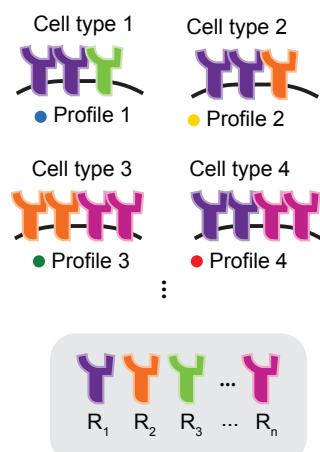


Figure 1: Pathway expression profiles could recur across diverse cell types

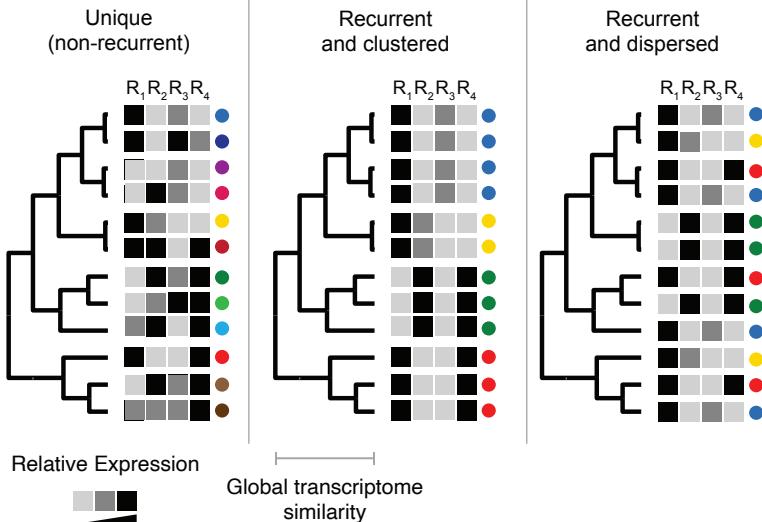
A

Receptor expression profiles



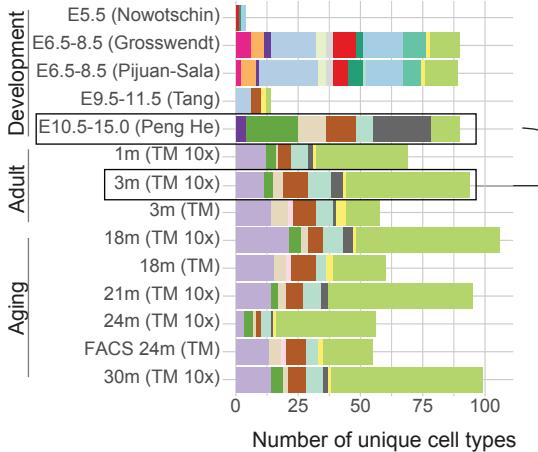
B

Pathway profiles could be...



C

Multiple mouse cell atlas datasets

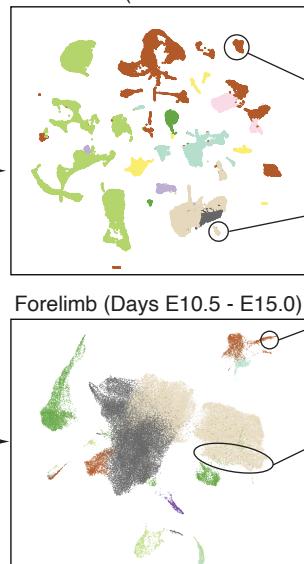


D

Individual cell atlases  
Single-cell transcriptome profiles

1 dot = 1 cell

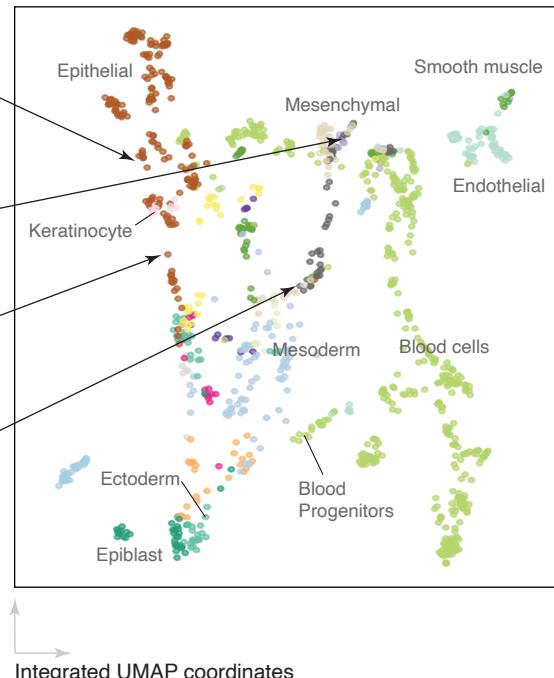
Tabula muris (3 month old mouse)



Integrated cell state atlas  
Global cluster-averaged profiles

All data sets in (C)

