

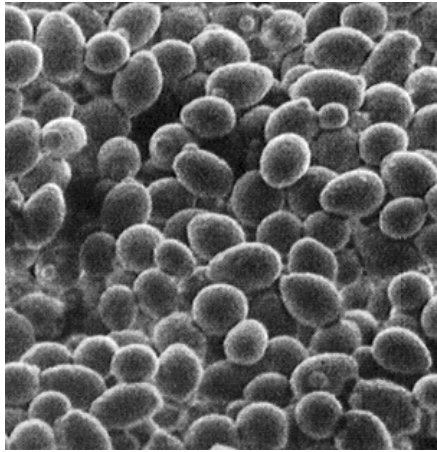


The Contribution of Ploidy to Evolutionary Divergence of Gene Expression in Yeasts

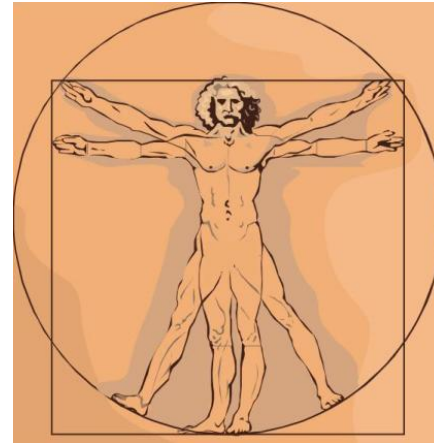
Eric Delgado
Regev Group
Summer Research Program in Genomics

