

Transcriptional atlas of *Drosophila*  
*melanogaster* imaginal discs

June 3, 2016

# Outline

## Introduction

- Overview of RNA-seq samples

## Eye, leg and wing

- DEG across tissues and time

- Plot 3D

- Isoform Usage

## Wing compartments

- DEG across wing compartments

# Outline

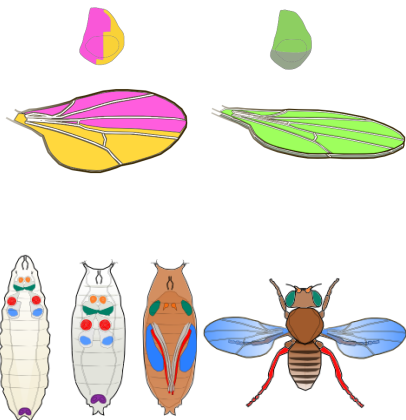
## Introduction

Overview of RNA-seq samples

Eye, leg and wing

Wing compartments

# Overview of processed RNA-seq samples



anterior	2	2	2
posterior	2	2	2
dorsal	2	2	2
ventral	2	2	2
wing	2	2	2
eye	2	2	2
antenna	2	2	-
female_genitalia	2	2	-
male_genitalia	2	2	-
leg	2	2	2
	L3	white pupa	late pupa

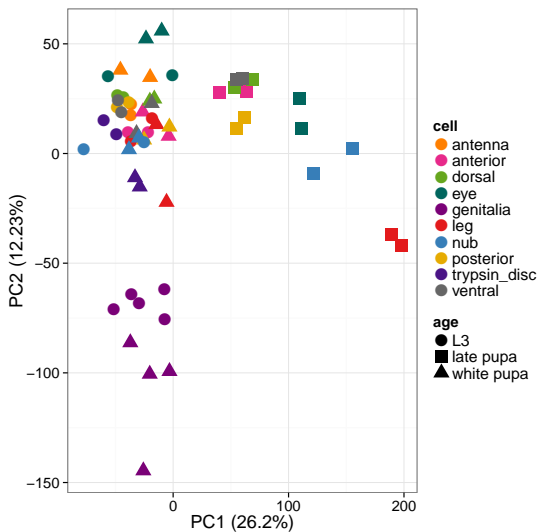
tissue

- antenna
- eye
- genitalia
- leg
- wing

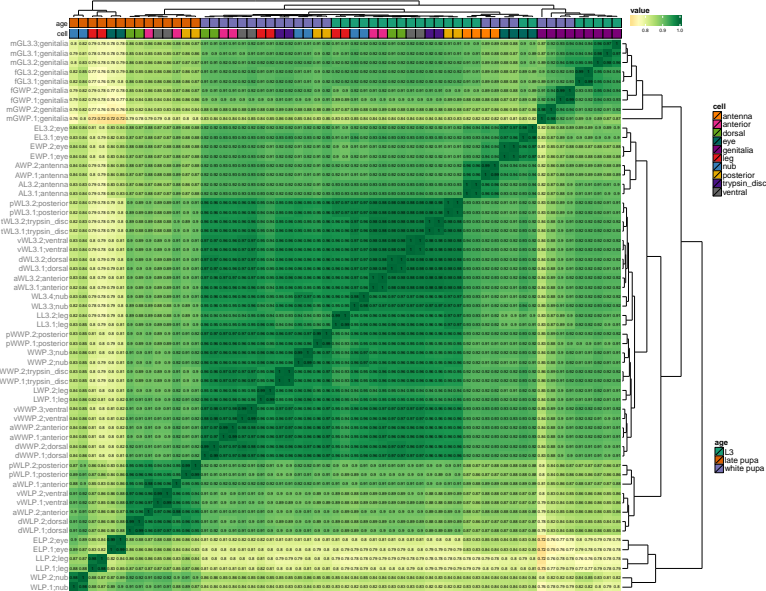
# RNA-seq pipeline

- ▶ Assembly: dm6
- ▶ Annotation: FlyBase r6.05
  - ▶ 17,158 genes
  - ▶ 34,152 transcripts
  - ▶ 186,431 exons
  
  - ▶ 13,920 mRNA
  - ▶ 2,470 ncRNA
  - ▶ 308 pseudogene
  - ▶ 147 rRNA
  - ▶ 313 tRNA
- ▶ TruSeq from Illumina
- ▶ 75bp
- ▶ stranded
- ▶ paired-end
- ▶ polyA
  
