



## Quantitative genetic analysis of the metabolism of key fermentation aroma by wine yeast

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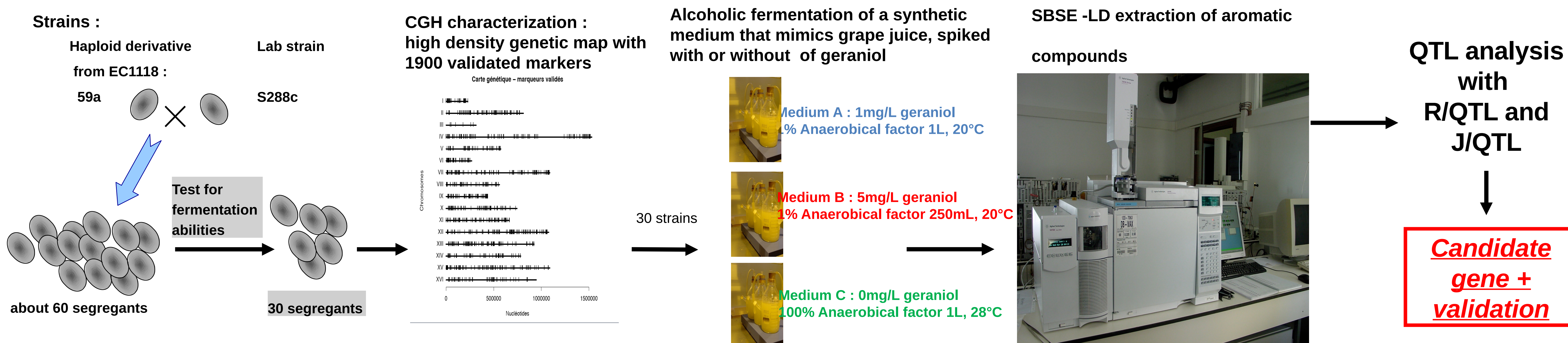


