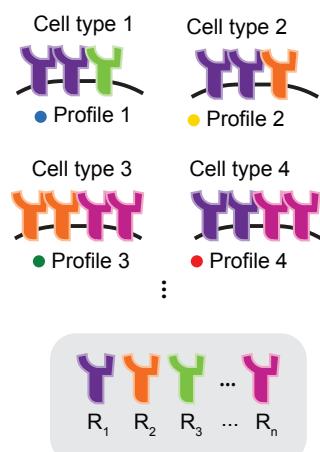


Figure 1: Pathway expression profiles could recur across diverse cell types

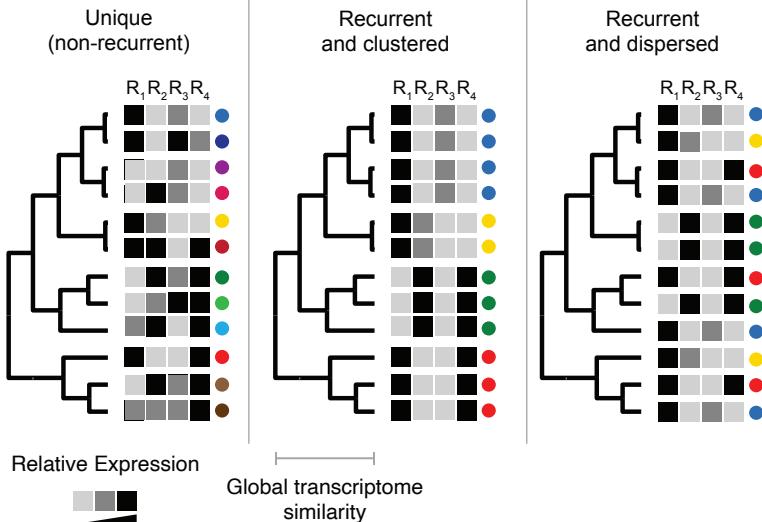
A

Receptor expression profiles



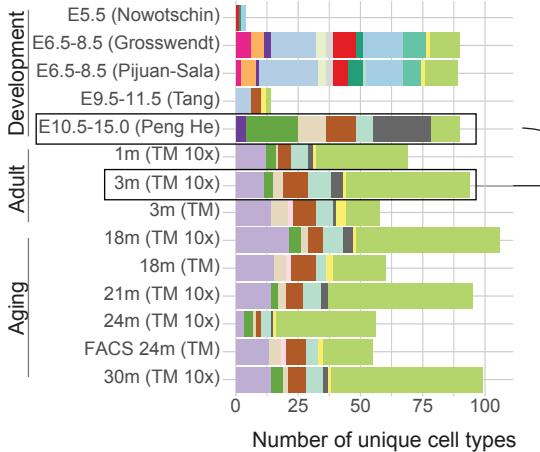
B

Pathway profiles could be...



C

Multiple mouse cell atlas datasets

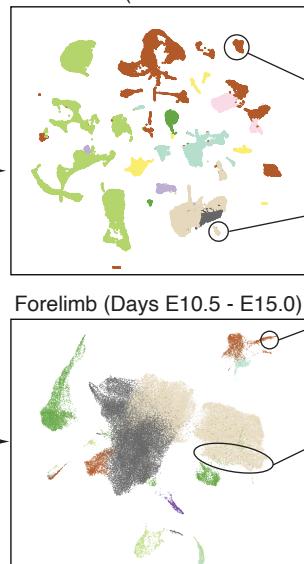


D

Individual cell atlases  
Single-cell transcriptome profiles

1 dot = 1 cell

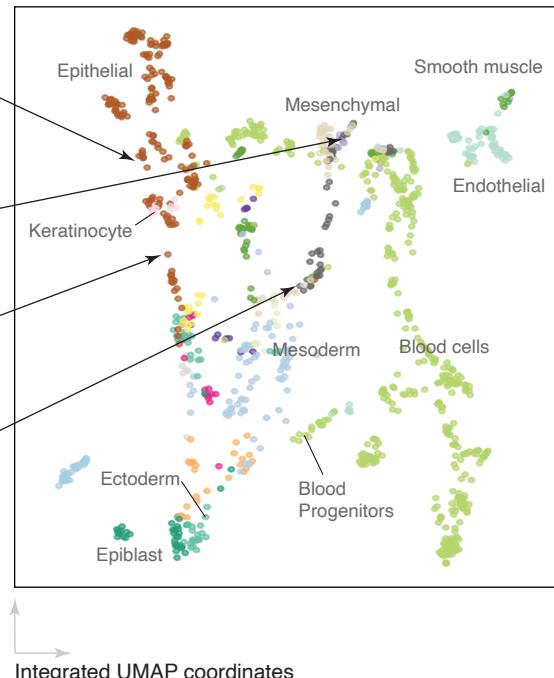
Tabula muris (3 month old mouse)



Integrated cell state atlas  
Global cluster-averaged profiles

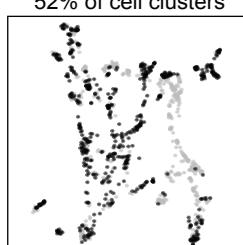
All data sets in (C)