- ▶ Grape pipeline - STAR+RSEM  
<https://github.com/guigolab/grape-nf>

# Principal Component Analysis



# Clustering by gene expression (Spearman)



# Outline

Introduction

Eye, leg and wing

DEG across tissues and time

Time and space

Plot 3D

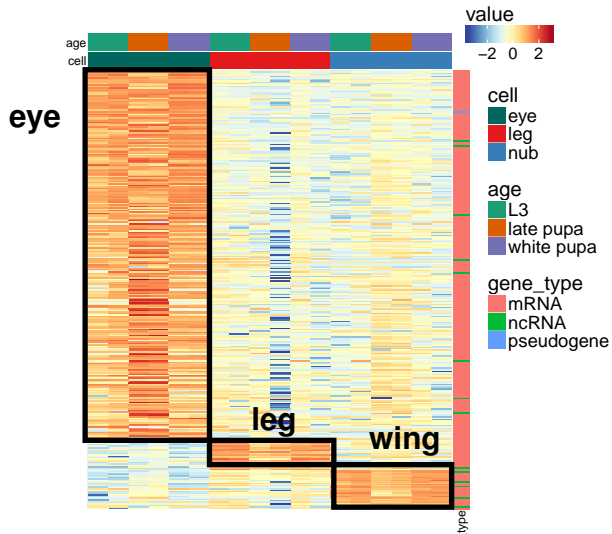
Isoform Usage

Wing compartments

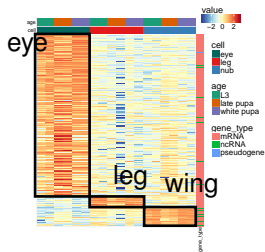


# DEG across tissues

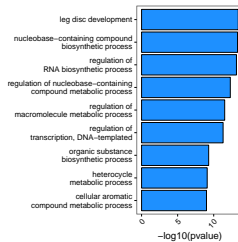
EdgeR -  $\log_{2}FC > 1.5$ ,  $FDR < 0.01$



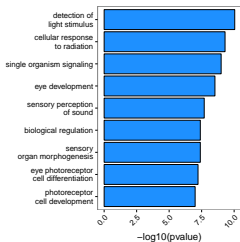
# DEG across tissues



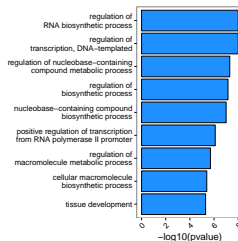
## Leg



## Eye

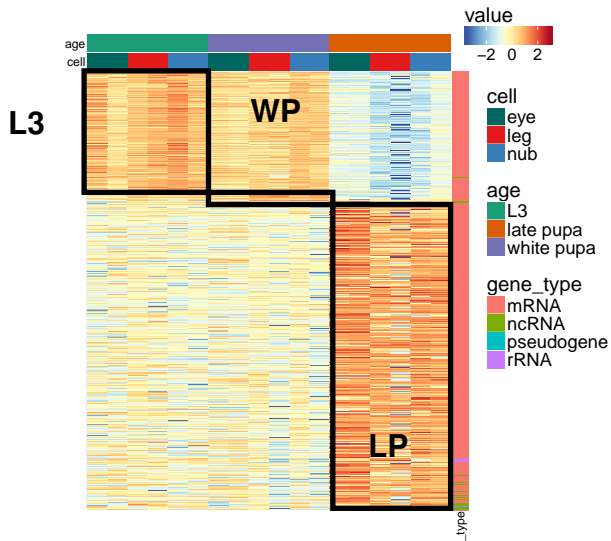


## Wing

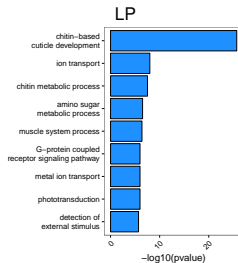
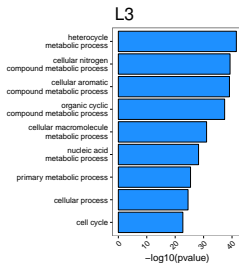
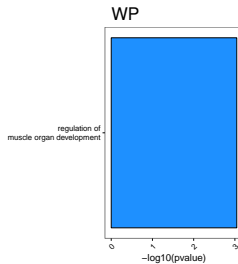
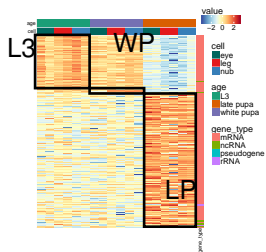