: Ploidy Varies Among Organisms

Haploid



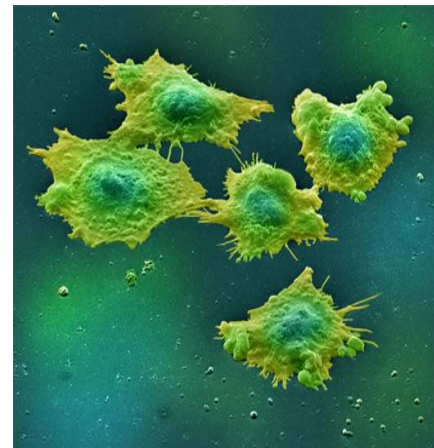
Diploid



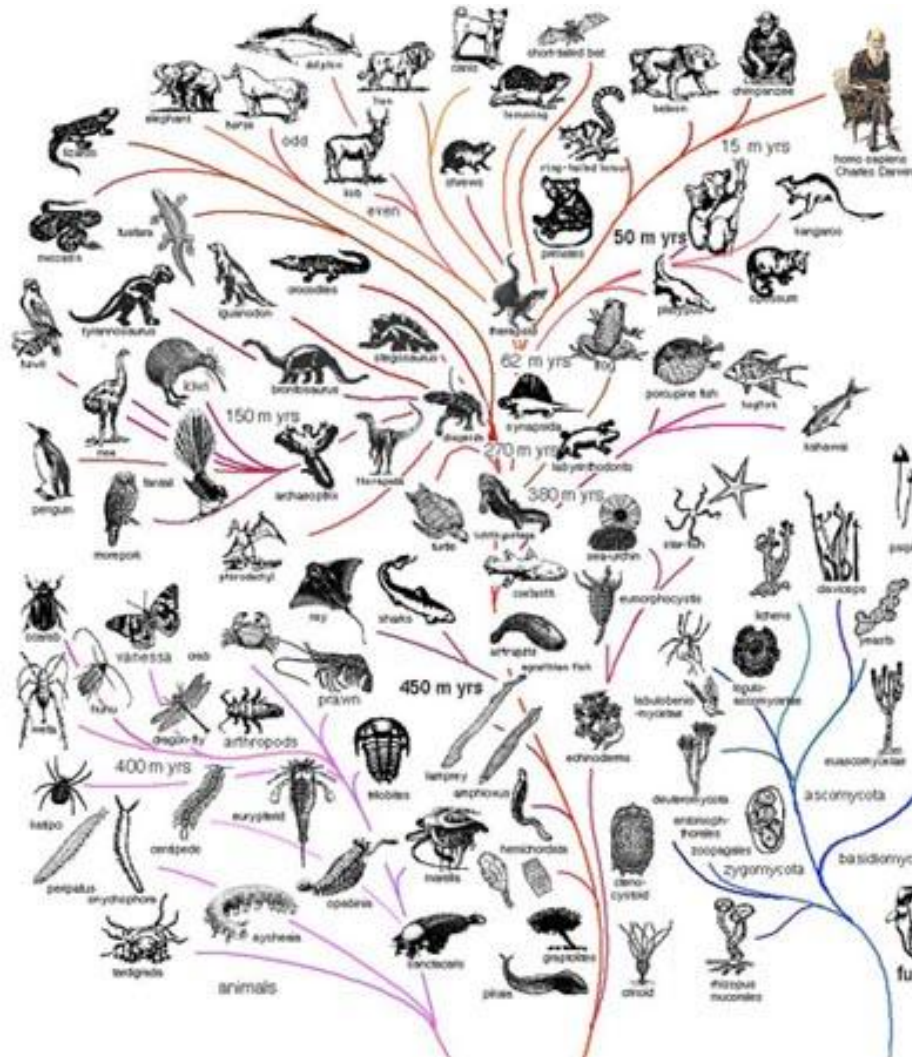
Triploid



Aneuploid / Polyploid



The Evolutionary Contribution of Ploidy is Unclear



SCIENCE VOL 299 24 JANUARY 2003

An Evolutionary Advantage of Haploidy in Large Yeast Populations

Clifford Zeyl,* Thomas Vanderford,† Michele Carter‡

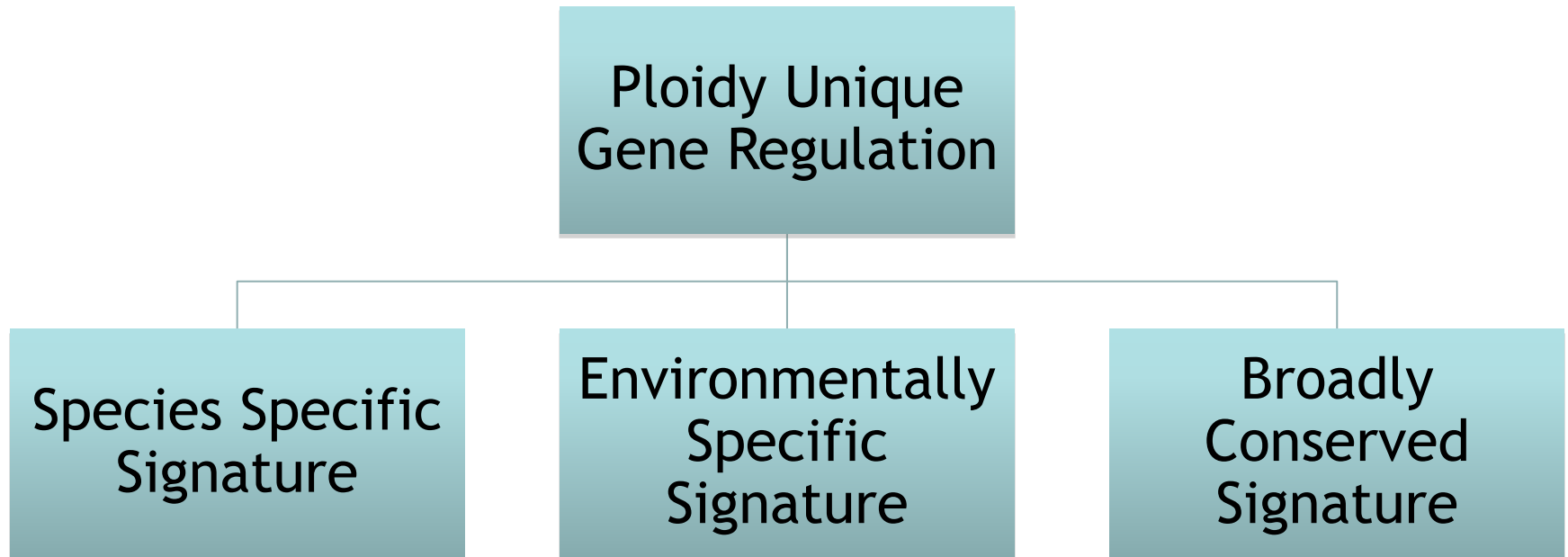
Antisense Transcription Controls Cell Fate in *Saccharomyces cerevisiae*

Cintia F. Hongay,¹ Paula L. Grisafi,¹ Timothy Galitski,² and Gerald R. Fink^{1,*}

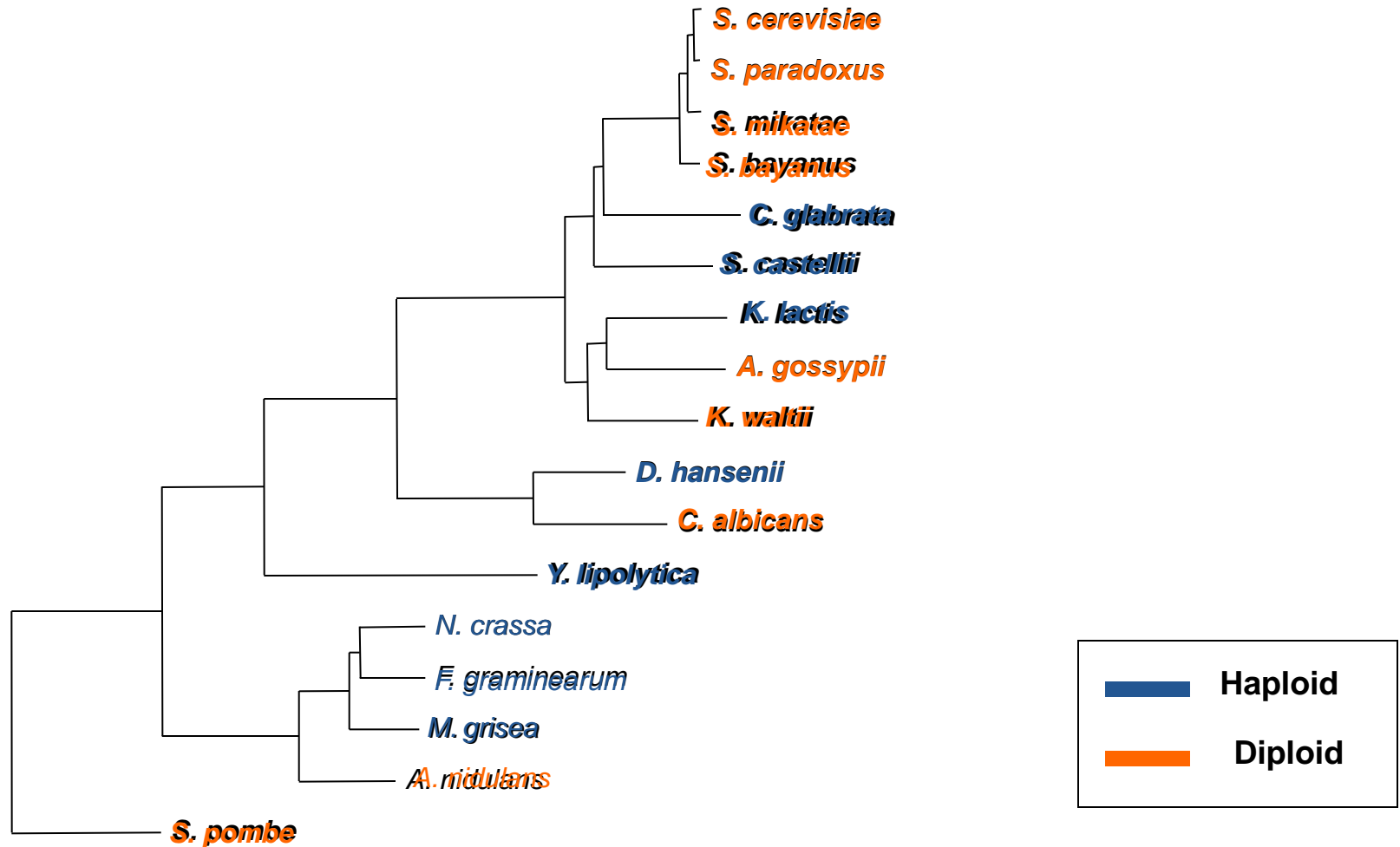
: Project Aims

- To determine the set of ploidy regulated genes.
- To determine whether differences in gene expression are the caused by species-specific traits, environmental factors or conserved ploidy dependent differences.