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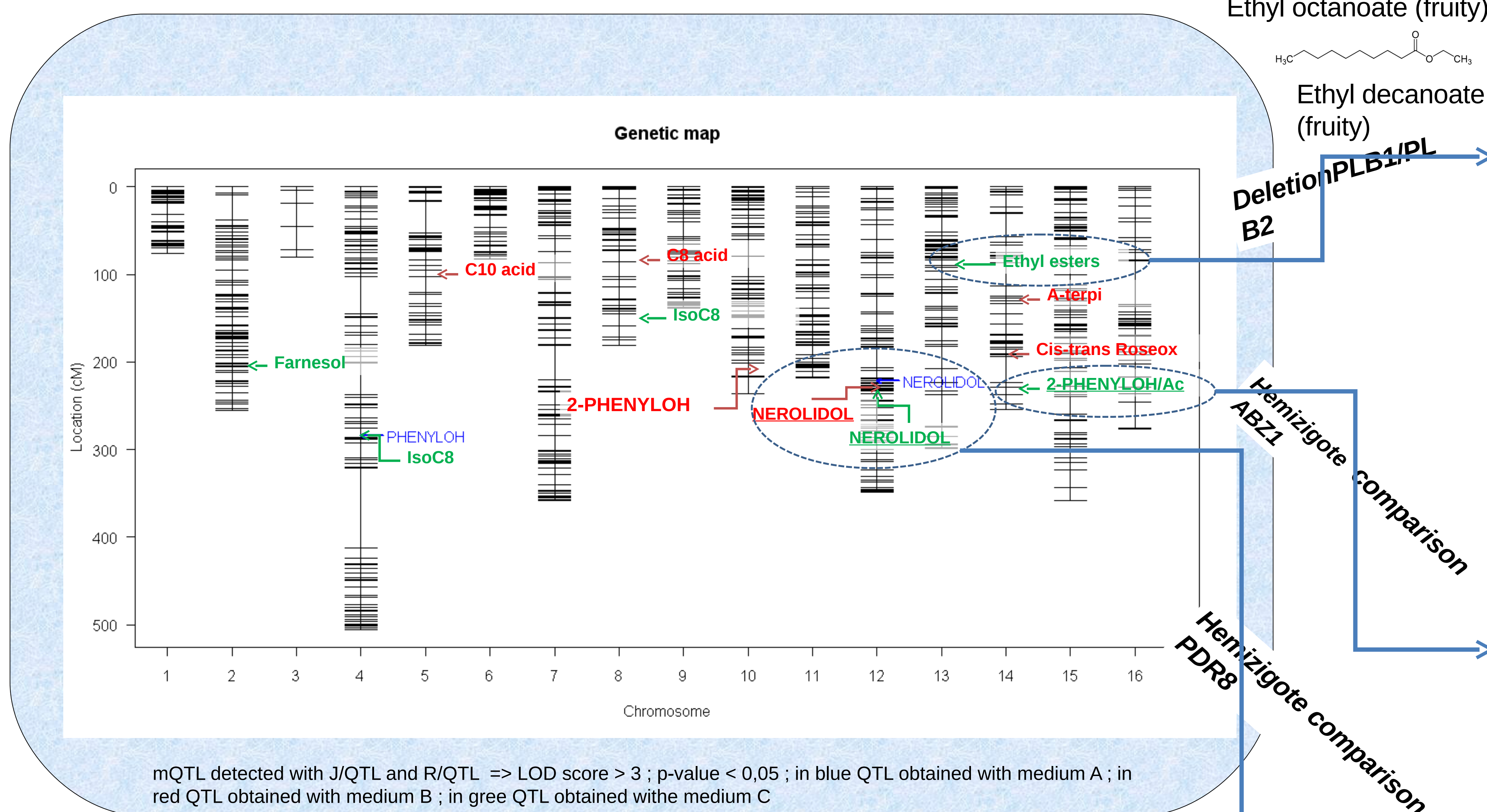
## Introduction

Wine aromatic profile is the combination of vine aromatic compounds that can be metabolized by yeast and of compounds produced by yeast during alcoholic fermentation. The variability of the influence of wine yeast strains on wine aroma is well known from wine makers who have selected numerous strains produced nowadays at an industrial scale. Even though several genes involved in the production of aroma have already been described, little is known about the genetic basis of the variability of the metabolism of these compounds. In order to answer this issue, we compared the aroma production and the geraniol metabolism during alcoholic fermentation using a progeny of 30 strains. This progeny was obtained from a cross between *S. cerevisiae* strains S288C and 59A, and was previously mapped using oligonucleotide microarrays.