# DEG across time

EdgeR -  $\log_{2}FC > 2$ ,  $FDR \leq 0.01$



# DEG across time



# Outline

Introduction

Eye, leg and wing

DEG across tissues and time

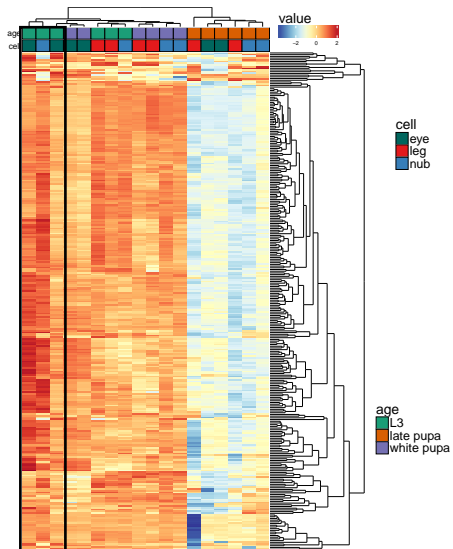
Time and space

Plot 3D

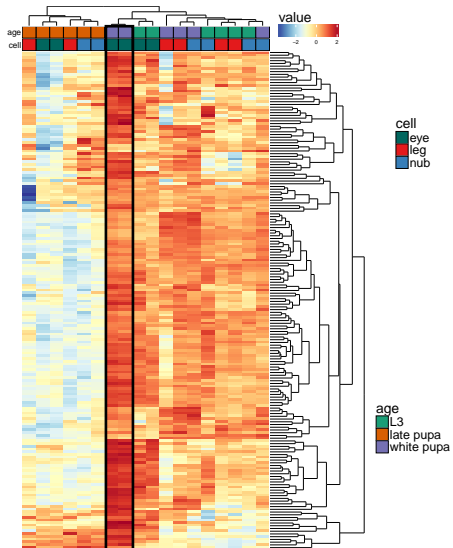
Isoform Usage

Wing compartments

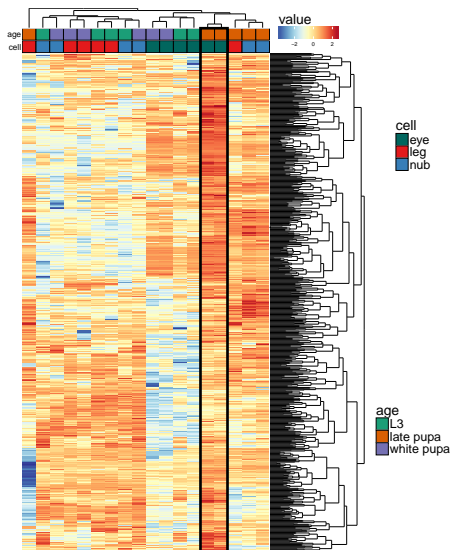
# Eye L3 - 292 genes



# Eye WP - 182 genes

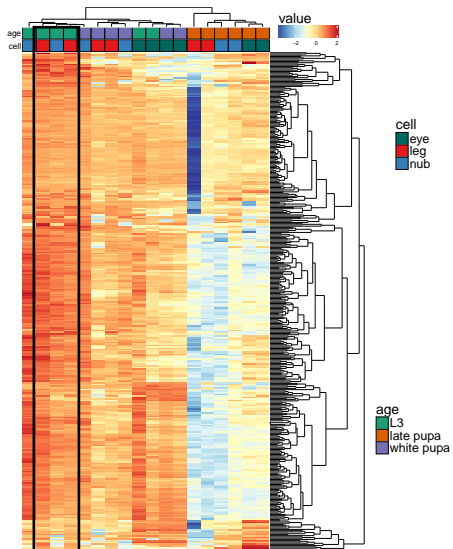


# Eye LP - 580 genes

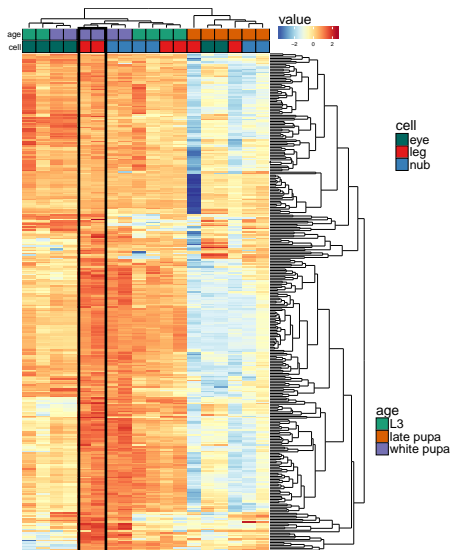




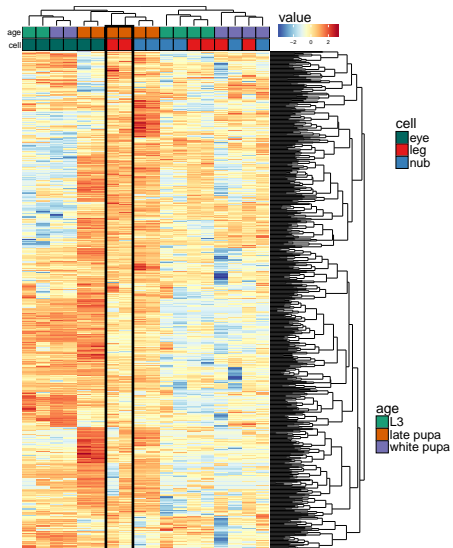
# Leg L3 - 399 genes



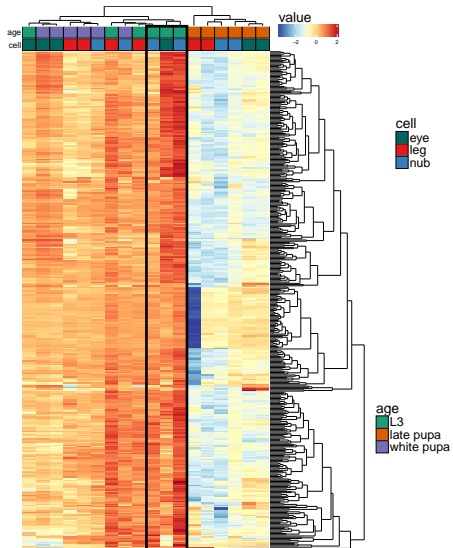
# Leg WP - 324 genes



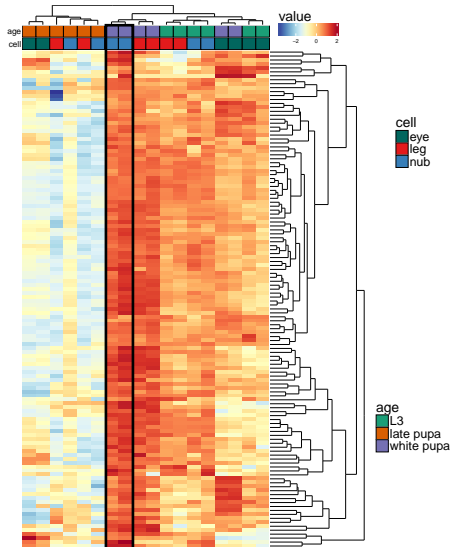