Unique Regulation of Ploidy-Dependent Genes May Be Due To Multiple Factors



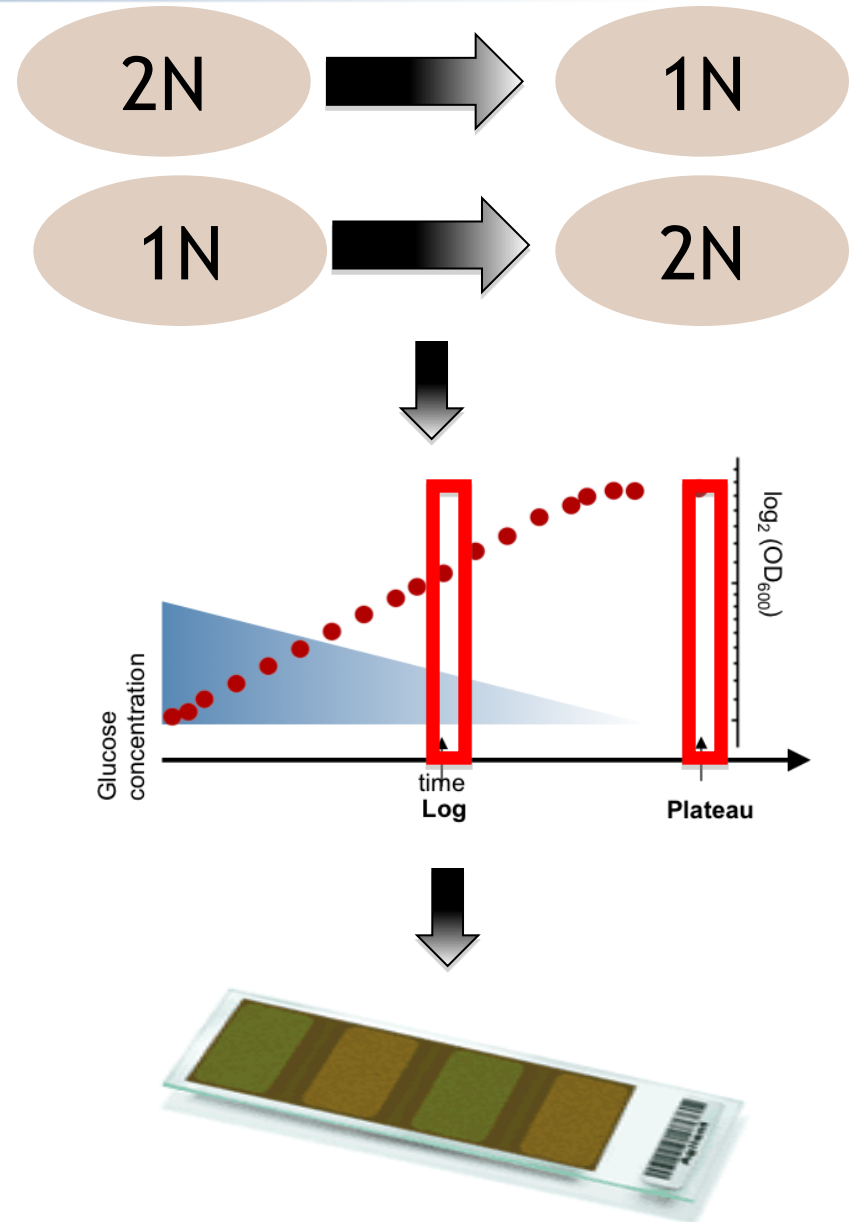
: Ascomycota Fungi Provide an Ideal System for Studying Ploidy