1 dot = 1 cell cluster



E

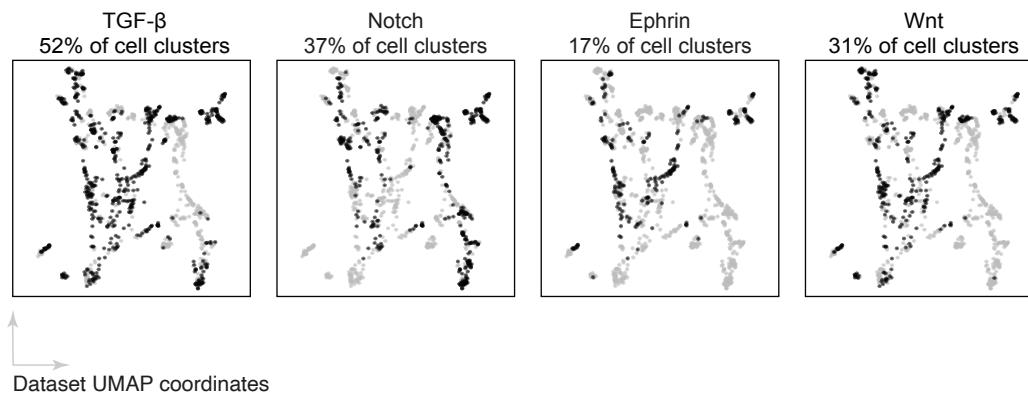
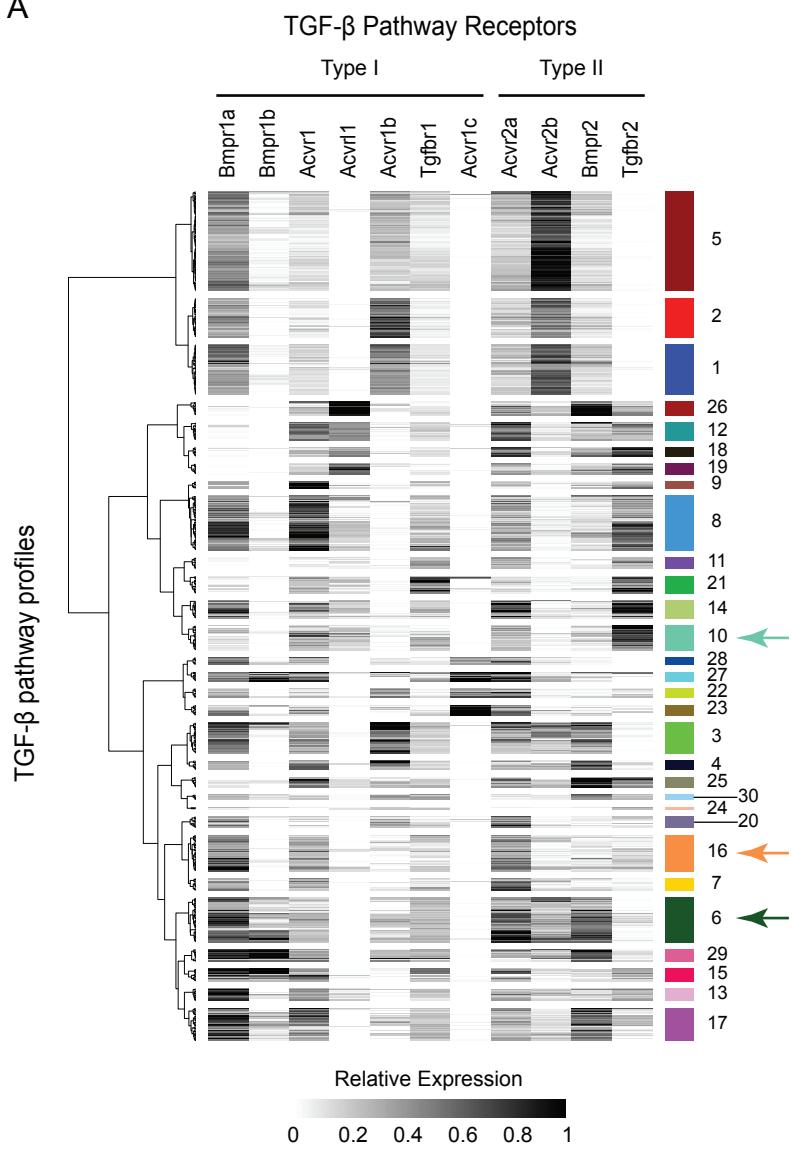
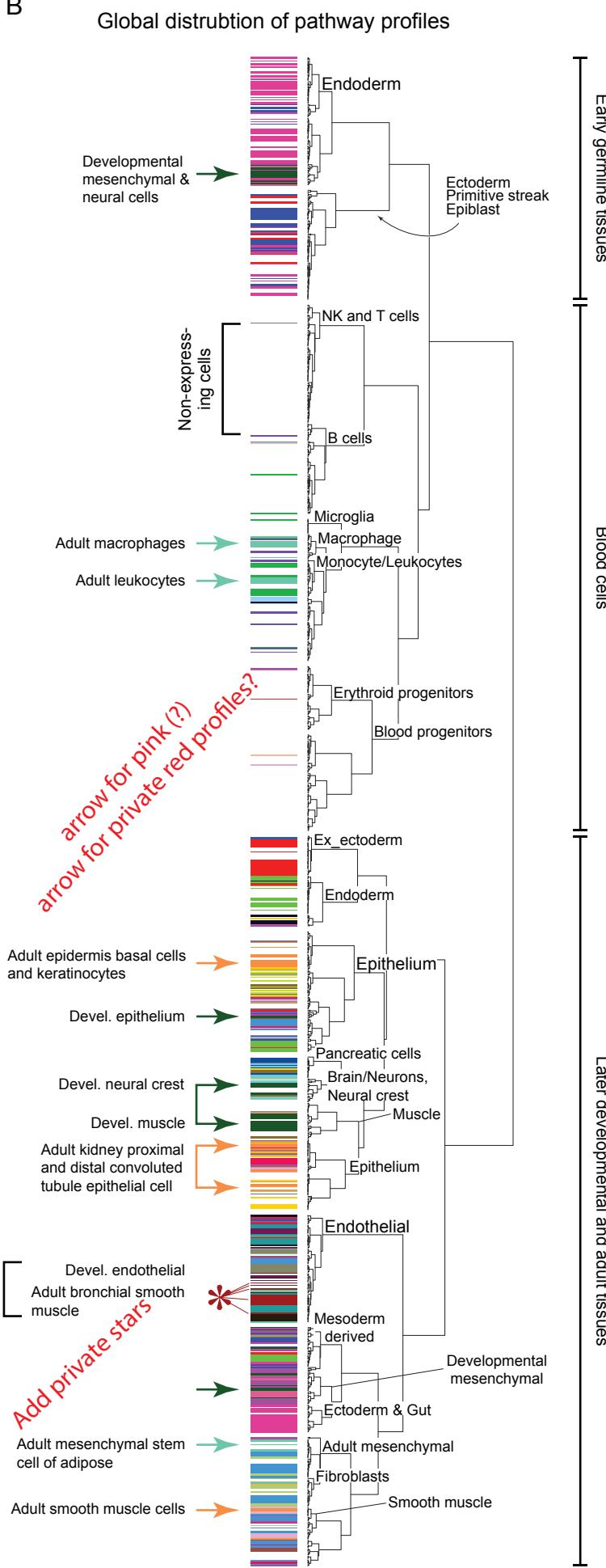


Figure 2: TGF- $\beta$  Receptors exhibit distinct and recurrent pathway expression profiles