# Leg LP - 615 genes



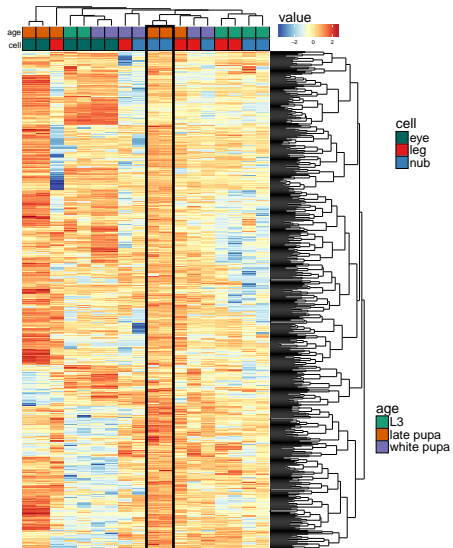
# Wing L3 - 402 genes



# Wing WP - 126 genes



# Wing LP - 526 genes



# Outline

Introduction

Eye, leg and wing

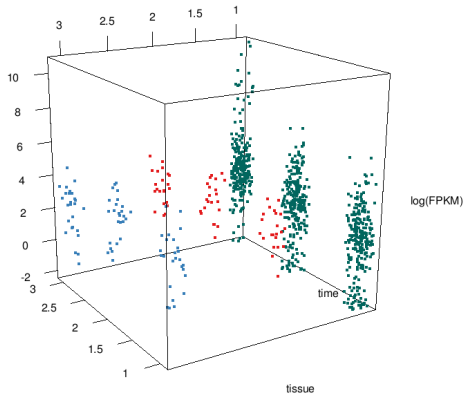
DEG across tissues and time

Plot 3D

Isoform Usage

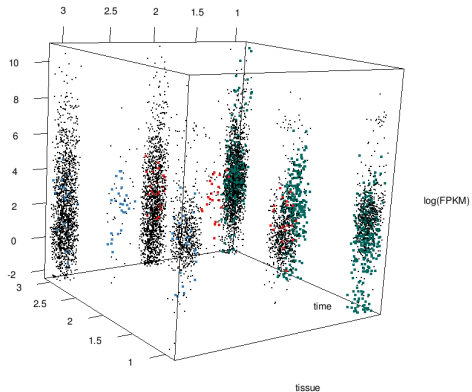
Wing compartments

# Space-specific genes

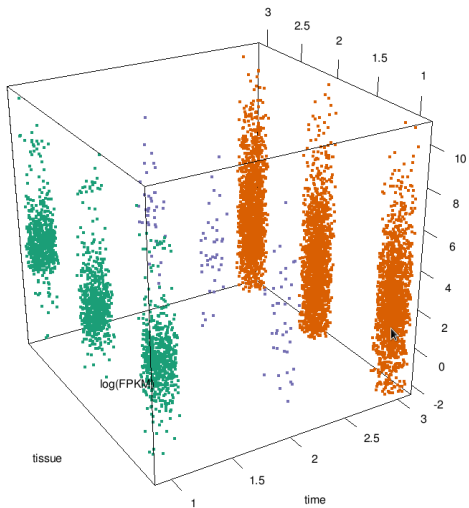




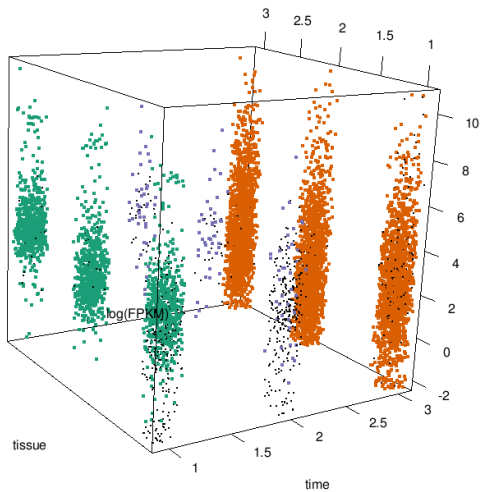
# Space-specific genes



# Time-specific genes



# Time-specific genes



# Outline

Introduction

**Eye, leg and wing**

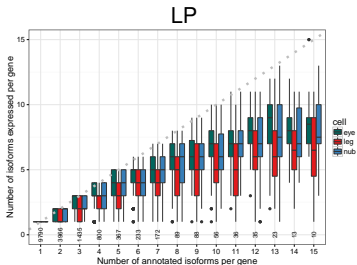
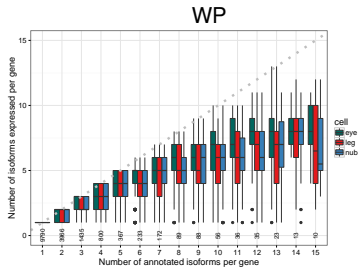