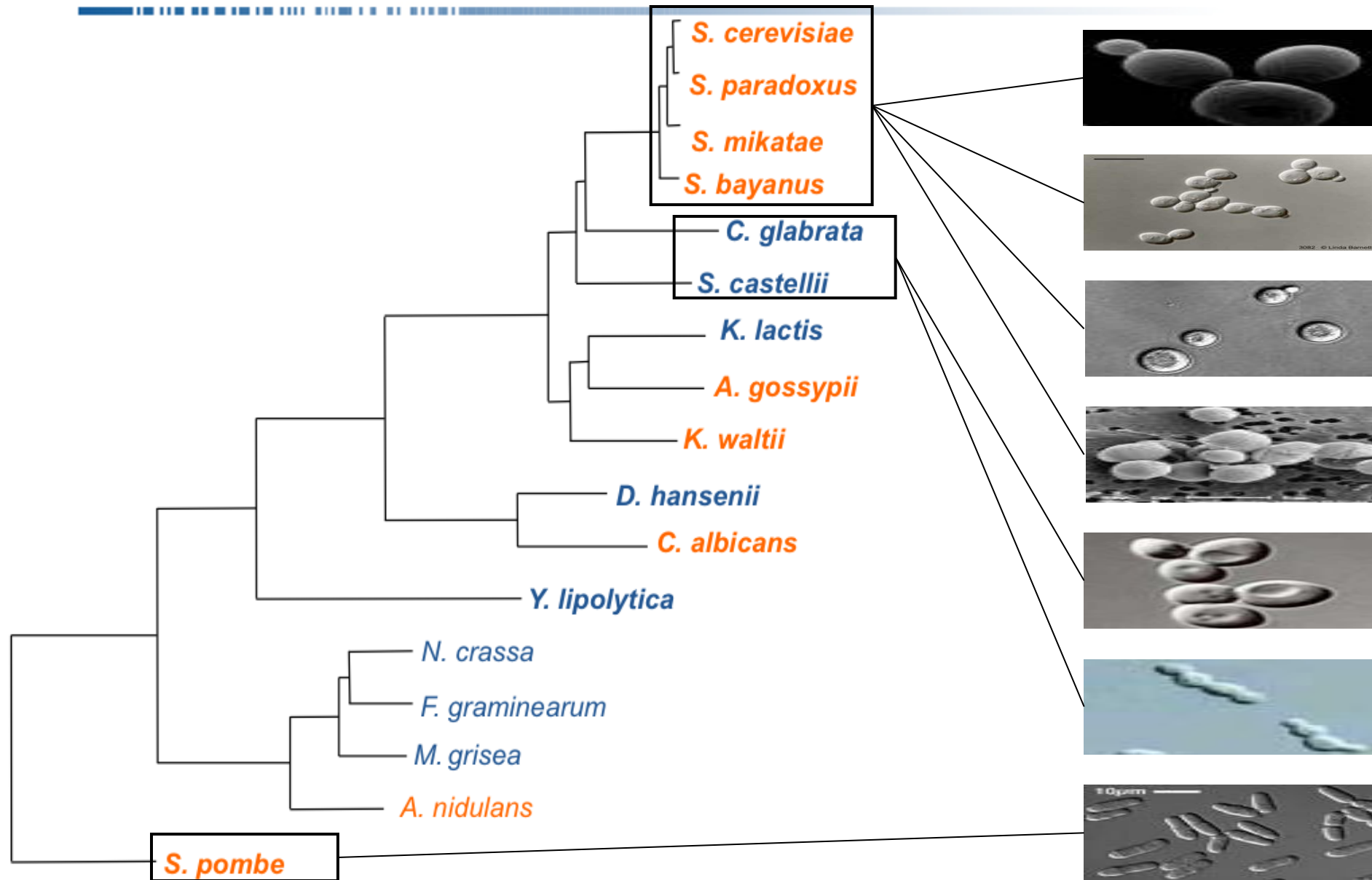
These species span over 300 million years of evolution

: Experimental Approach

- Create stable haploids from diploid species
- Create stable diploids from haploid species
- Compare expression profiles among strains