1 dot = 1 cell cluster

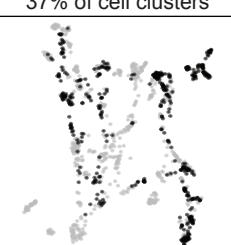


E

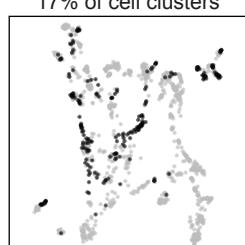
TGF- $\beta$   
52% of cell clusters



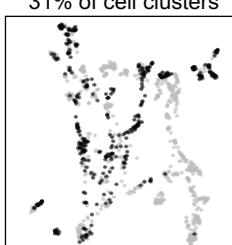
Notch  
37% of cell clusters



Ephrin  
17% of cell clusters



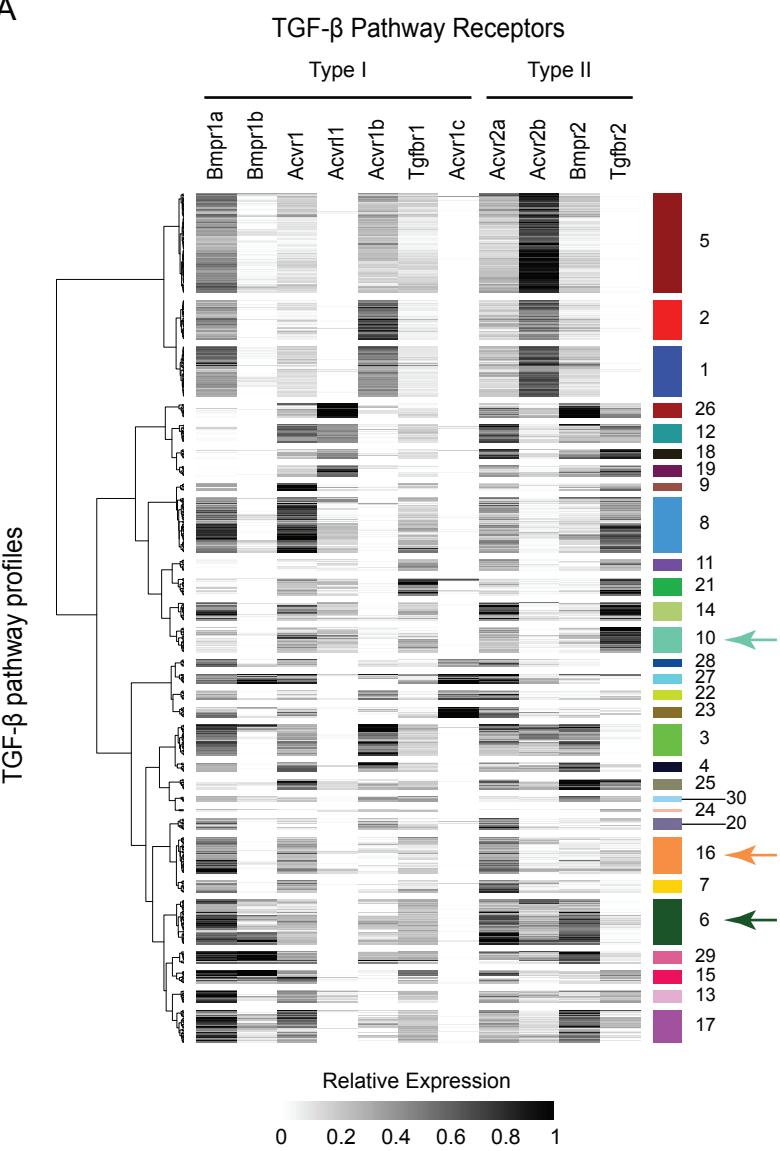
Wnt  
31% of cell clusters



Dataset UMAP coordinates

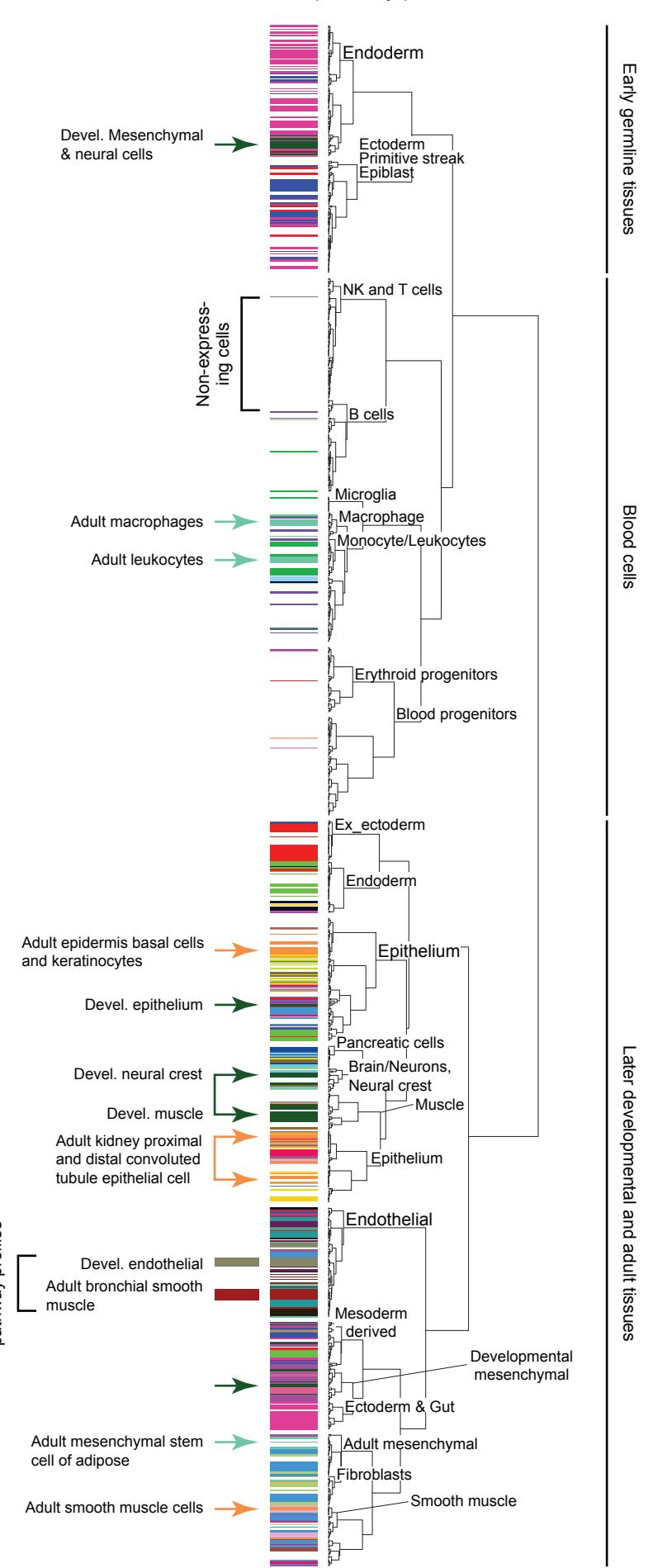
Figure 2: TGF- $\beta$  Receptors exhibit distinct and recurrent pathway expression profiles