## Methods

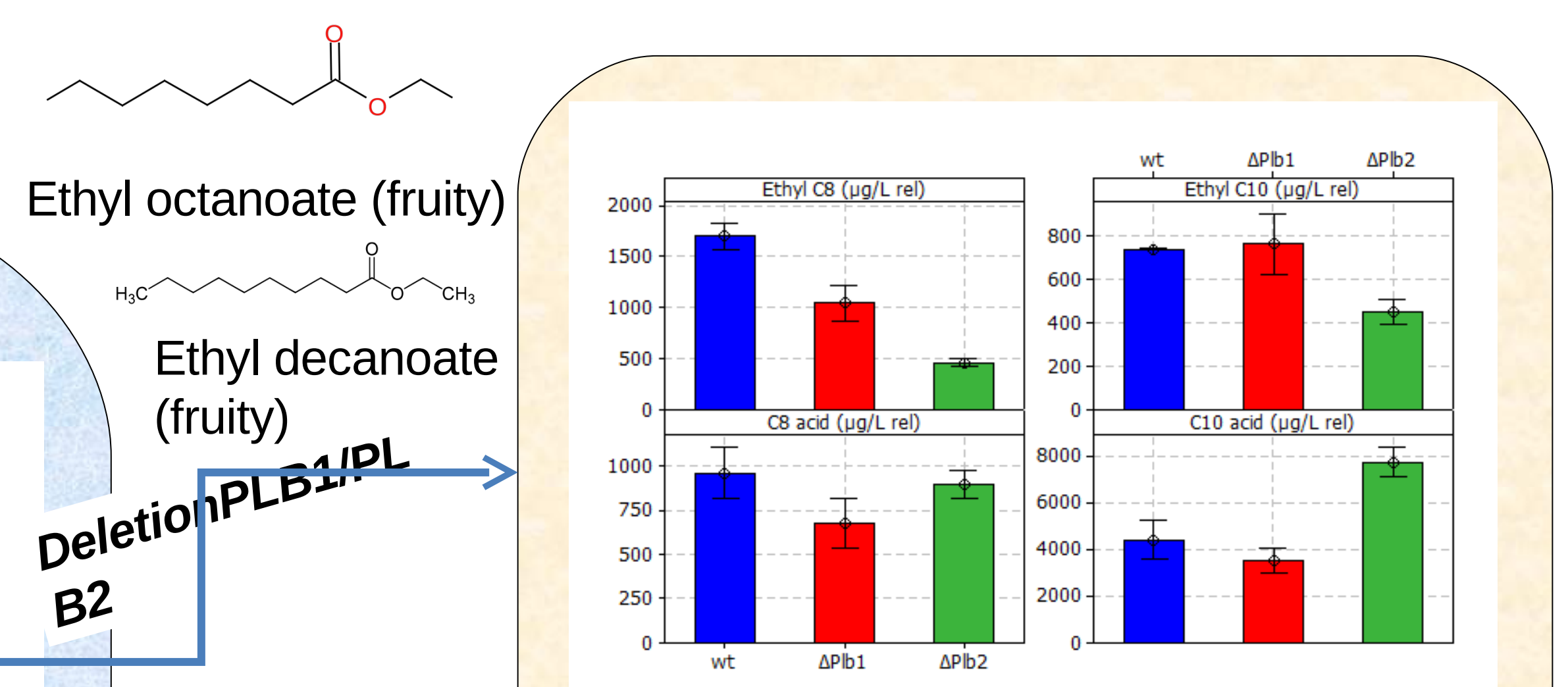


## Results/conclusion

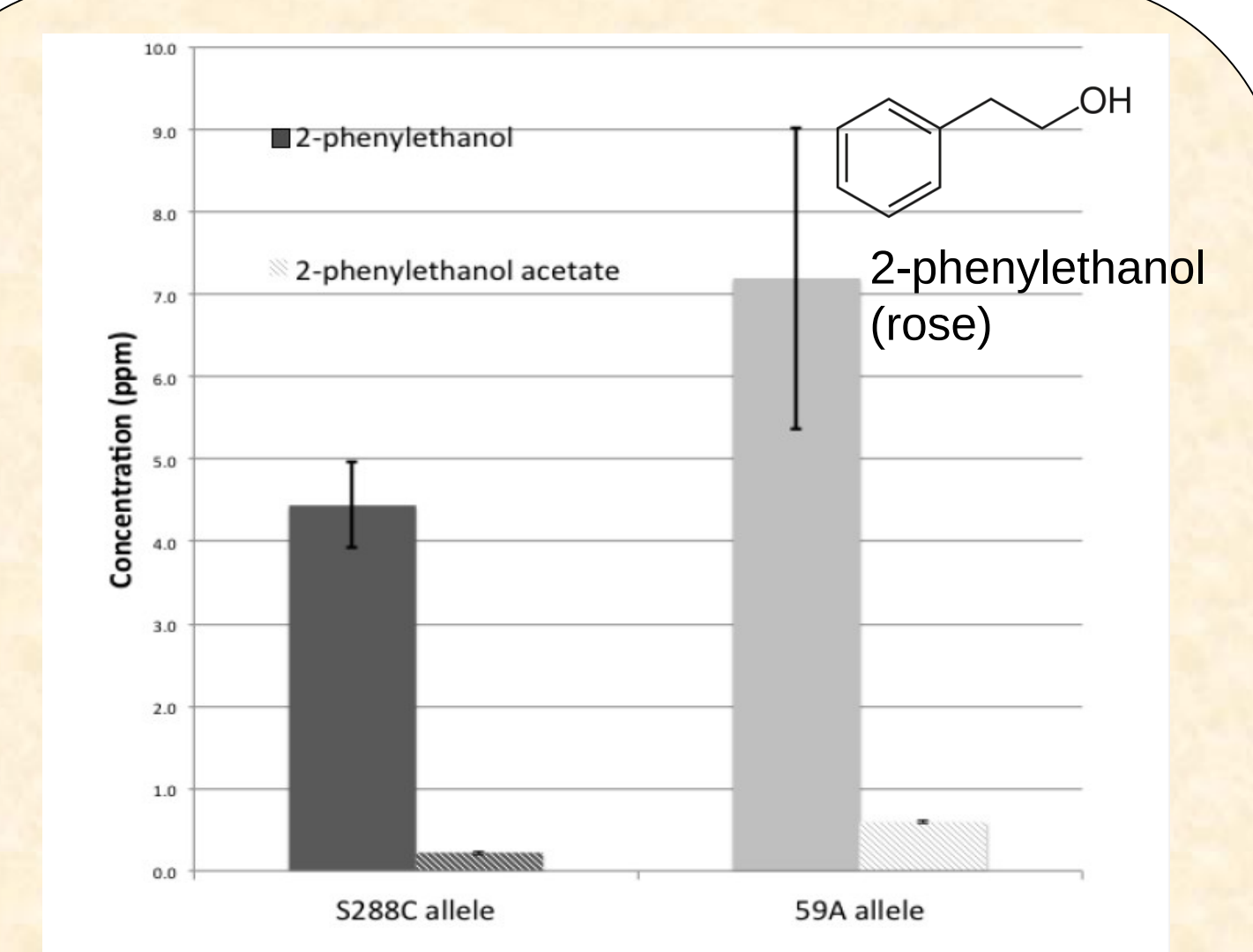


We detected 13 mQTL involved in the production of volatile compounds by yeast during fermentation. One was investigated by deletion and two by hemizigote comparison. In a "By" background, deletion of Phospholipase B2 gene (*PLB2*) reduces drastically the concentration of ethyl octanoate and decanoate and increases the concentration of decanoic acid (**fig 1**). In the same condition, deletion of its homolog *PLB1* contributes only to a decrease of ethyl octanoate (**fig 1**). Thanks to hemizigote we show that the allelic version of the Para-aminobenzoate synthase (*ABZ1*) is involved in the production of 2-phenyl –ethanol/-acetate (rose/honey) (**fig 2**). We also demonstrate that the alleles of the transcription factor *PDR8* found S288C and 59A differently regulate the release of nerolidol into the media (**fig 3**) (target : *QDR2* data not shown).

