

The benefit of being slow – a long lag phase yields a fitness advantage in constant environments

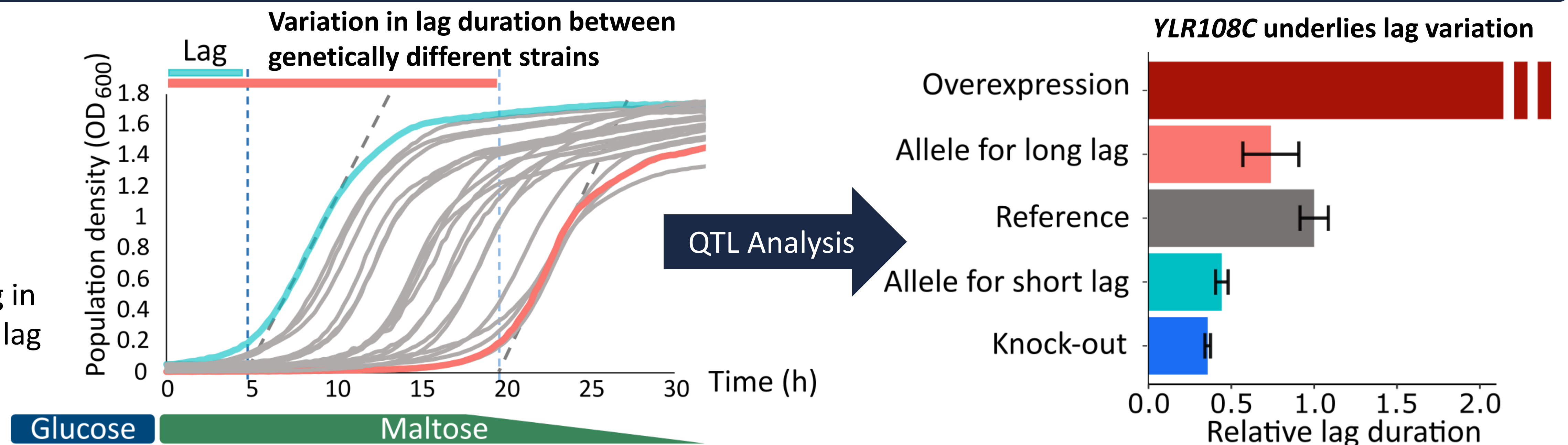
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INTRODUCTION

Microorganisms are subjected to changes in their environment

→ Cells need to adapt to the new environment

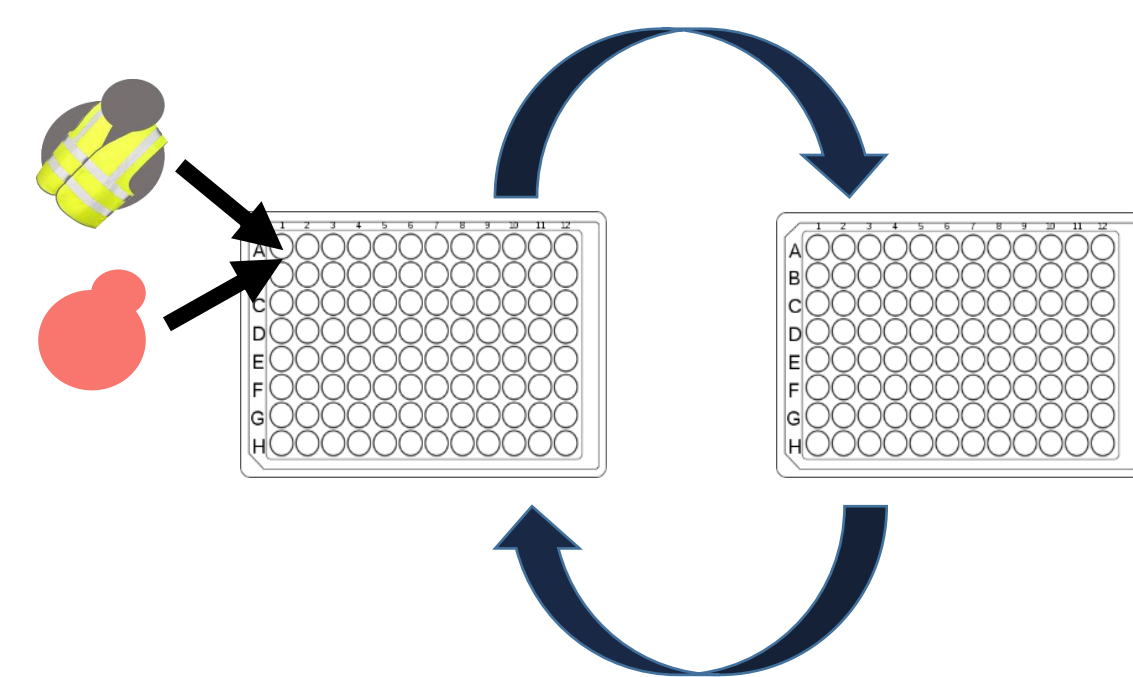
→ Takes time and energy resulting in a period of no or reduced growth: lag