A



B

Global distribution of pathway profiles



C

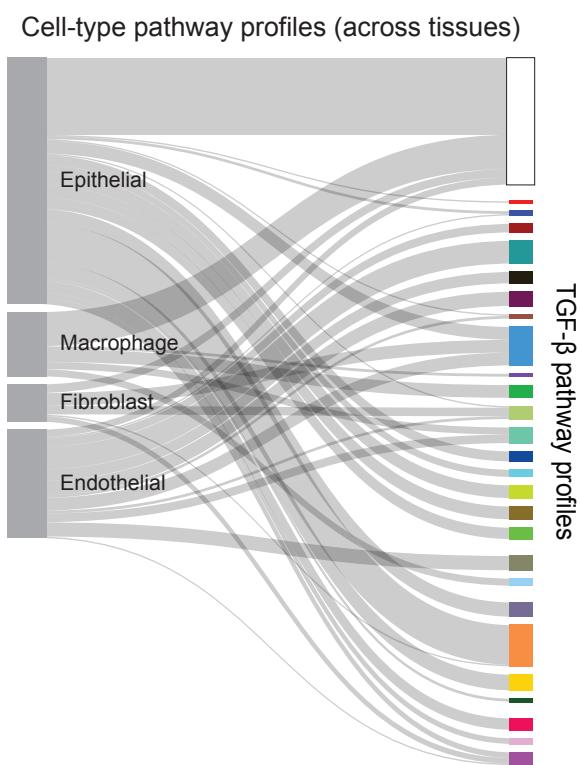
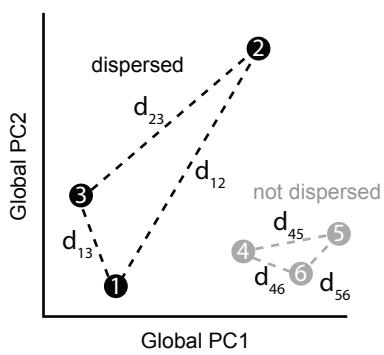


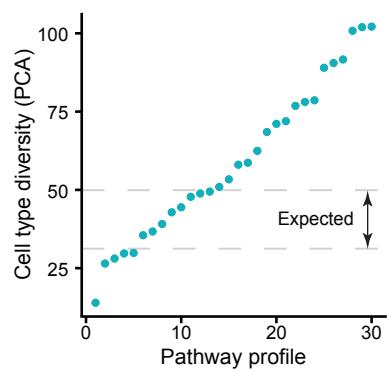
Figure 3: TGF- $\beta$  expression motifs are dispersed across cell types and organs

**A** Pairwise distance computation (schematic)

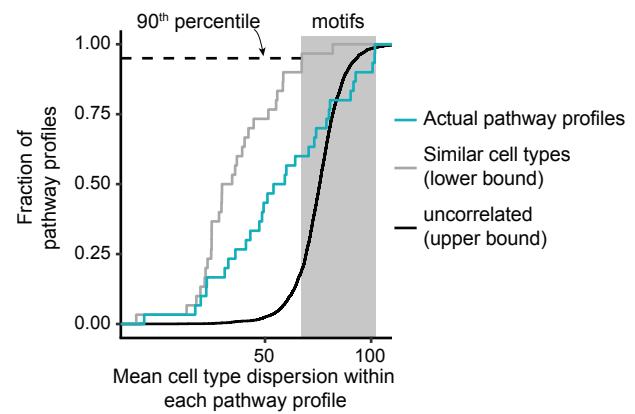
(Actual computation occurs in 100-dimensional PCA space)