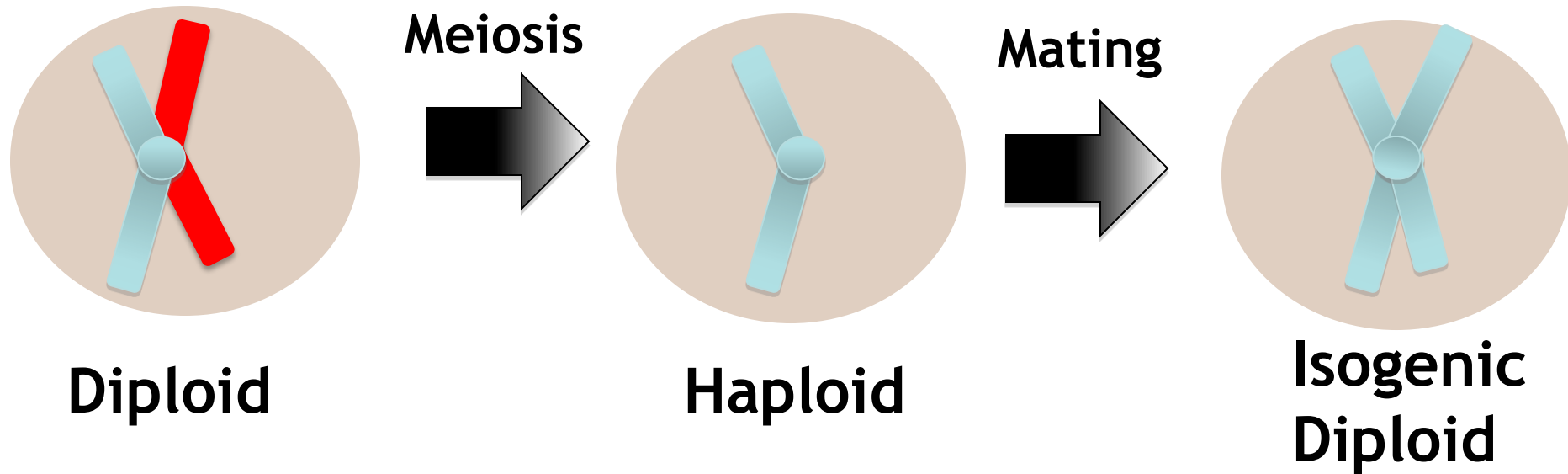


: Ascomycota Fungi Provide an Ideal System for Studying Ploidy



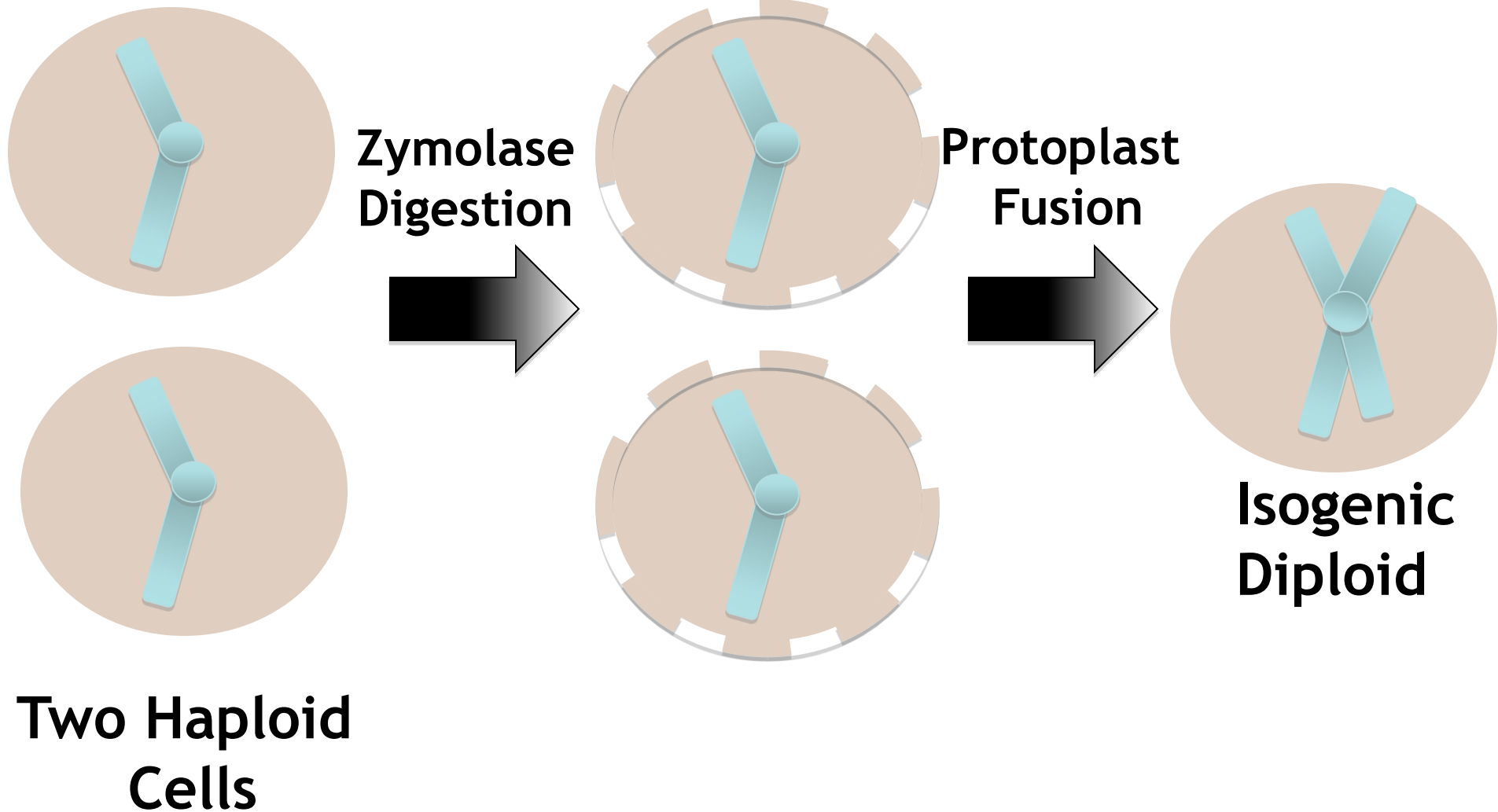
: Isogenic Strain Construction Allows For Ploidy-Based Gene Expression Comparison