A



B



C

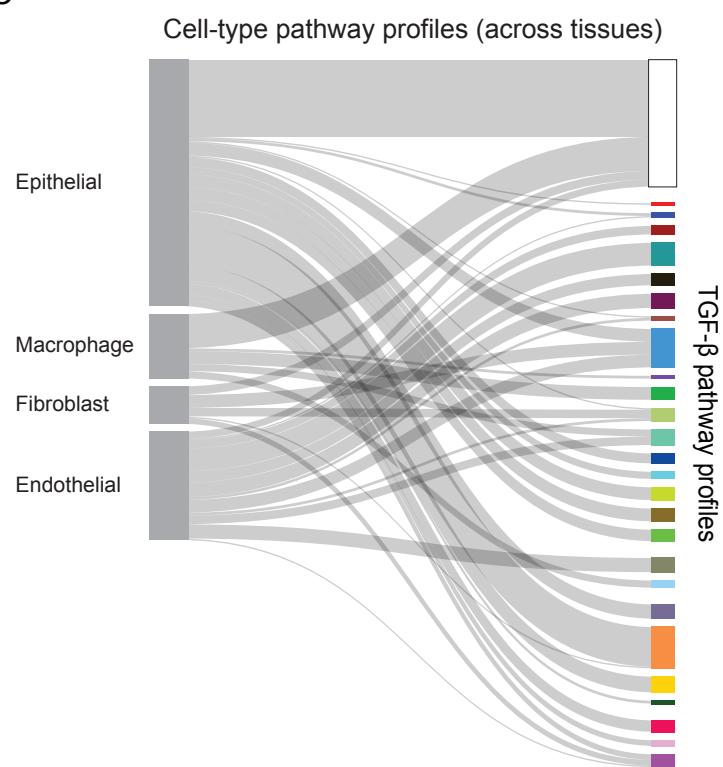
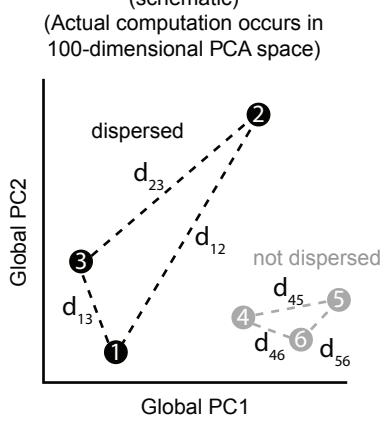
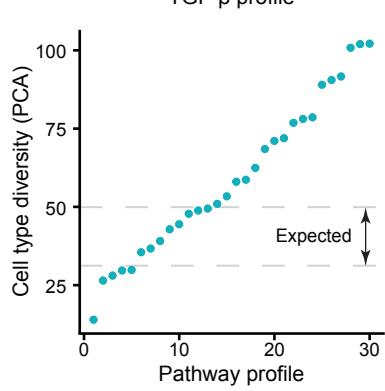


Figure 3: TGF- $\beta$  expression motifs are dispersed across cell types and organs

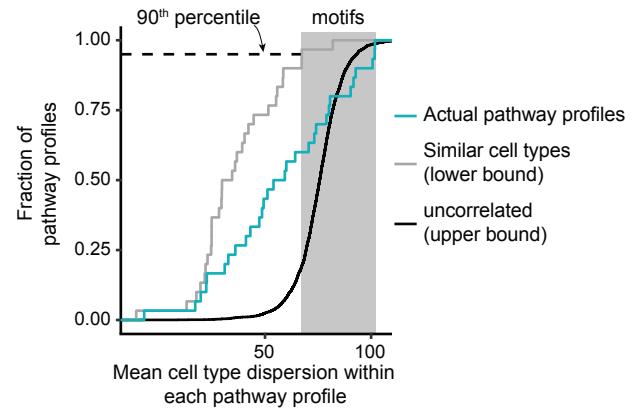
**A** Pairwise distance computation (schematic)  
(Actual computation occurs in 100-dimensional PCA space)



**B** Number of cell types with TGF- $\beta$  profile

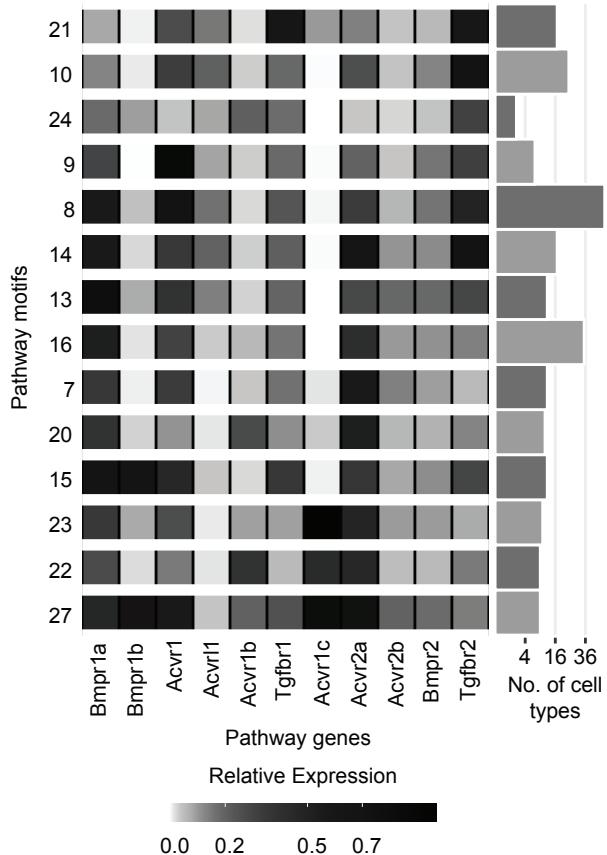


**B**



**C**

Broadly Dispersed TGF- $\beta$  Motifs



**D**

Broadly Dispersed TGF- $\beta$  Motifs

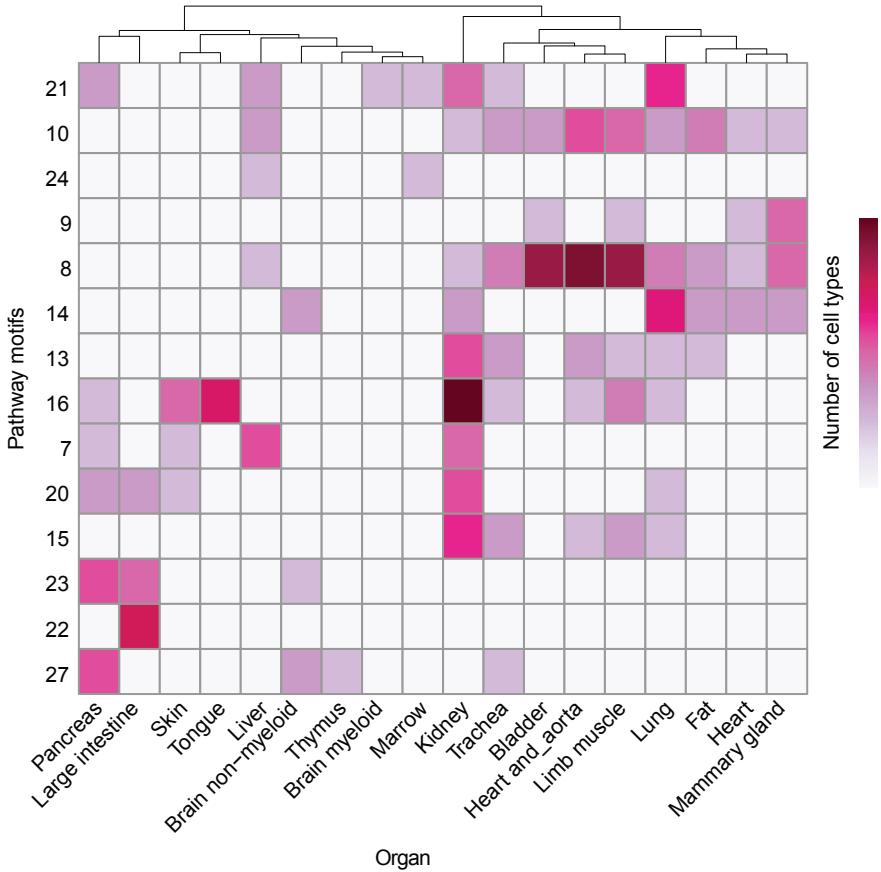
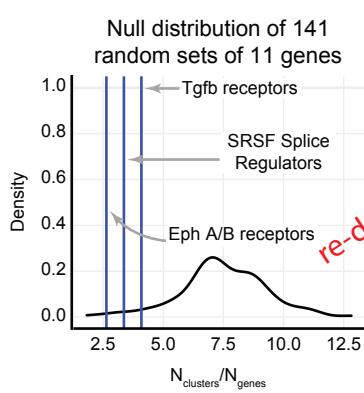
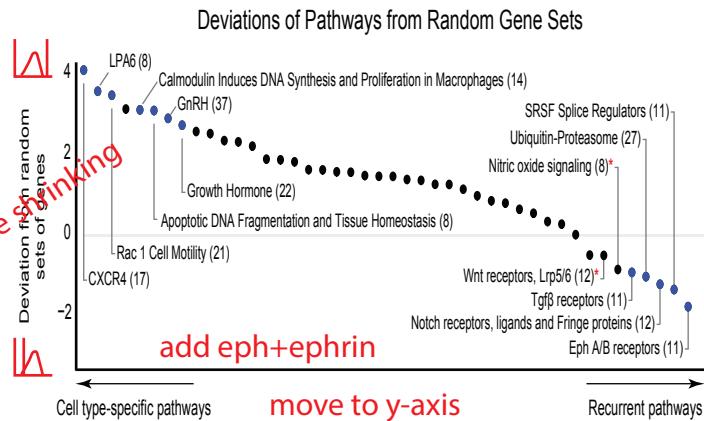