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

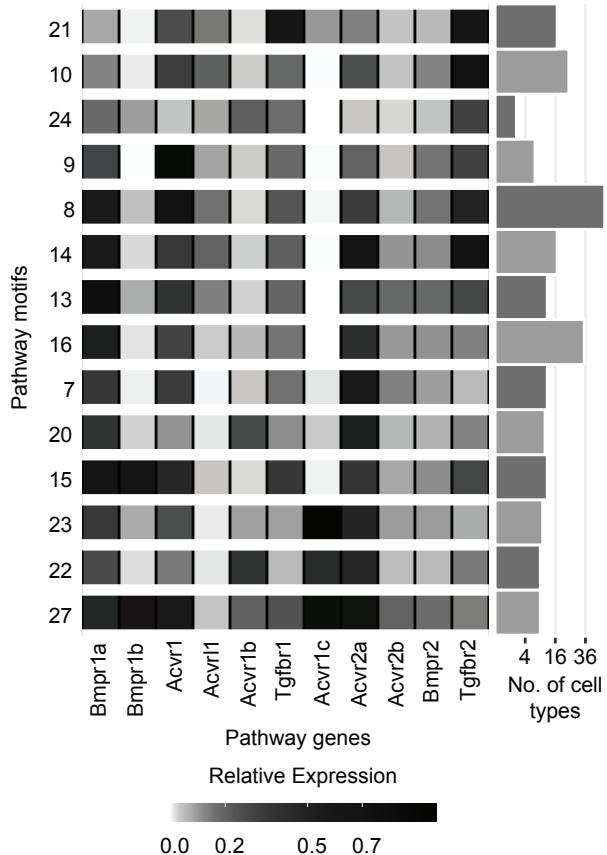


**B**



**C**

Broadly Dispersed TGF- $\beta$  Motifs



**D**

Broadly Dispersed TGF- $\beta$  Motifs

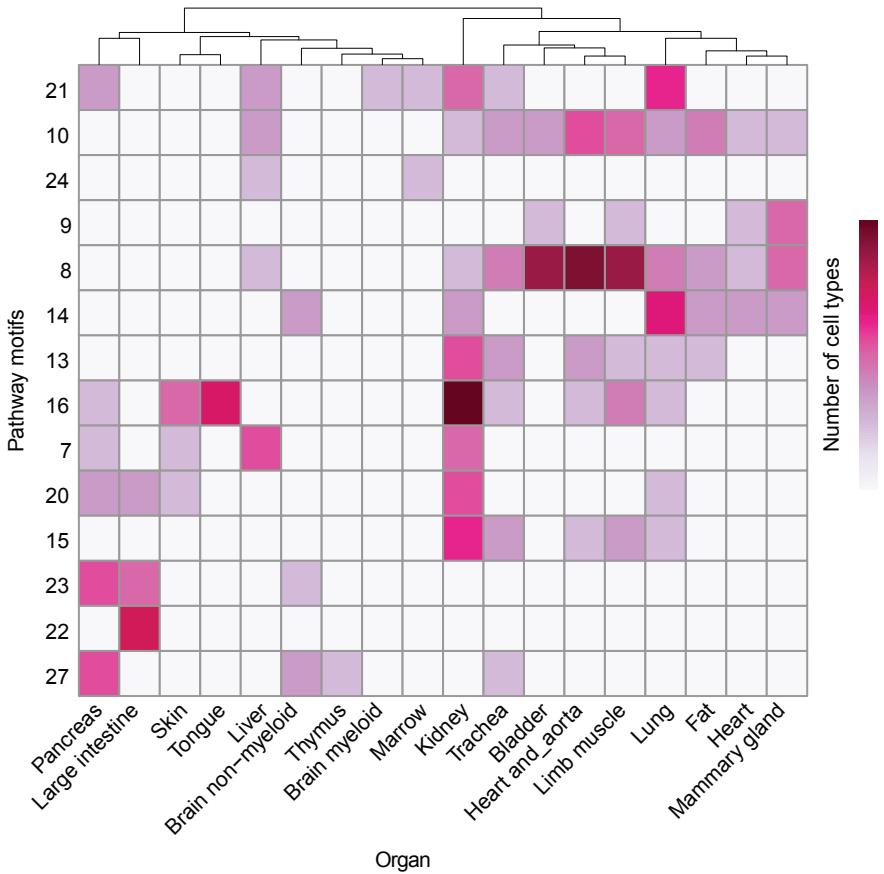
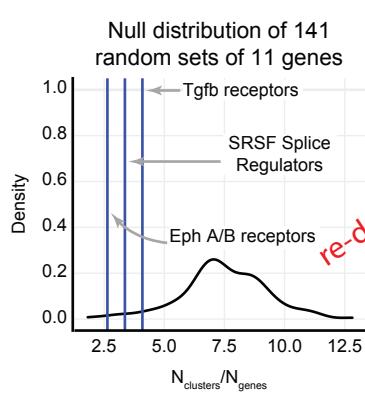
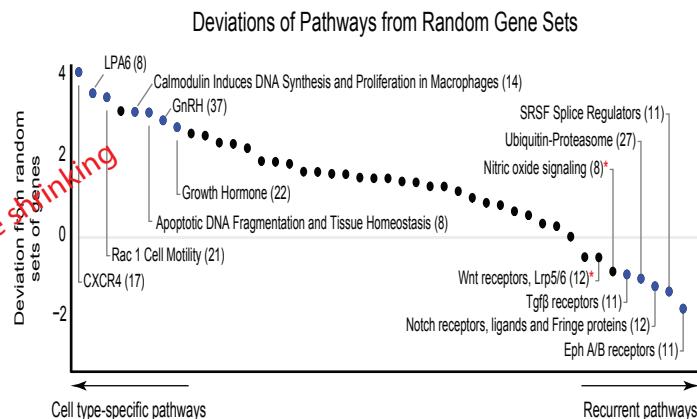


Figure 4: Wnt and Notch also show broadly dispersed recurrent pathway expression motifs