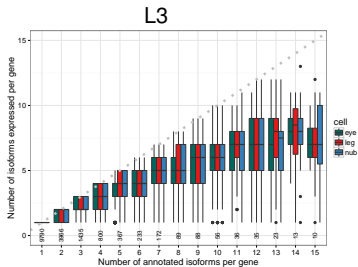
DEG across tissues and time

Plot 3D

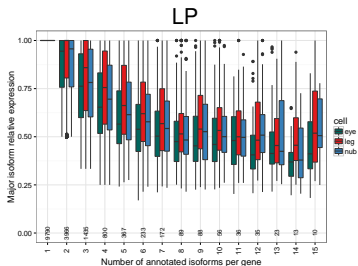
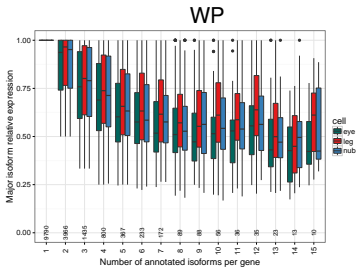
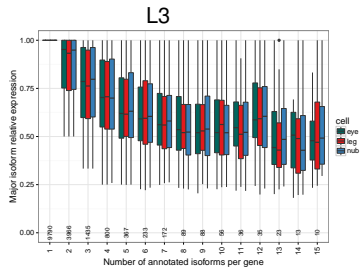
**Isoform Usage**

Wing compartments

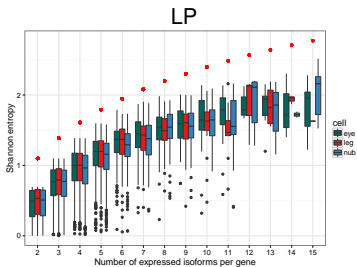
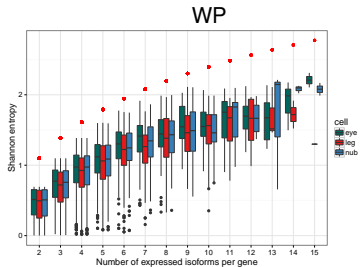
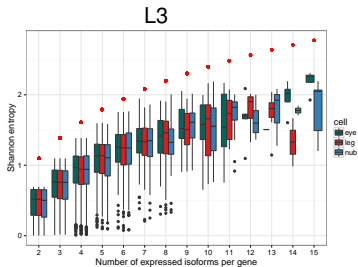
# Isoform usage



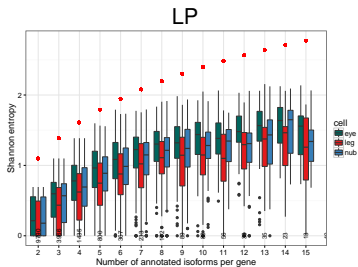
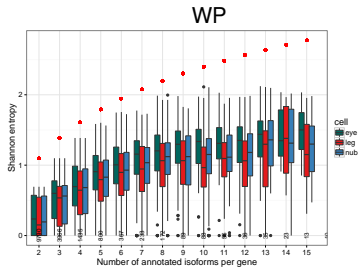
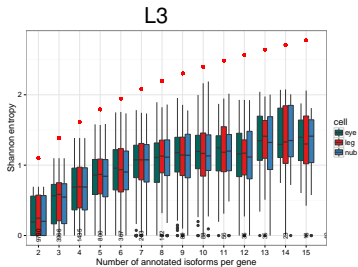
# Isoform usage



# Isoform usage

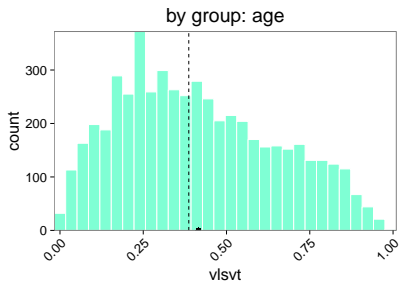
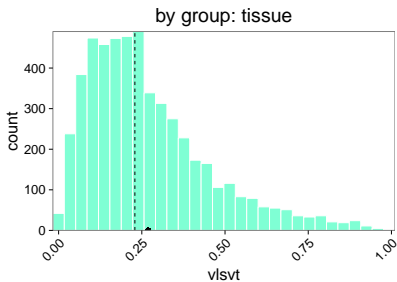
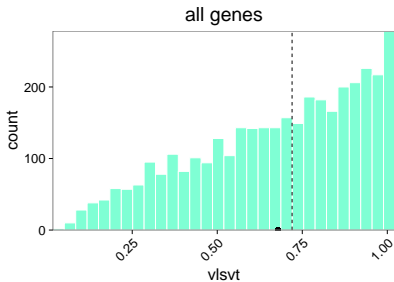