Figure 4: Wnt and Notch also show broadly dispersed recurrent pathway expression motifs

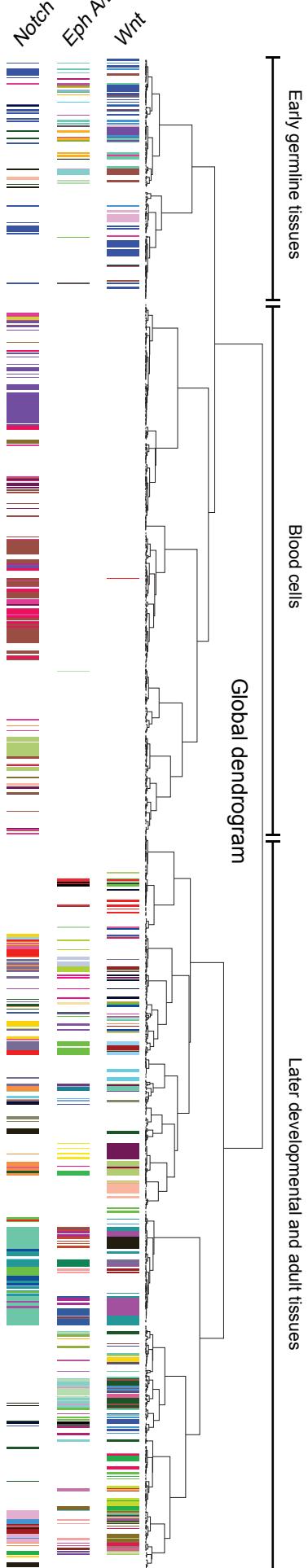
A



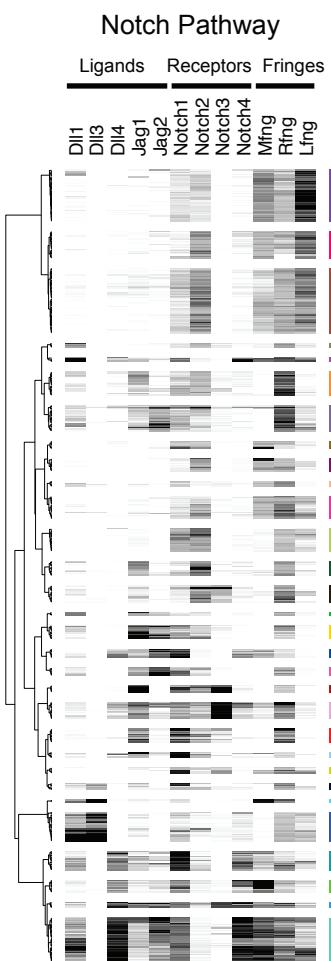
B



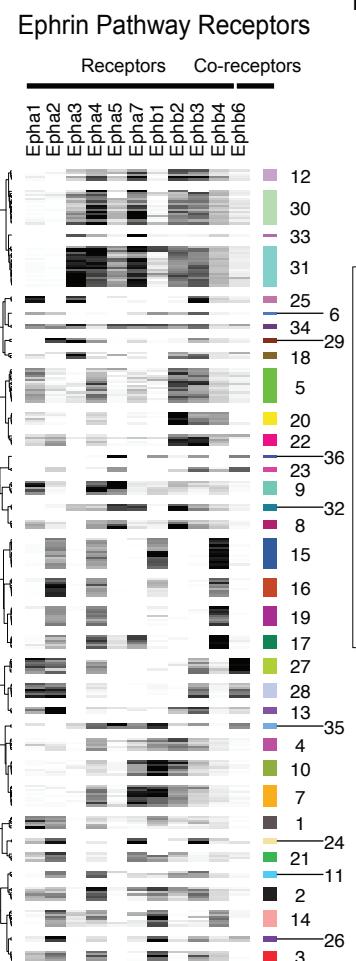
F



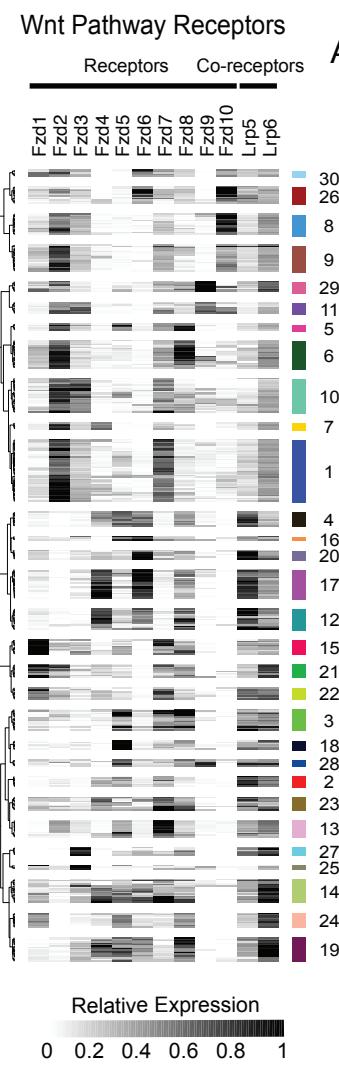
C



D



E



G

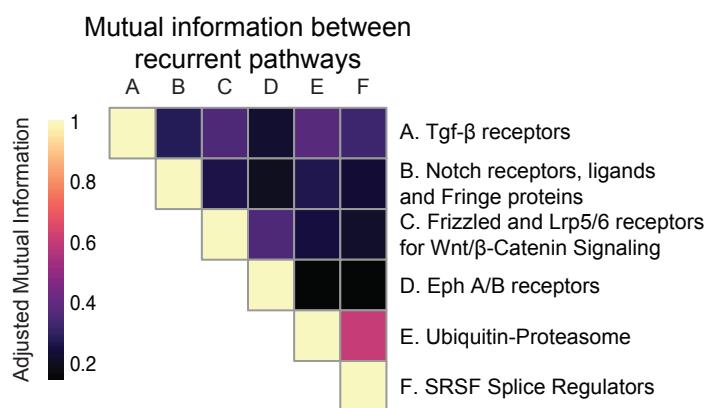
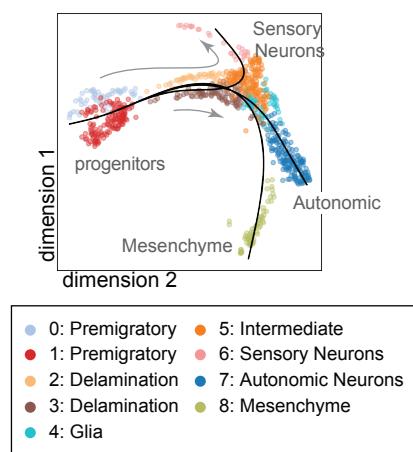


Figure 5:

### TGF- $\beta$ and Notch show distinct dynamics in neural crest differentiation

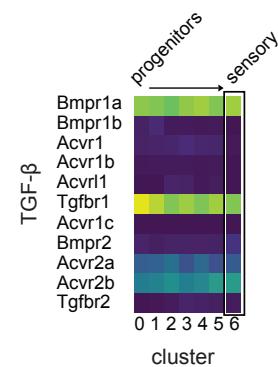
A

#### Trunk Neural Crest (E9.5)



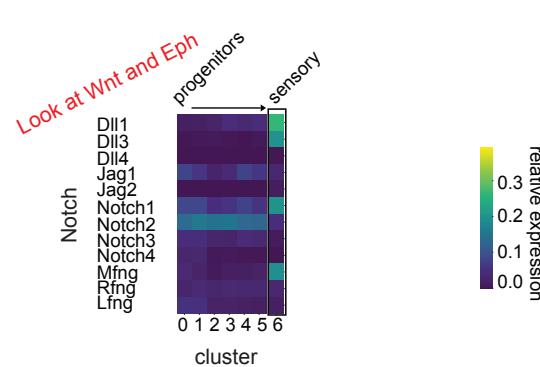
B

#### Neural crest E9.5



C

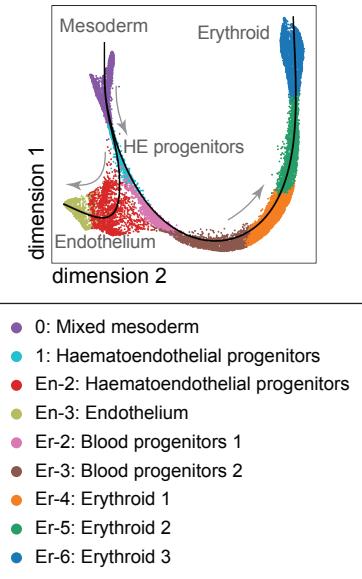
