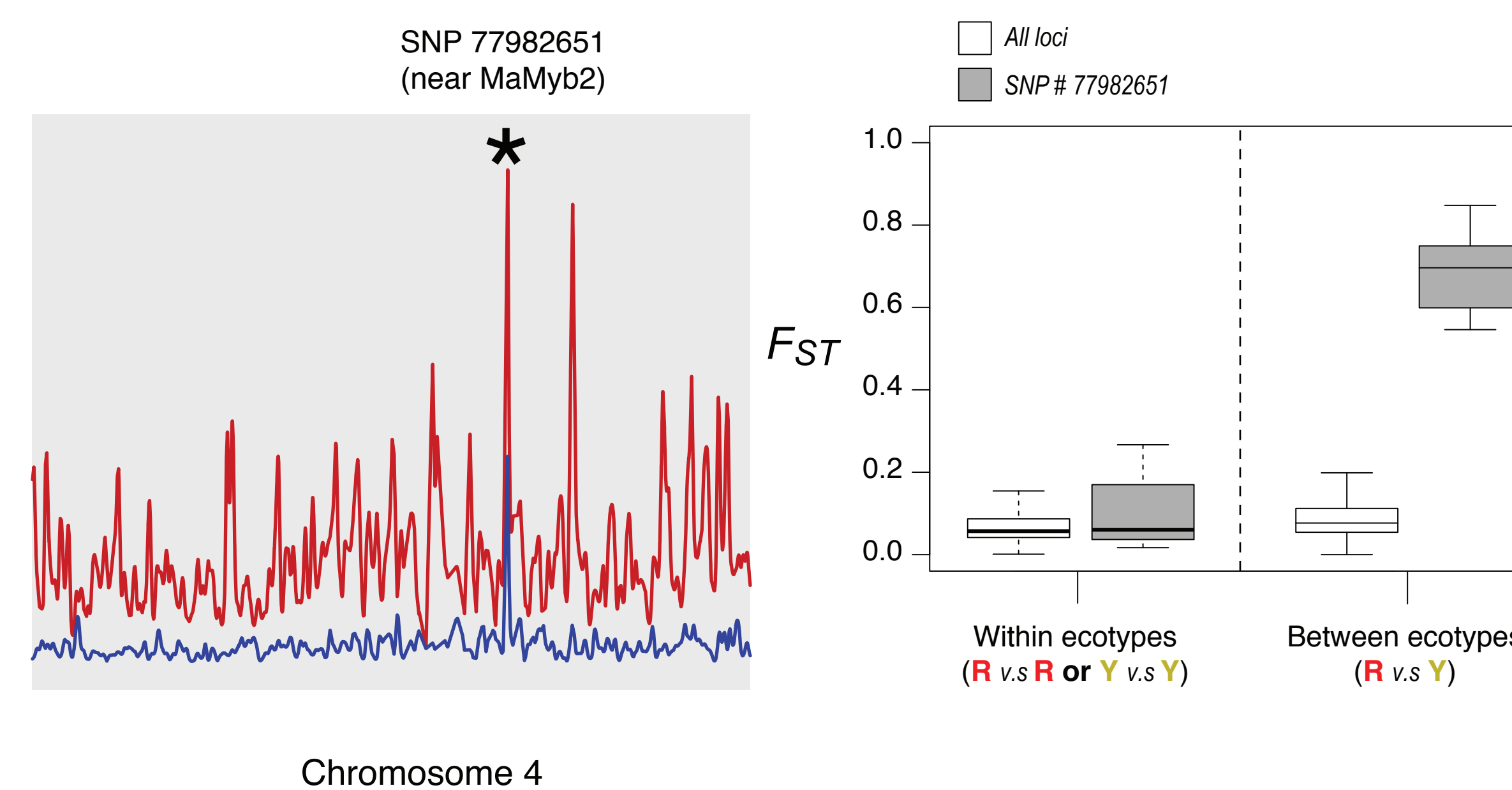
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ATGCTACGATAAC

- Calculated  $F_{ST}$  between each pair of populations
- Estimate of divergence ranging from 0 to 1