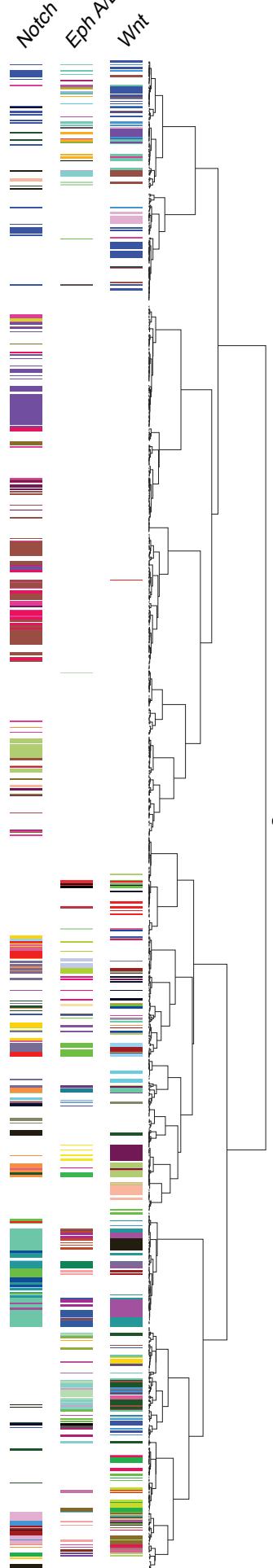
A



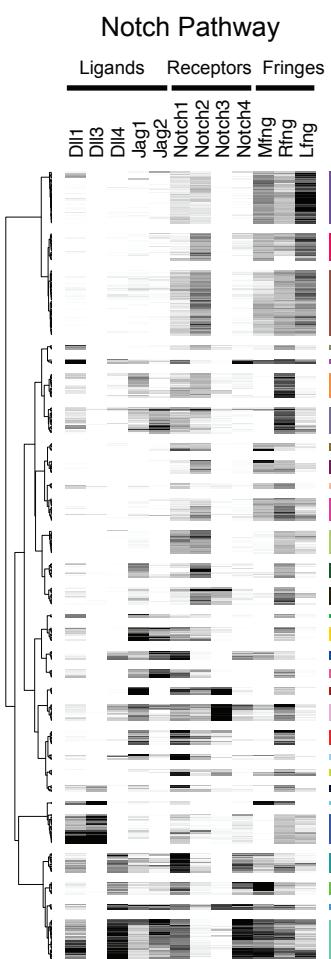
B



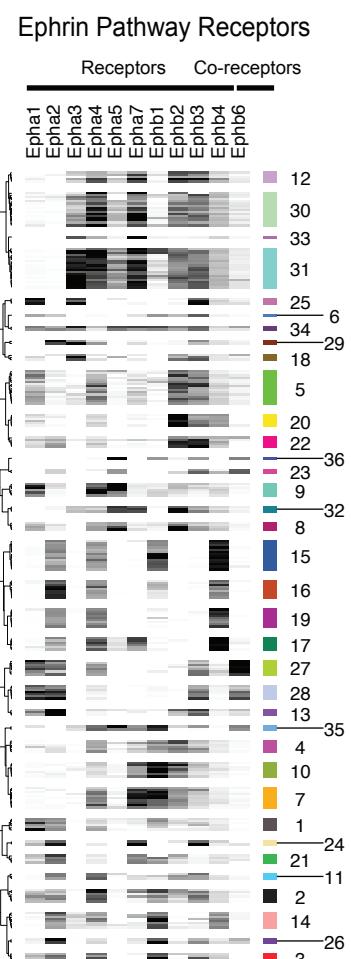
F



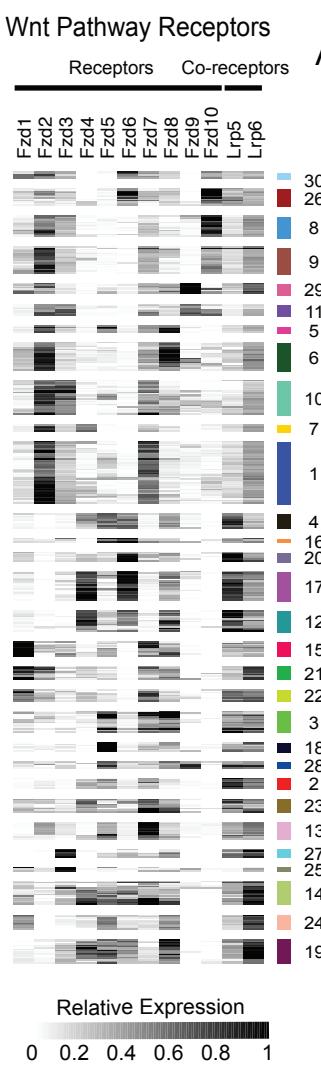
C



D



E



Relative Expression

G

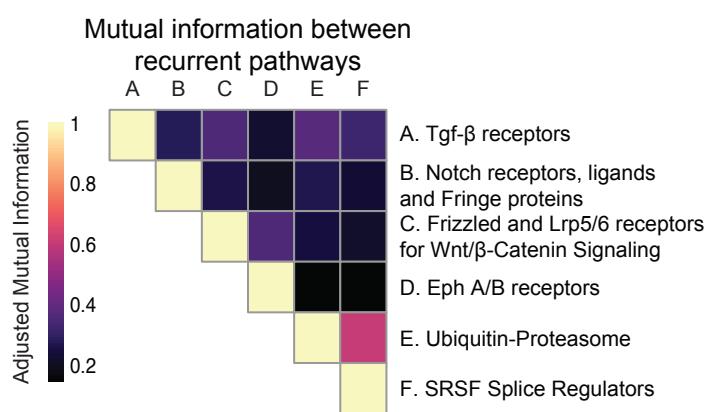
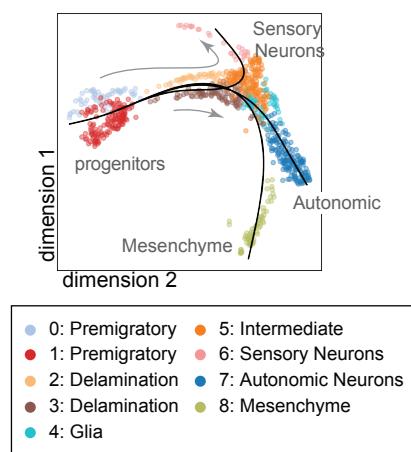


Figure 5:

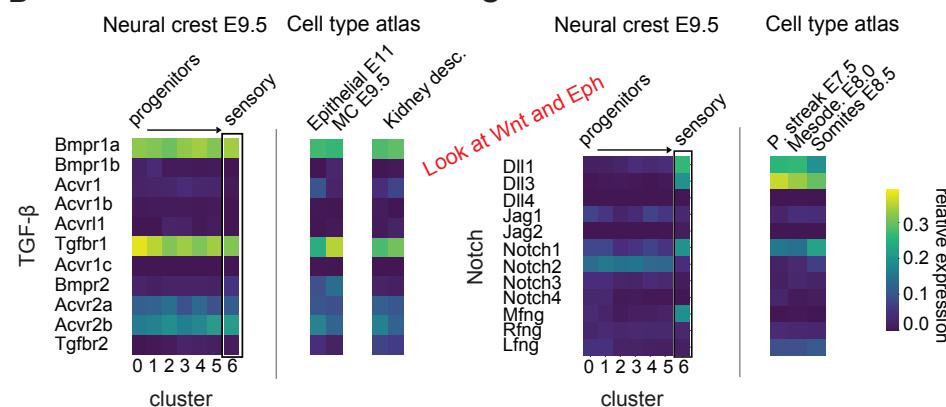
### TGF- $\beta$ and Notch show distinct dynamics in neural crest differentiation

A

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



B

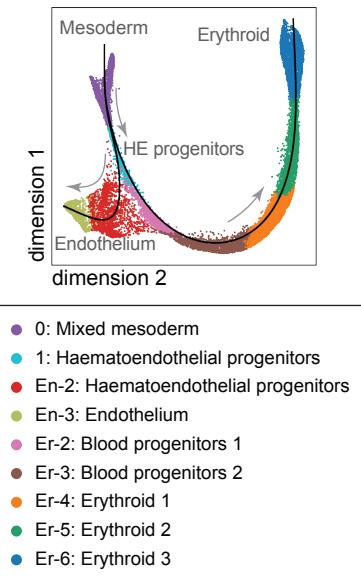


C

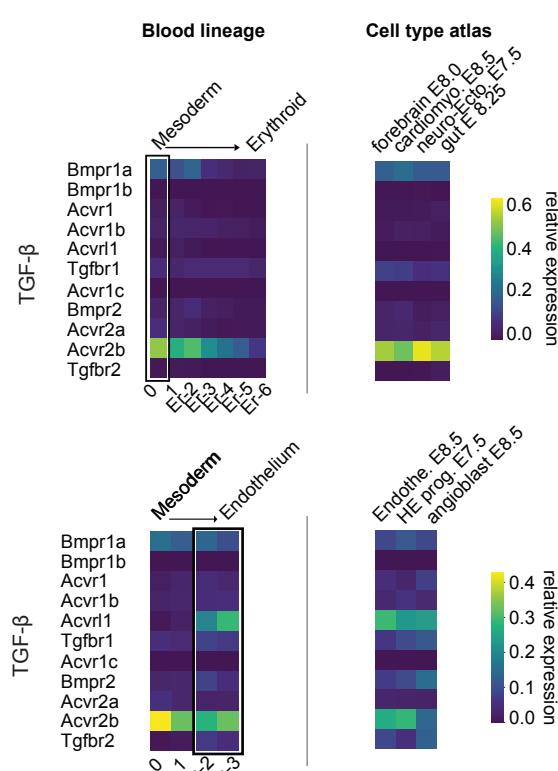
### TGF- $\beta$ shows fate-dependent dynamics in vascular differentiation