Diploid To Haploid

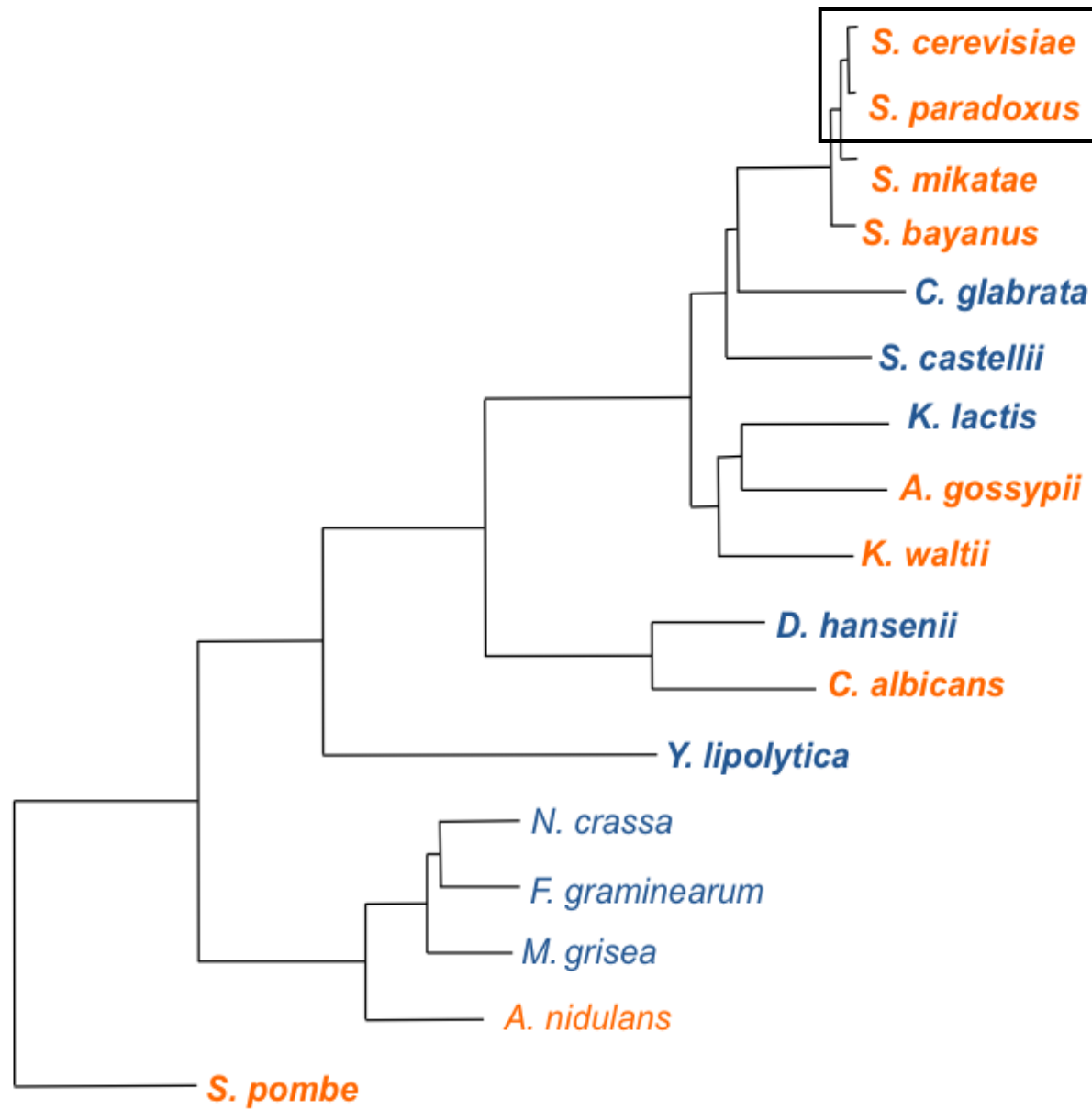


Isogenic Strain Construction Allows For Ploidy-Based Gene Expression Comparison

Haploid To Diploid

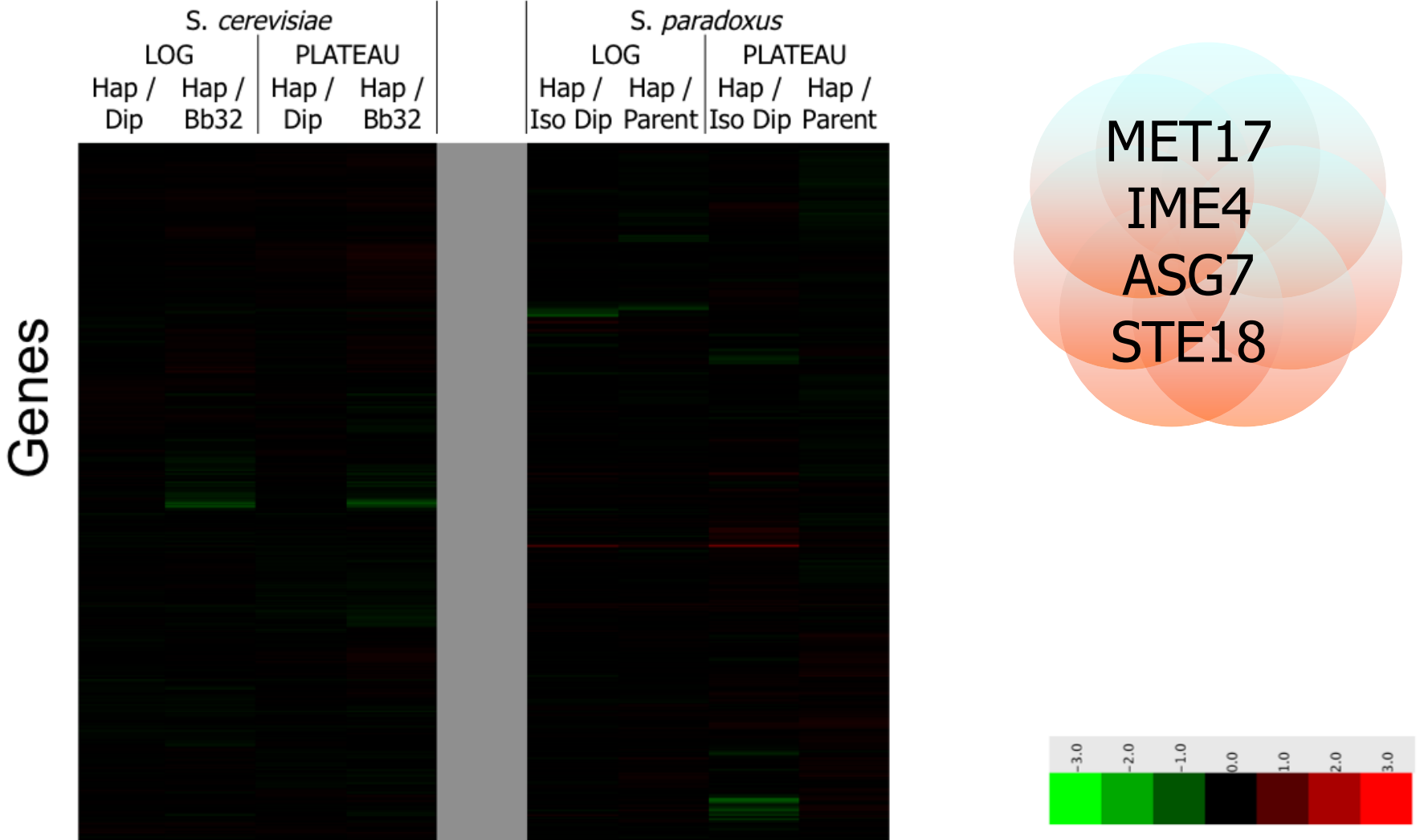


Organisms Included In Gene Expression Analysis

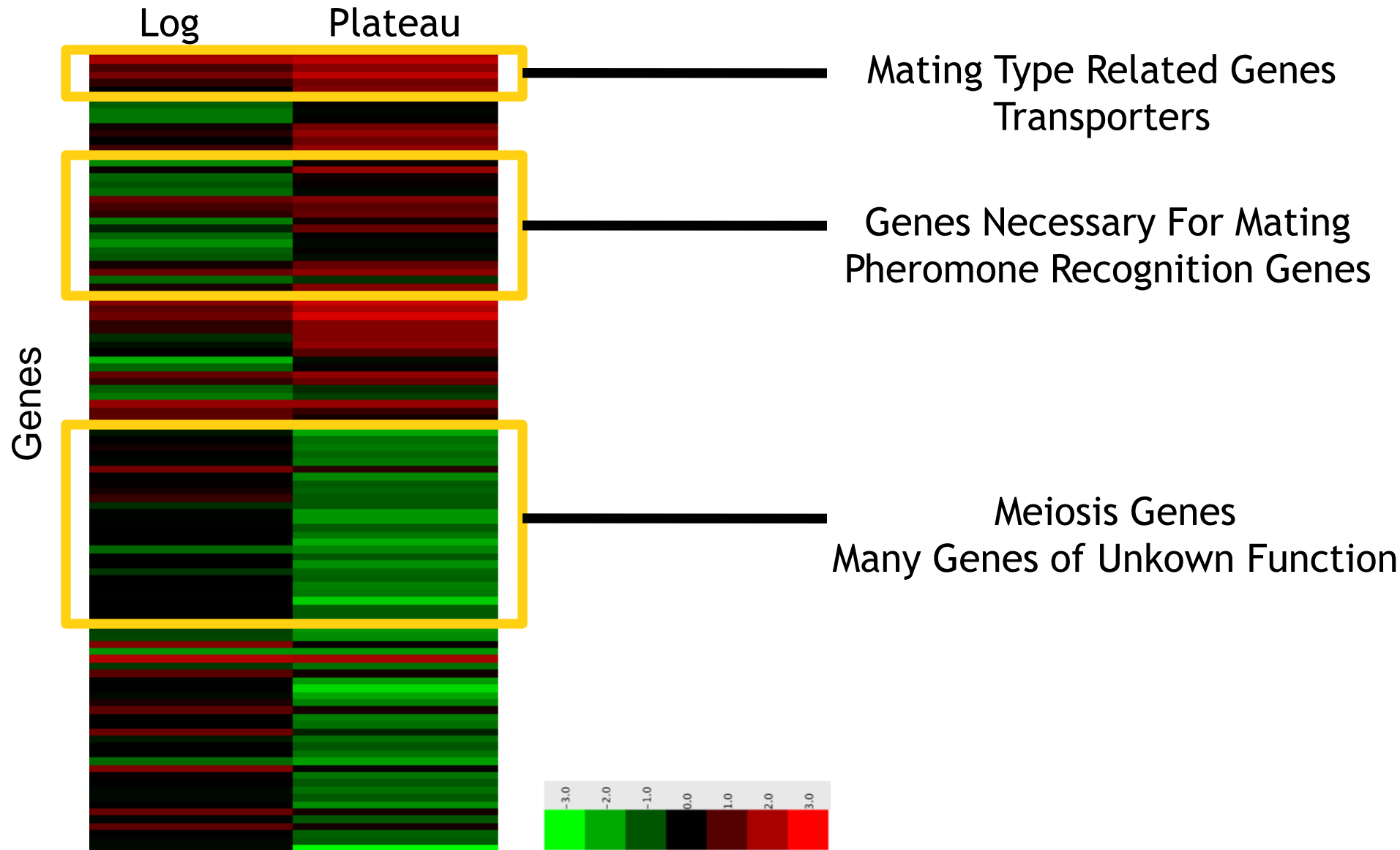