# Isoform usage





# Isoform usage

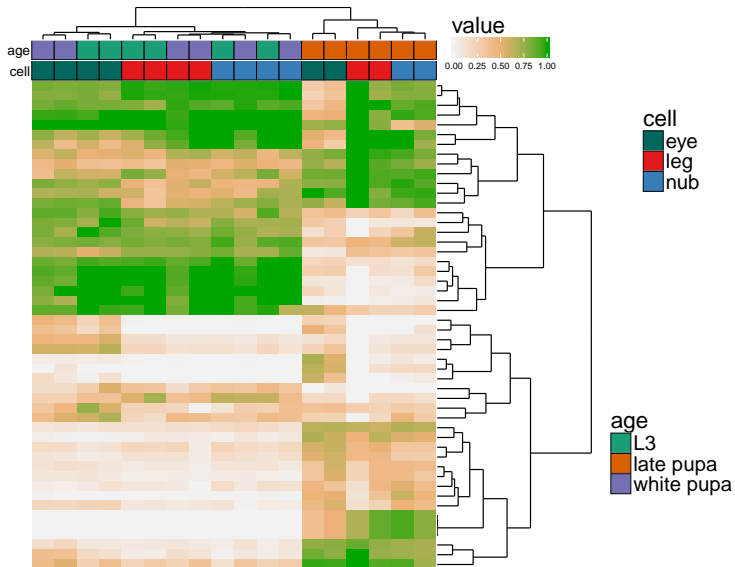


# Statistics of events in annotation FlyBase r6.05

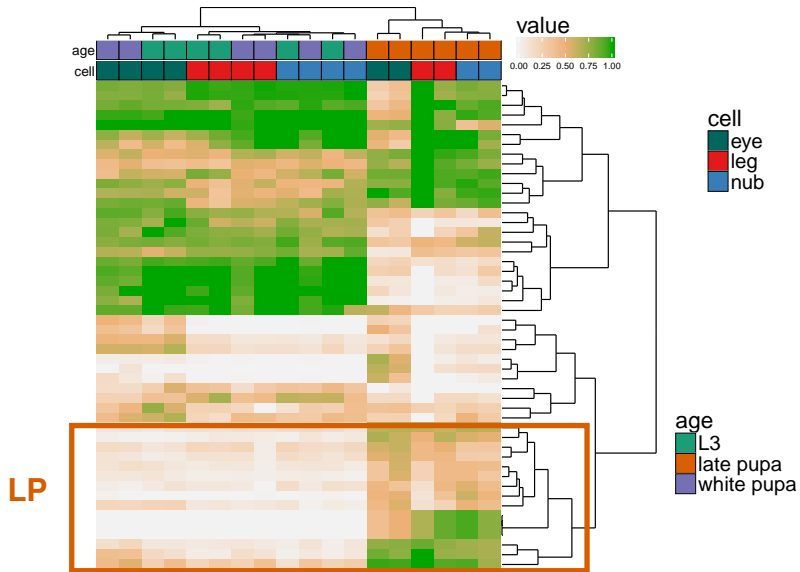
AStalavista: Alternative Splicing transcriptional landscape visualization tool  
<http://genome.crg.es/astalavista/>

event	number
single cassette exon	2535
retained intron	1653
alternative donor	2598
alternative acceptor	2506
mutually exclusive	2180
multiple exon skipping	522
alternative first	3982
alternative last	607