#### Neural crest E9.5



### TGF- $\beta$ shows fate-dependent dynamics in vascular differentiation

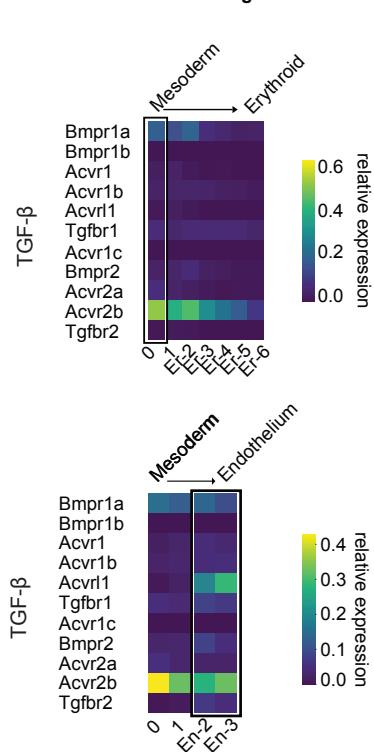
D

#### Early vascular differentiation



E

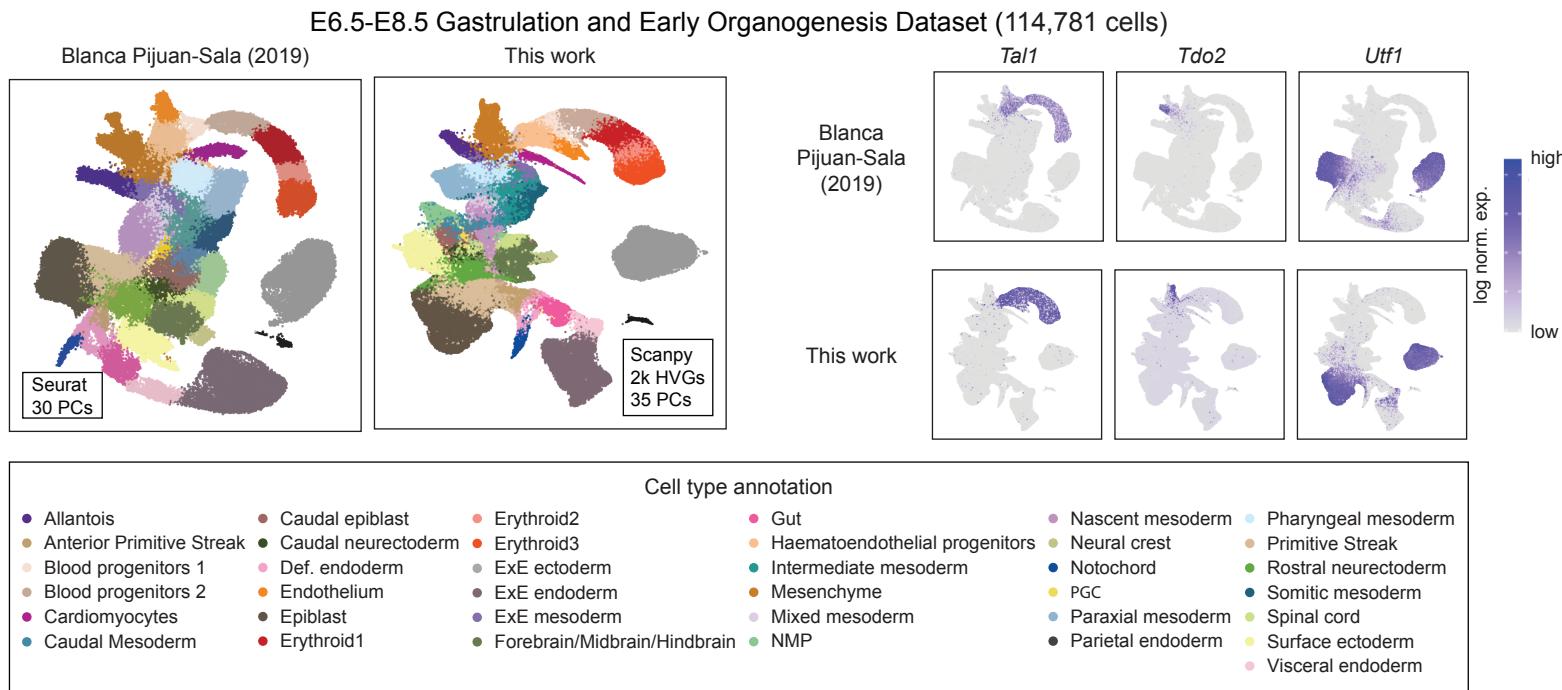
#### Blood lineage



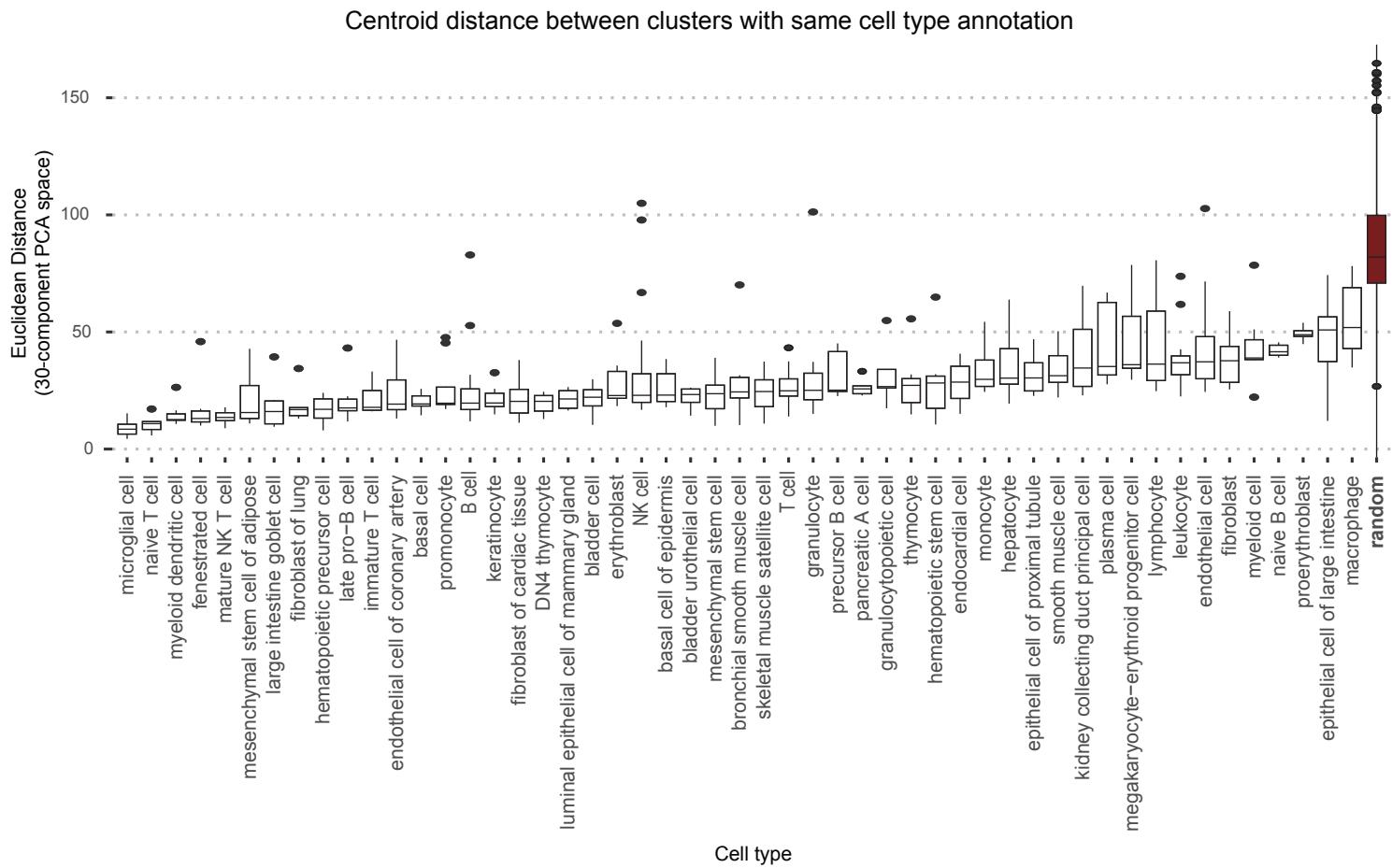
Stability during Aging result

Figure 1, Supplement 1

A



B