- *S. cerevisiae*
 - S288c Haploid
 - S288c Diploid
 - Bb32 Diploid
- *S. paradoxus*
 - Wild Parental
 - Parental Haploid
 - Diploid Isogenic To Haploid
- Single Channel Data For LOG and PLAT

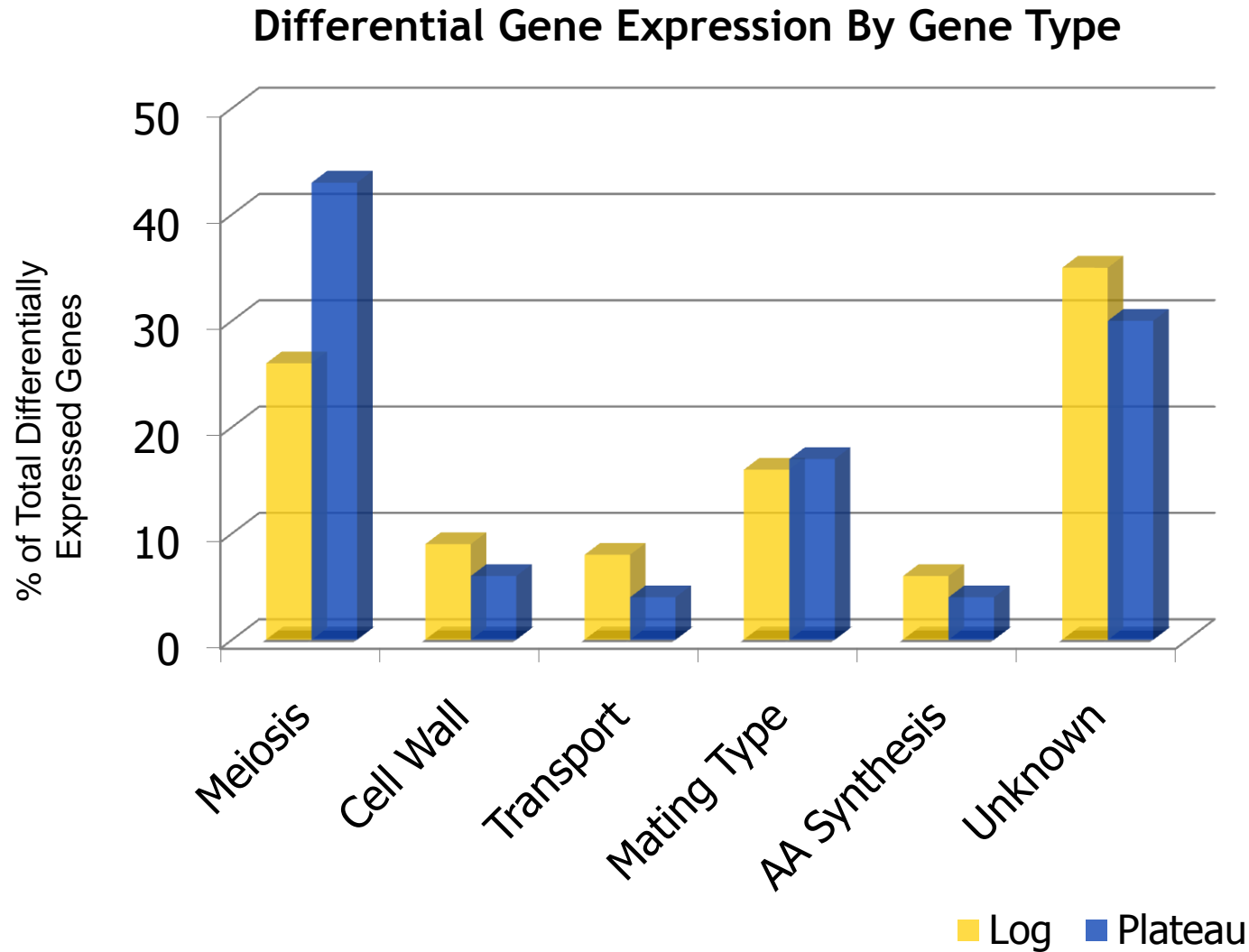
Haploid and Diploid Global Expression Patterns Are Similar