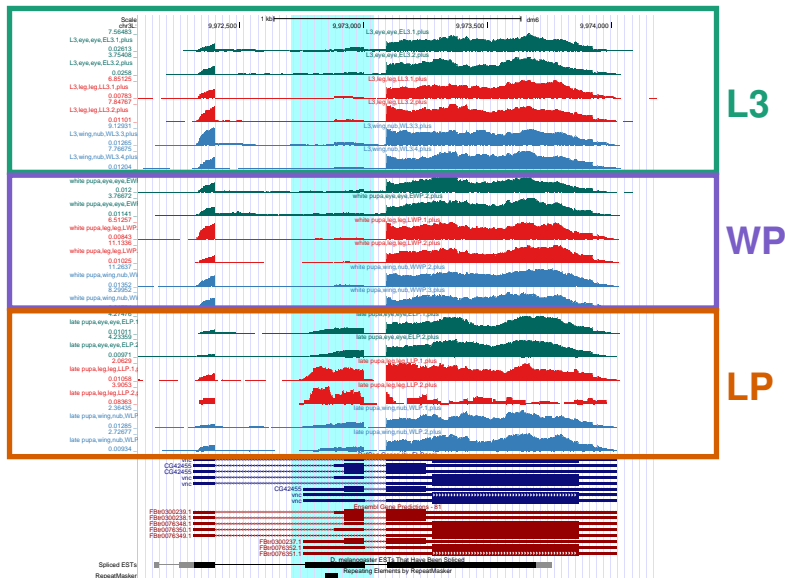
# Single exon skipping



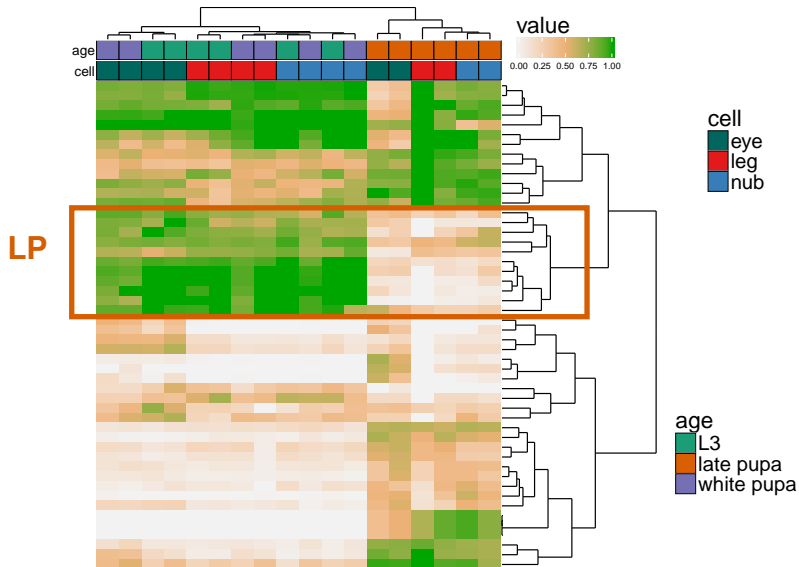
# Single exon skipping



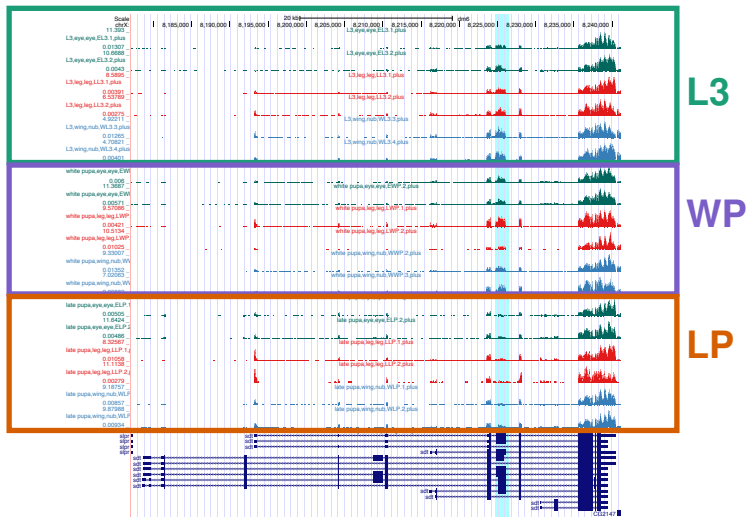
# vnc: histone acetyltransferase involved in neurogenesis