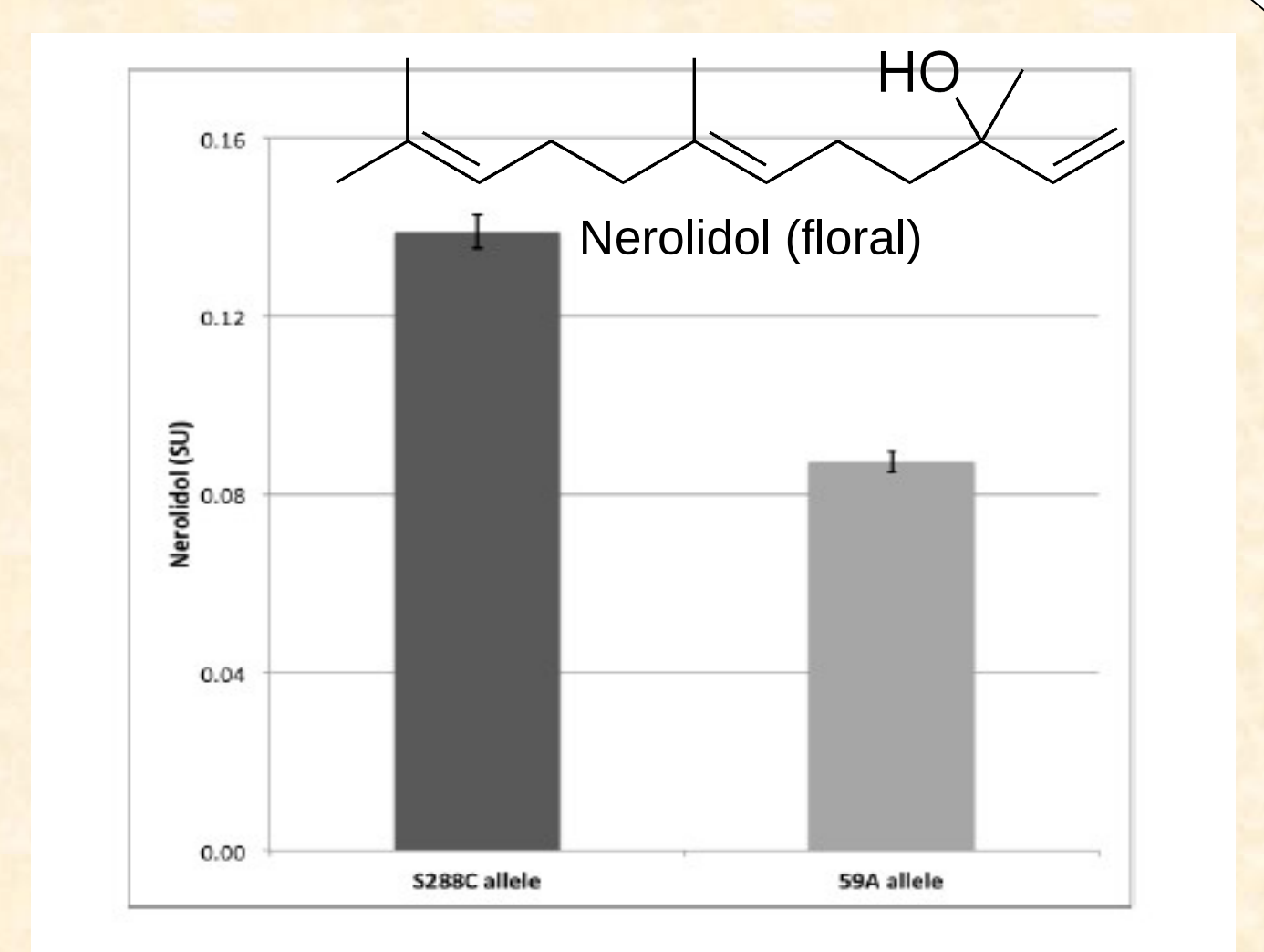
This study illustrates the value of QTL analysis for the analysis of metabolic traits, and in particular the production of wine aromas. It also identifies the particular role of the *PDR8* gene in the production of farnesyl diphosphate derivatives, of *ABZ1* in the production of numerous compounds and of *PLB2* in ethyl ester synthesis. This work also provides a basis for elucidating the metabolism of various grape compounds, such as citronellol and cis-rose oxide.



**Fig 1 : effect of the deletion of PLB1/PLB2 on ethyl esters and medium chain fatty acids concentration in enological condition (BY background)**



**Fig 2 : effect of the allelic expression of ABZ1 in enological condition on 2-phenylethanol/acetate concentration**



**Fig 3 : Effect of the allelic expression of PDR8 in enological condition on nerolidol concentration**