D

#### Early vascular differentiation



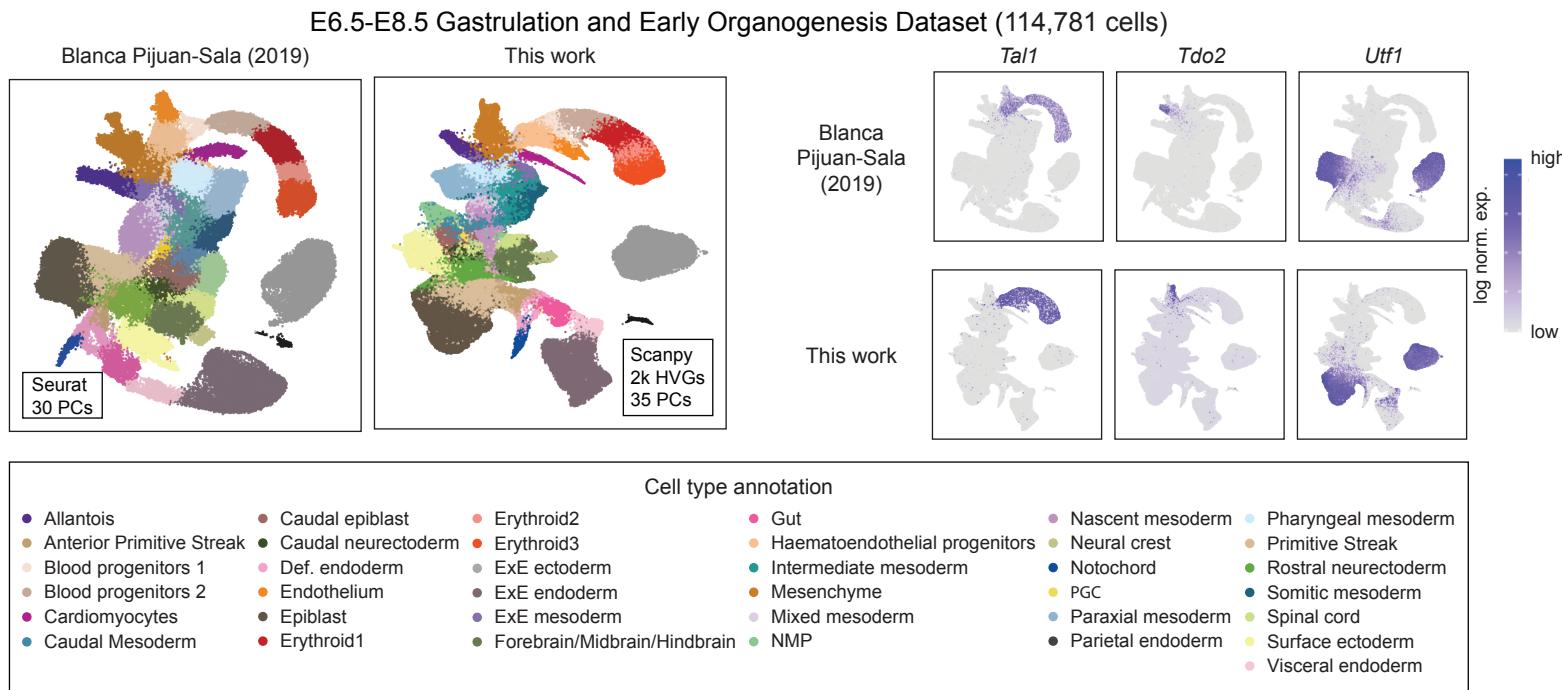
E



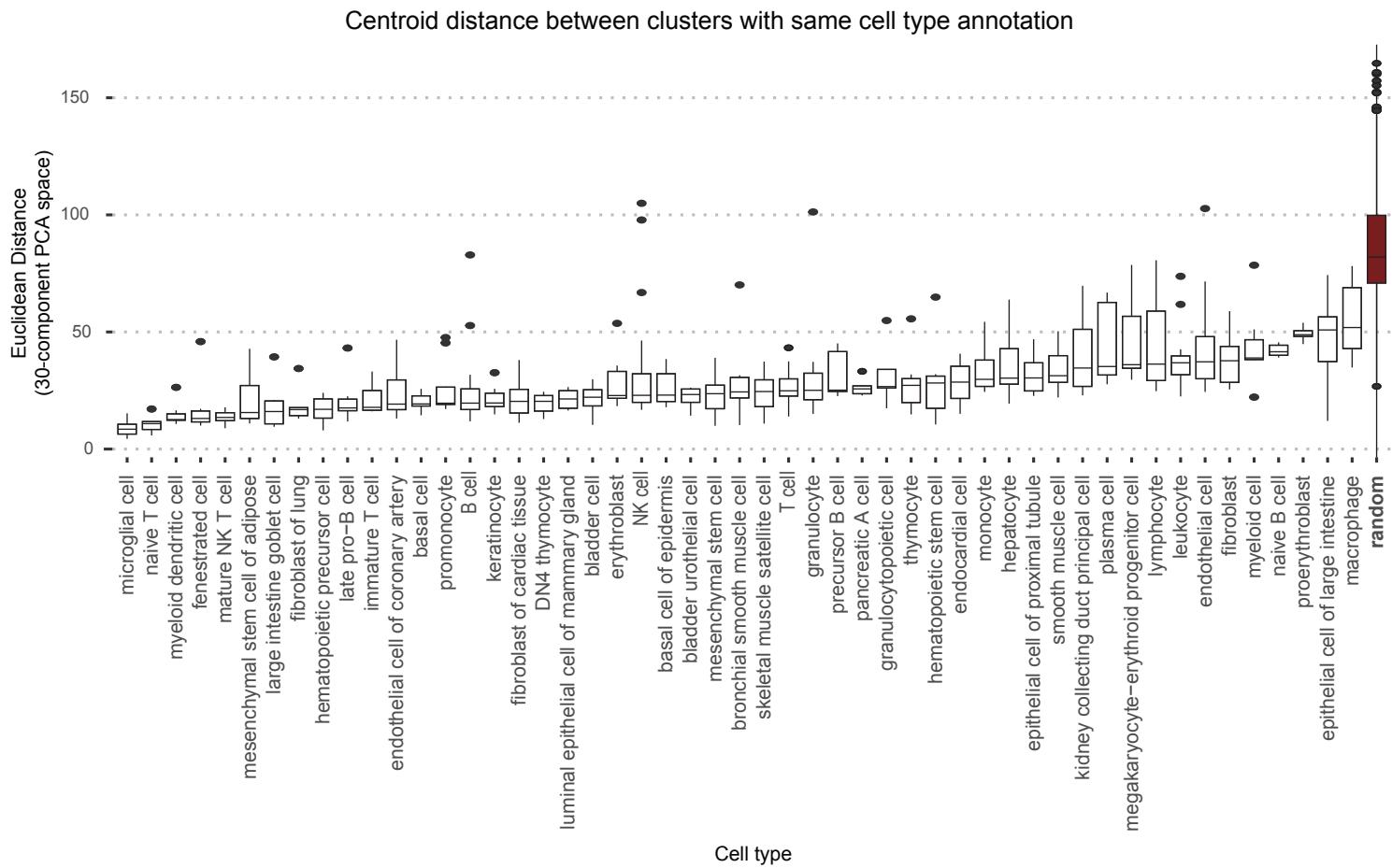
Stability during Aging result

Figure 1, Supplement 1

A