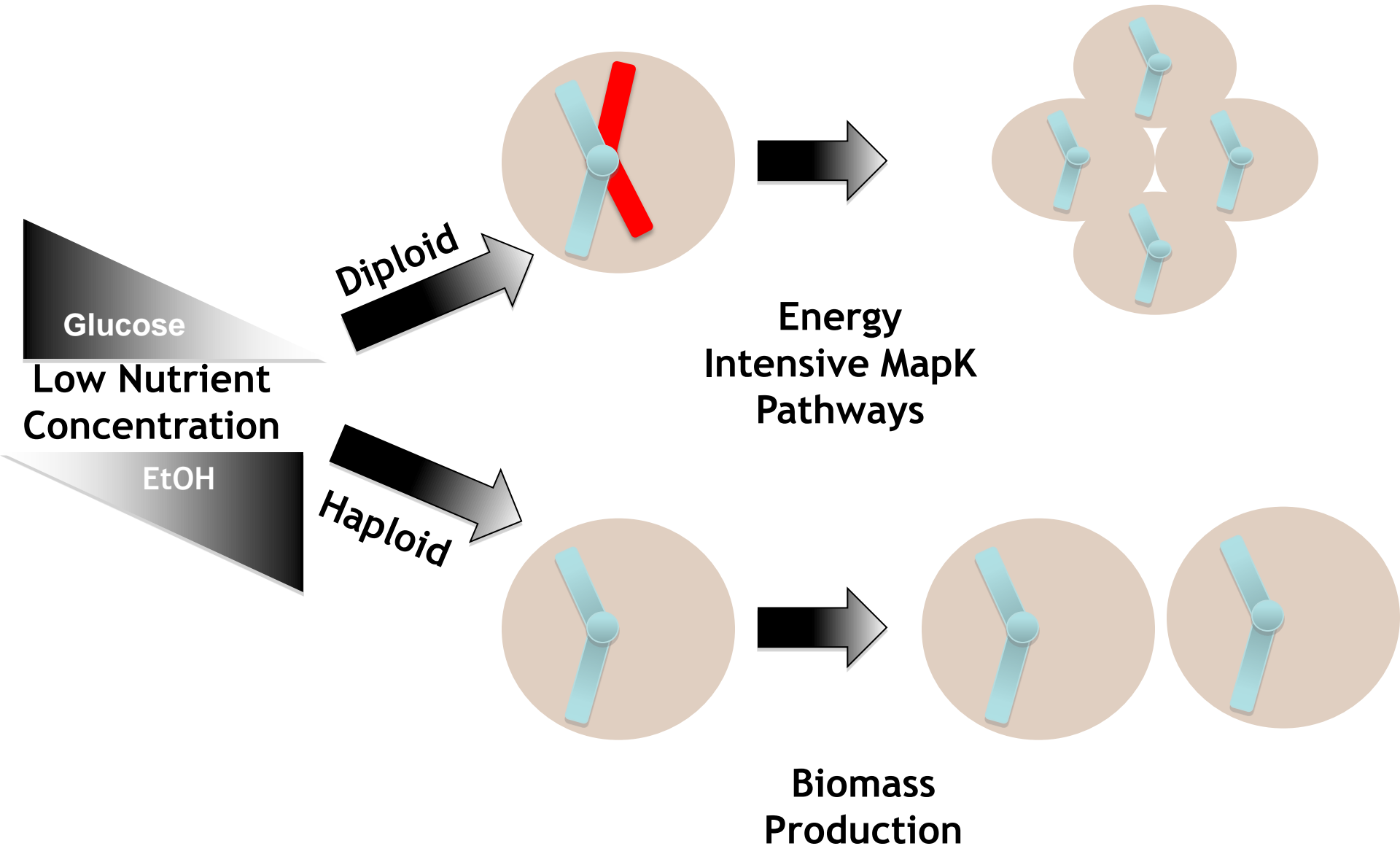
Several Groups of Genes Are Differentially Expressed In Haploids And Diploids



Meiosis Genes Are Differentially Expressed In Haploids And Diploids



Increased Expression in Meiosis Genes Provides Molecular Basis For Ploidy Advantage



Conclusions

- Clear ploidy expression signatures were identified
- Experimental approach validated by expected regulation of previously identified ploidy genes
- Novel ploidy genes identified
- Gene expression data may provide a molecular basis for evolutionary observations

- Future Direction
 - Expand comparisons across phylogeny
 - Introduce stress conditions

▪ Acknowledgments

- Dr. Dawn Thompson
- Dr. Aviv Regev
- Regev Group
- Summer Research Program In Genomics