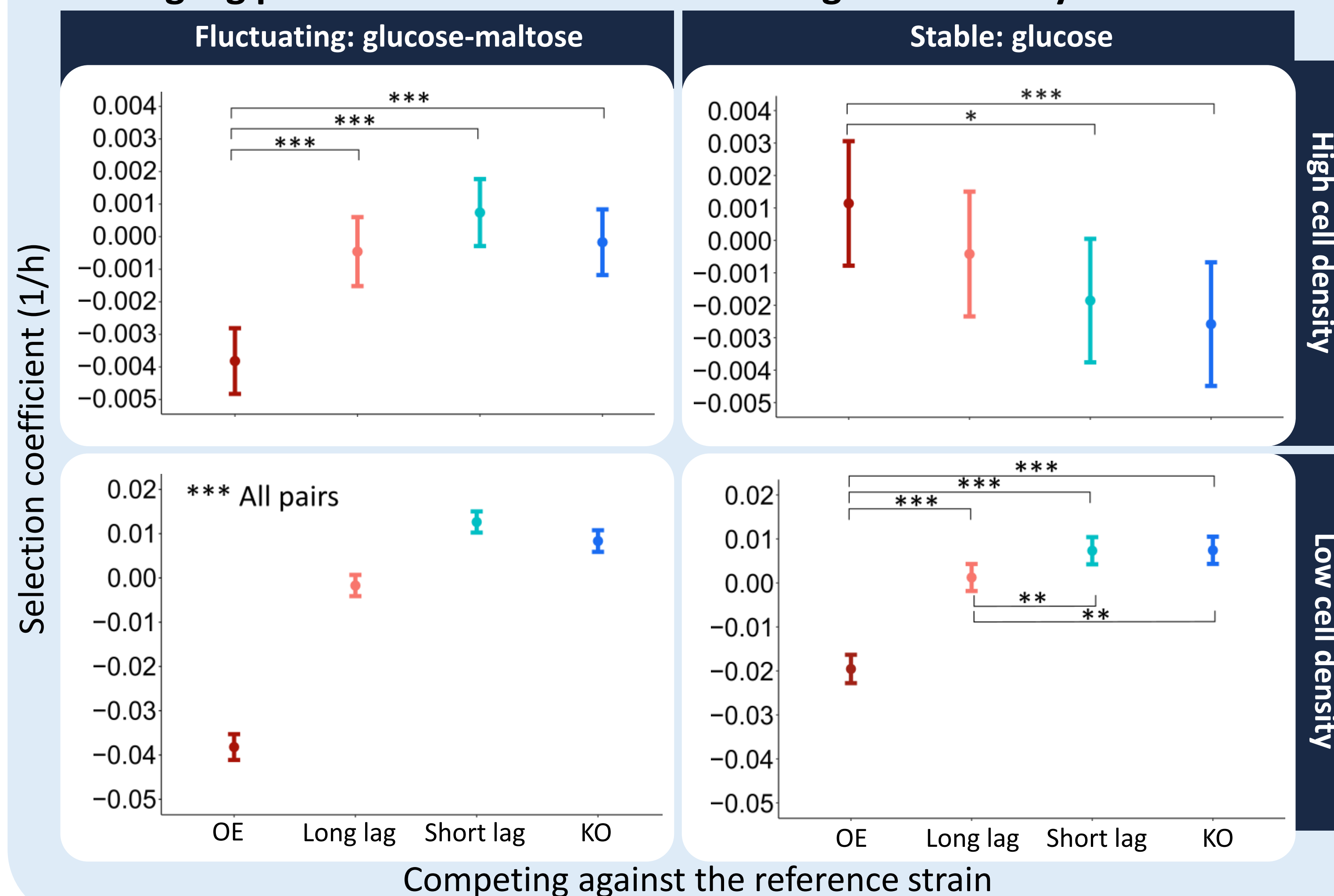
OBJECTIVE: When would a long lag be favorable?