C

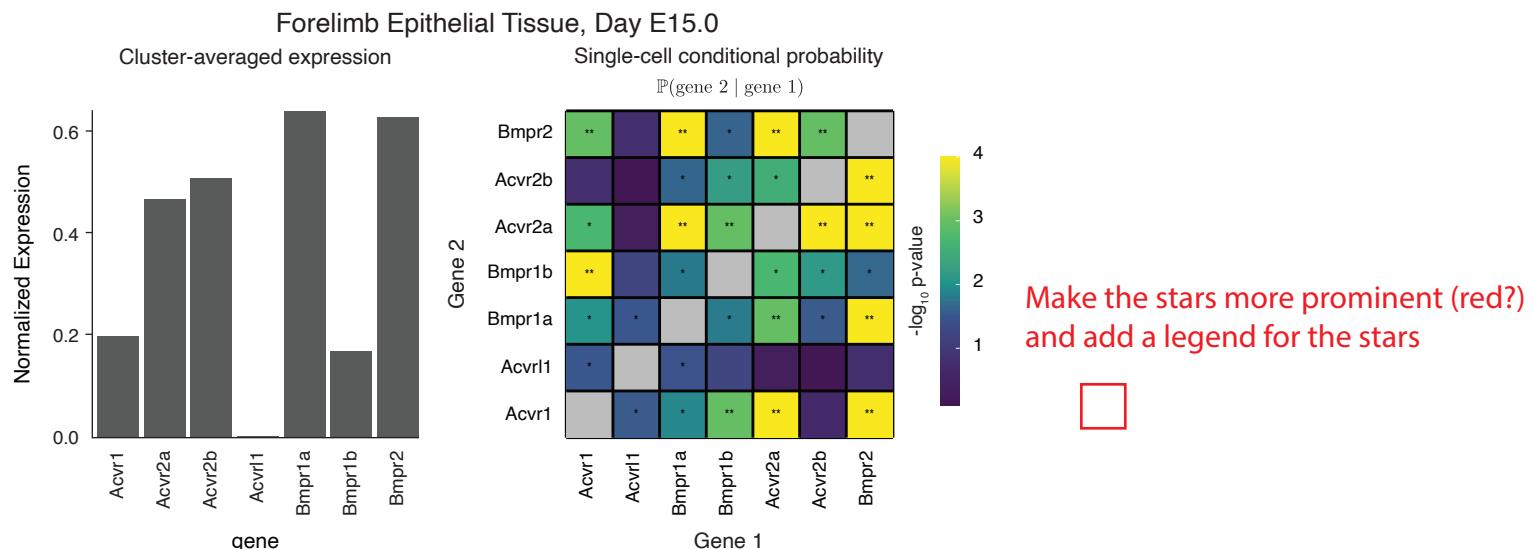
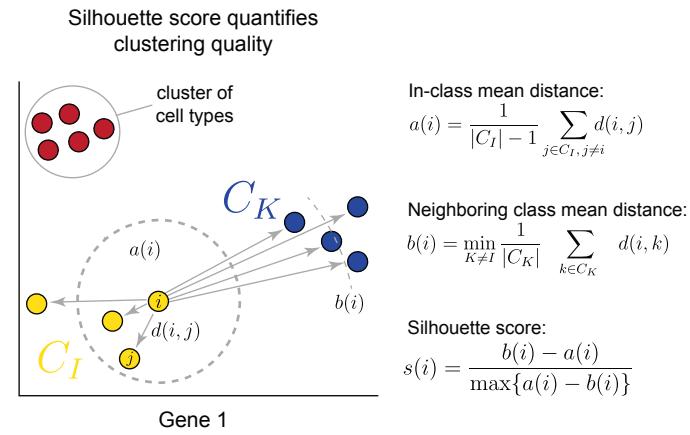


Figure 2, Supplement 1

A



B

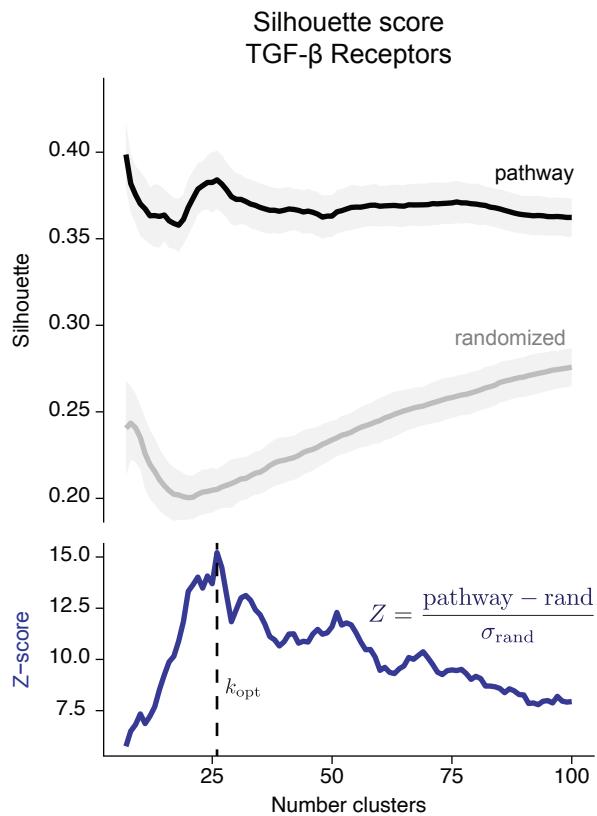


Figure 3 Supplement 1

A

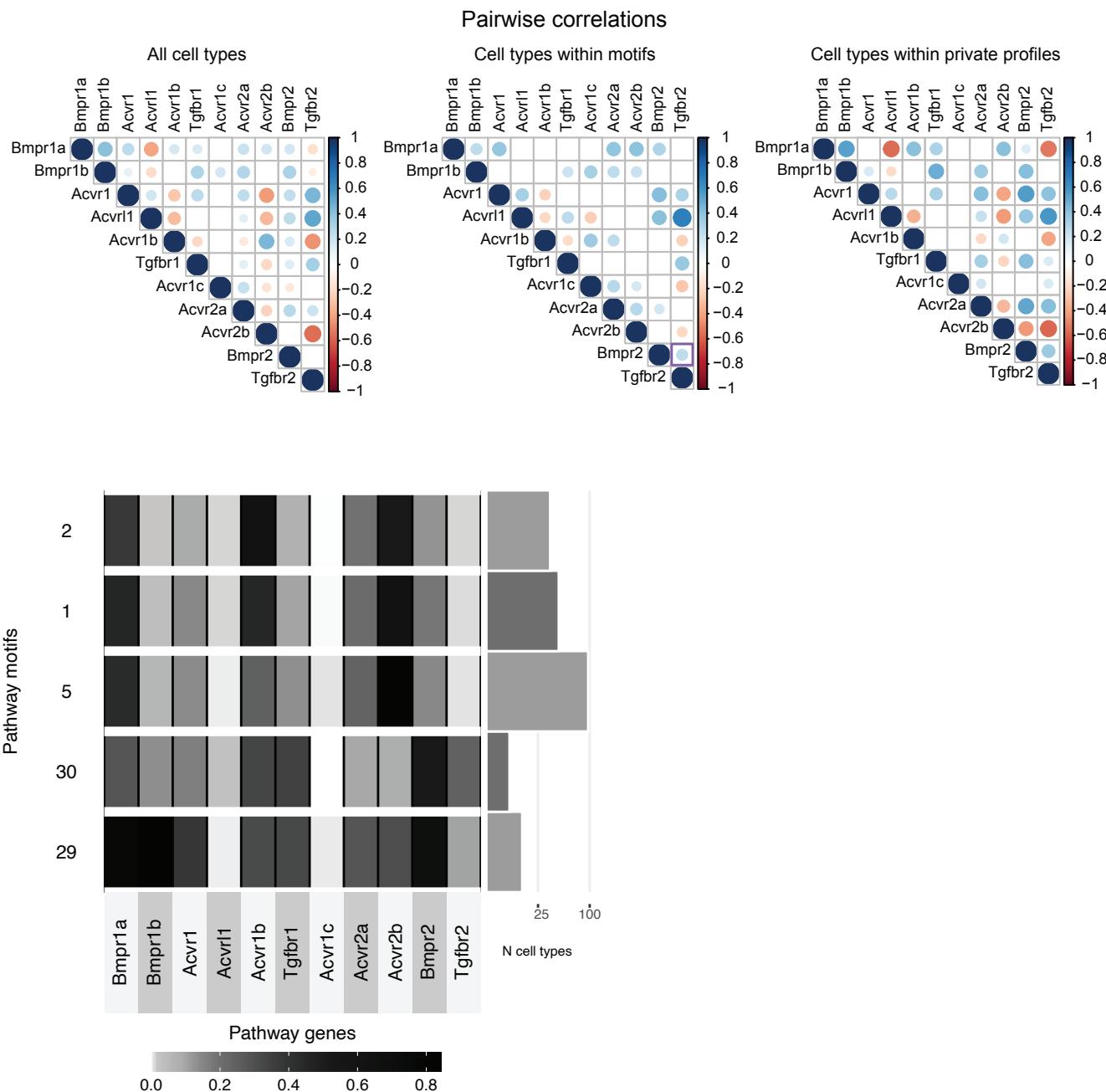
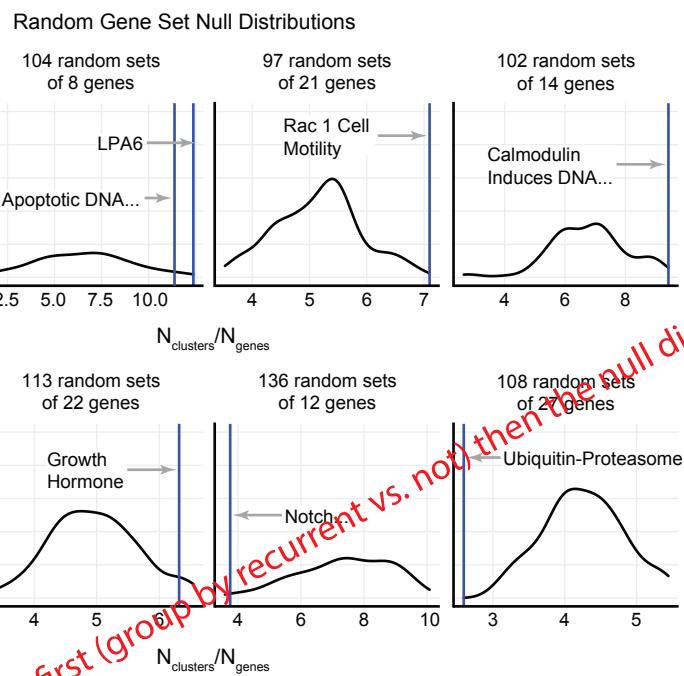
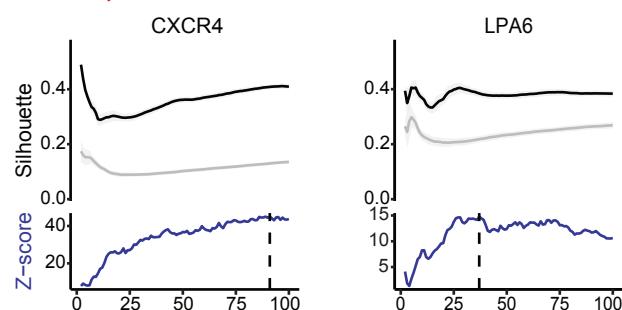