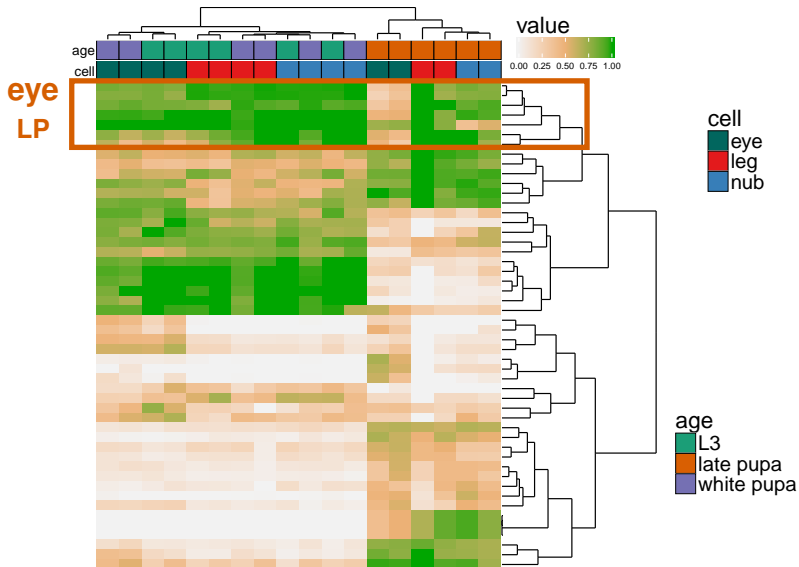
# Single exon skipping



# sdt: neural development

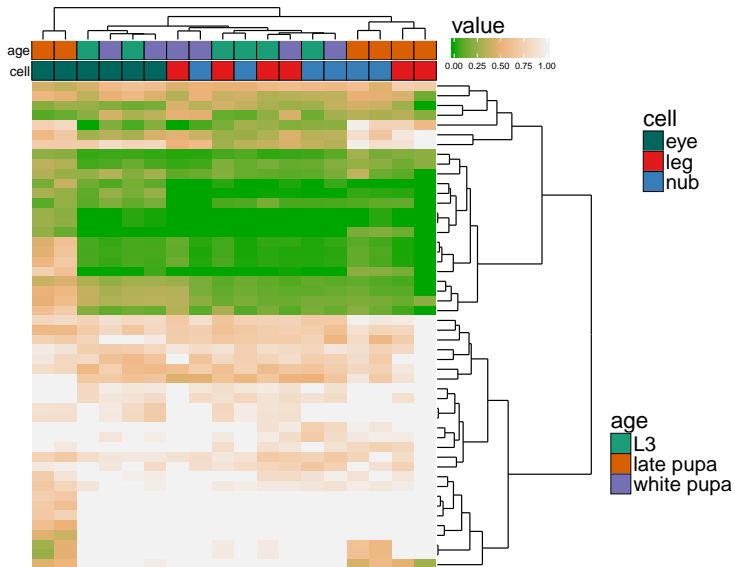


# Single exon skipping

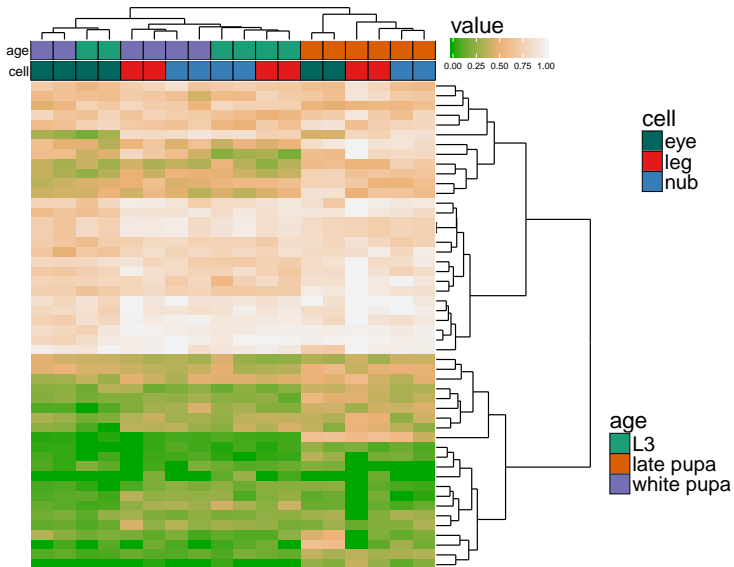




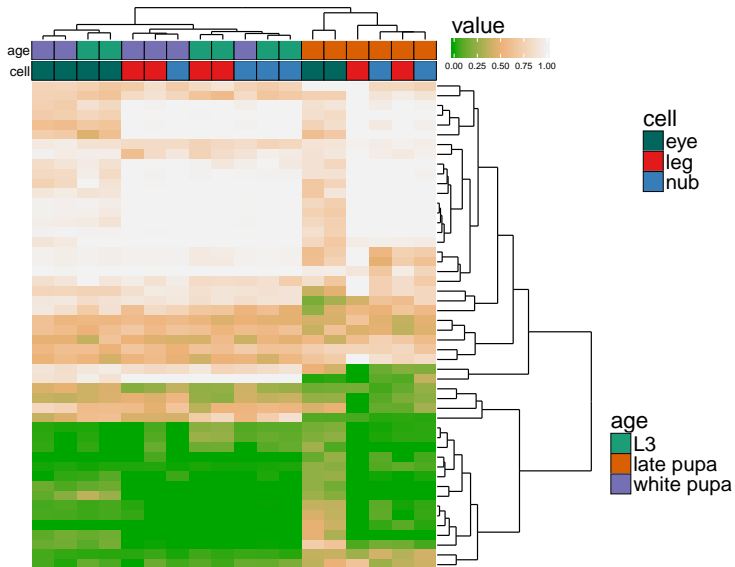
# Multiple exon skipping



# Retained intron



# Mutually exclusive exon



# syp (neurogenesis and splicing)



# Outline

Introduction

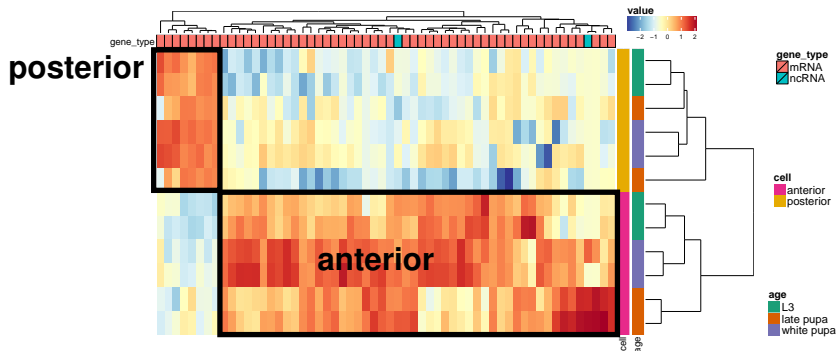
Eye, leg and wing

**Wing compartments**

DEG across wing compartments

# DEG across wing compartments - Anterior vs Posterior

EdgeR -  $\log_{2}FC > 2$ ,  $FDR \leq 0.01$



# DEG across wing compartments - Anterior vs Posterior