1. Competition experiments

- Overexpression
- Allele swap (Long lag allele)
- Reference
- Allele swap (Short lag allele)
- Knock-out



Long lag phase is beneficial in constant high cell density environment



2. Sequence analysis

Collect YLR108c sequences

S. paradoxus
S. mikatae
S. uvarum
S. kudriavzevii

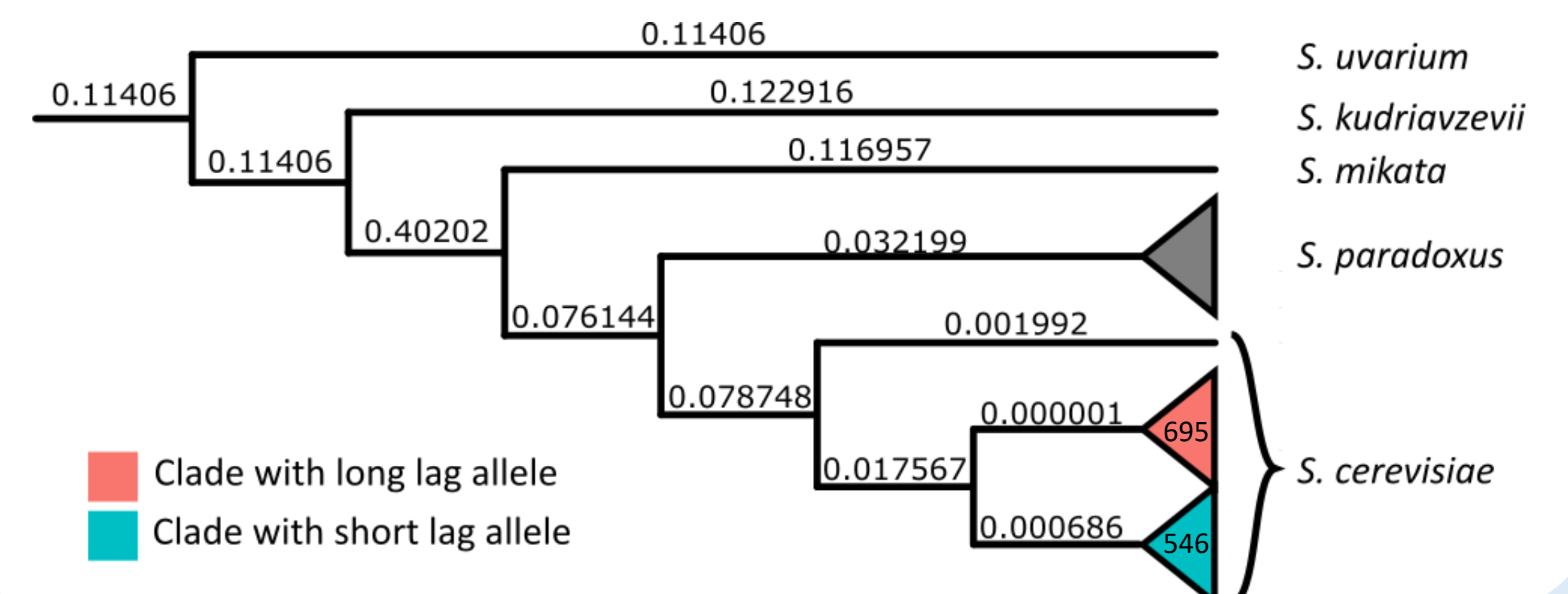
1,011 Natural isolates
 Peter J. (2018) Nature