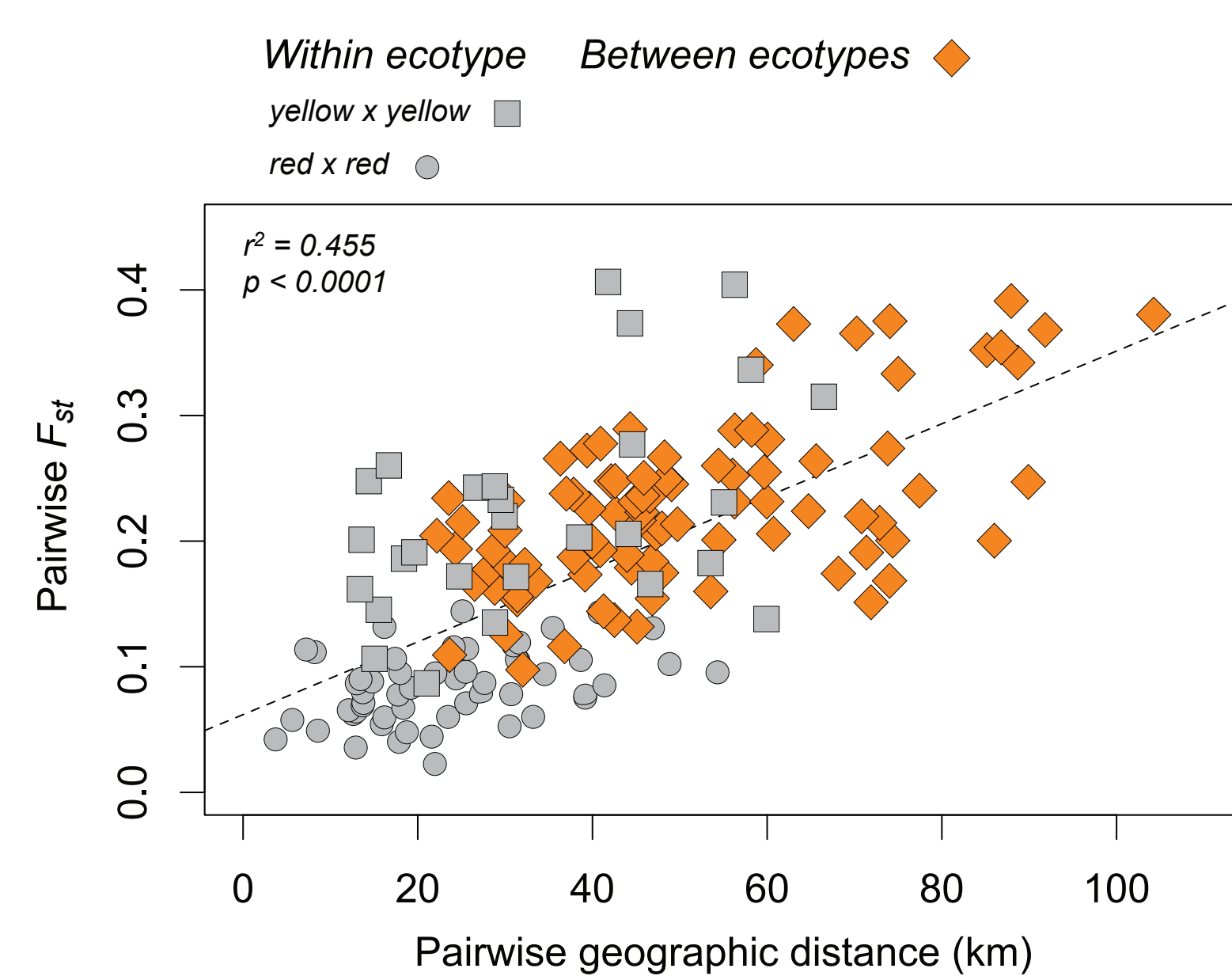
- Tested for consistent patterns between geographic distance and divergence, and for consistent divergence near a known target of natural selection
- flower color gene *MaMyb2*

Selection causes the consistent divergence of a narrow genomic region



- A SNP near the gene that controls flower color is highly diverged when red and yellow ecotypes are compared
- Divergence is limited to a narrow area of the genome
- Consistent with natural selection on flower color

Geographic distance accounts for some genome-wide differentiation



- Divergence increases as the distance between populations increases

- Changes in the distance between each pair of populations explains 46% of the variation in average  $F_{ST}$

- Divergence occurs across the whole genome

## Conclusion

Geography and selection both shape patterns of genome wide variation at different scales. Geographic distance between populations leads to a genome-wide increase in  $F_{ST}$  by decreasing gene flow while selection causes divergence in narrower genomic regions. Thus, a complete understanding how genomes diverge requires the study of geography and selection together.