Figure 4 Supplement 1

B



A



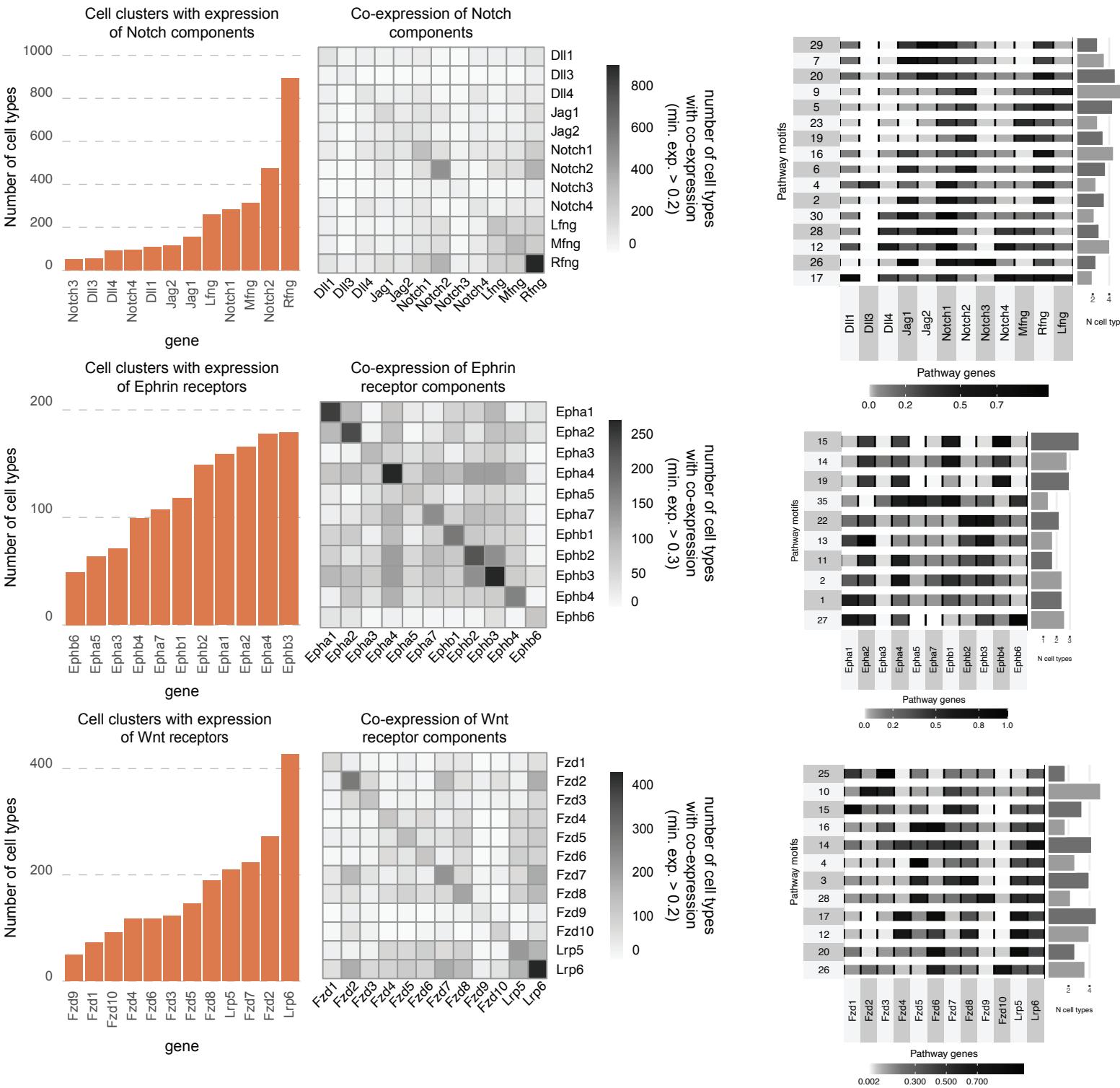


Figure 2, Supplement 2