Alleles for long and short lag in changing carbon environments

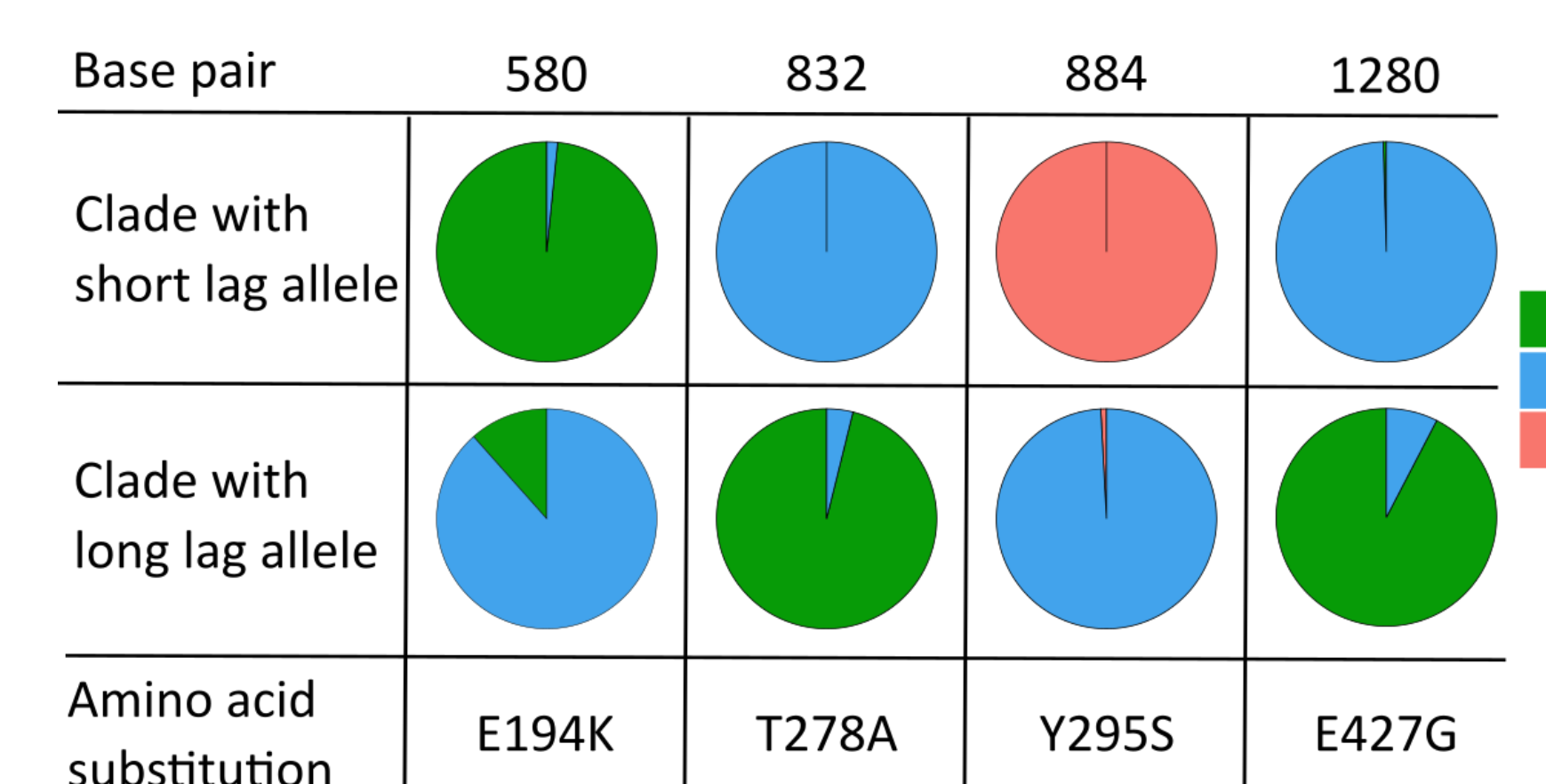
Alignment & clustering

Link clusters to:
 Phenotypic data
 Ecological niches
 Phylogenetic tree

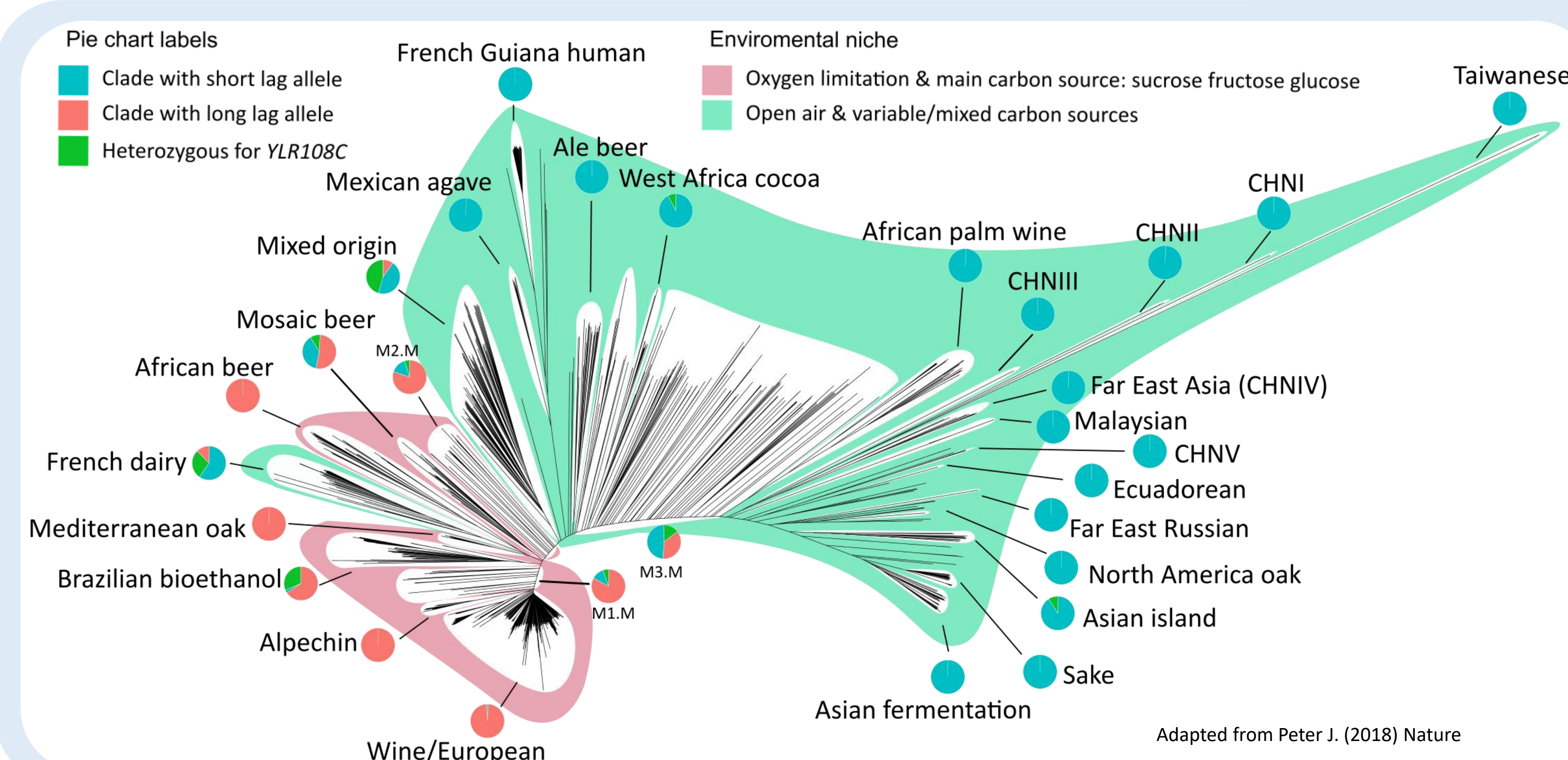
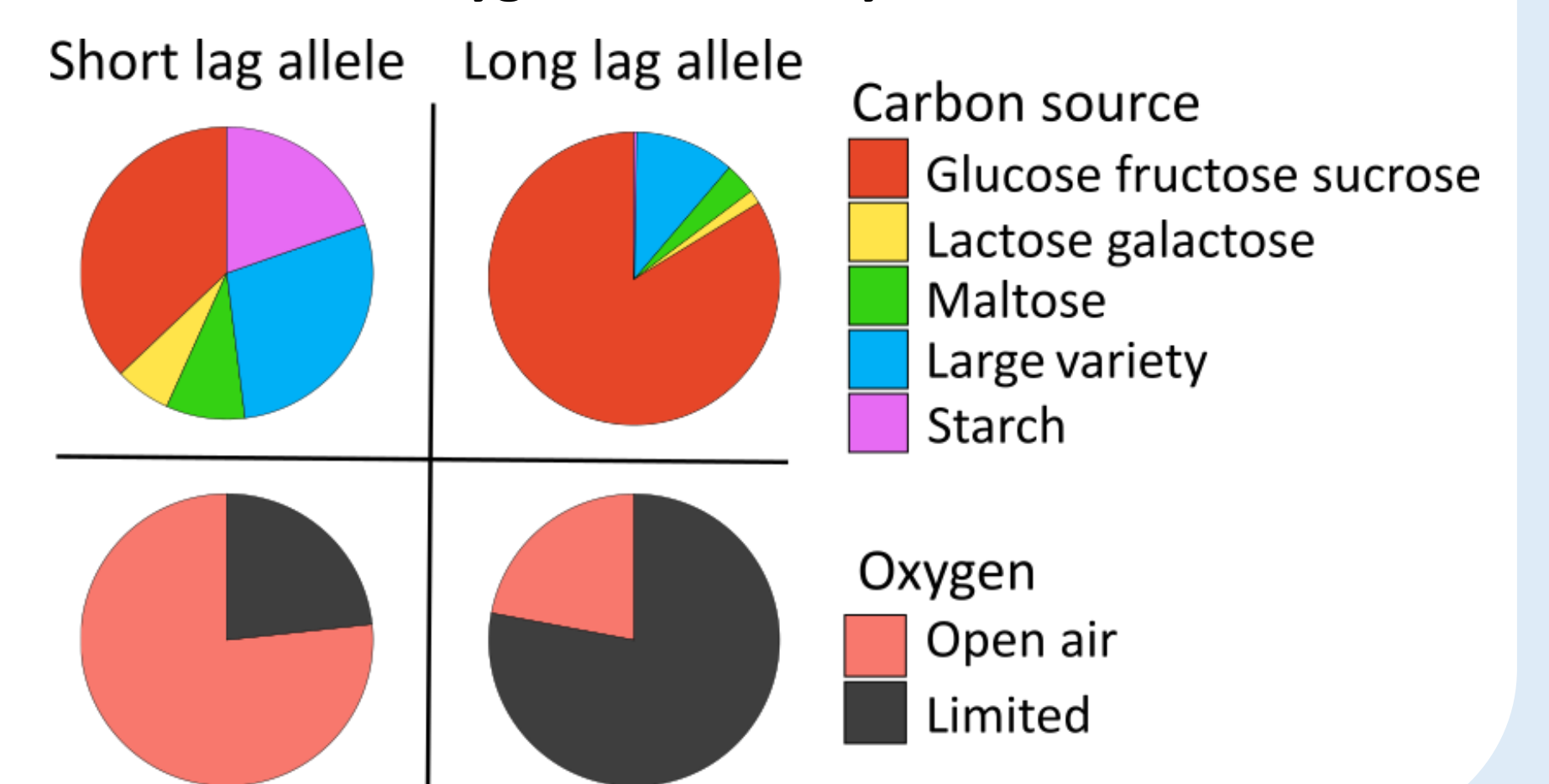
Gene tree reveals two main clusters for YLR108C



The two clades are separated by four SNPs in YLR108C



The allele types are found in specific carbon environments and oxygen availability



DISCUSSION & CONCLUSION

The benefit of having a long lag phase in a fluctuating environment is not immediately clear at first glance.

However, the results from competition experiments as well as the analysis of a large dataset of genetically different strains from a variety of ecological niches suggests that lag duration, and by extension YLR108C, could be evolutionarily tuned to the carbon sources present in the environment in combination with oxygen availability.