B



C

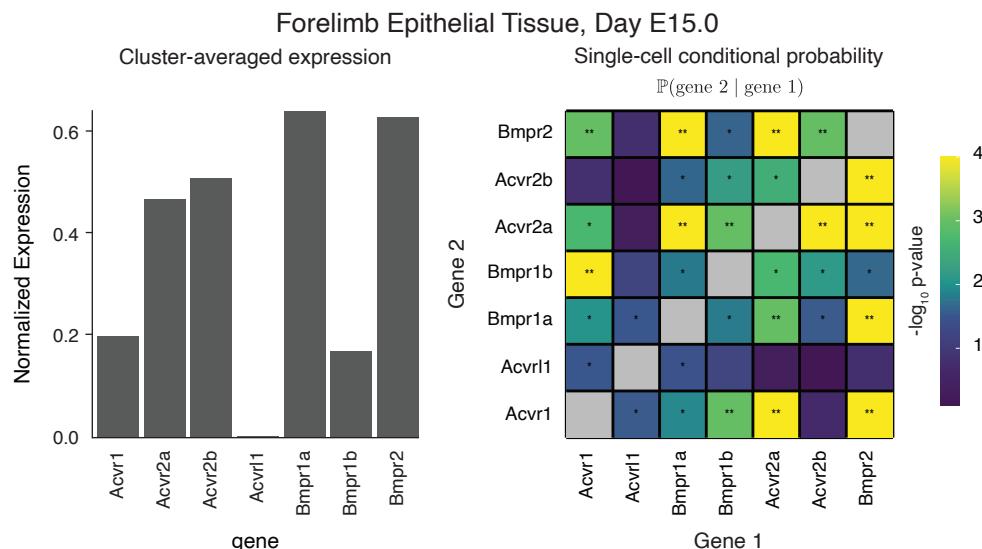
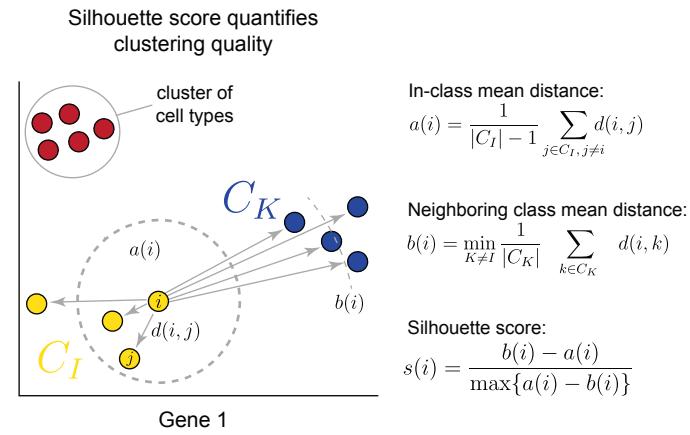


Figure 2, Supplement 1

A



B

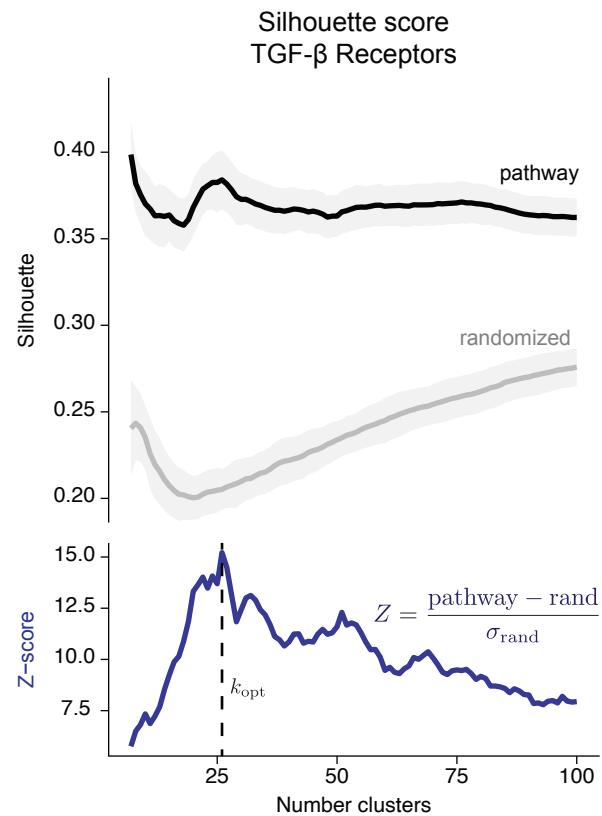


Figure 3 Supplement 1

A

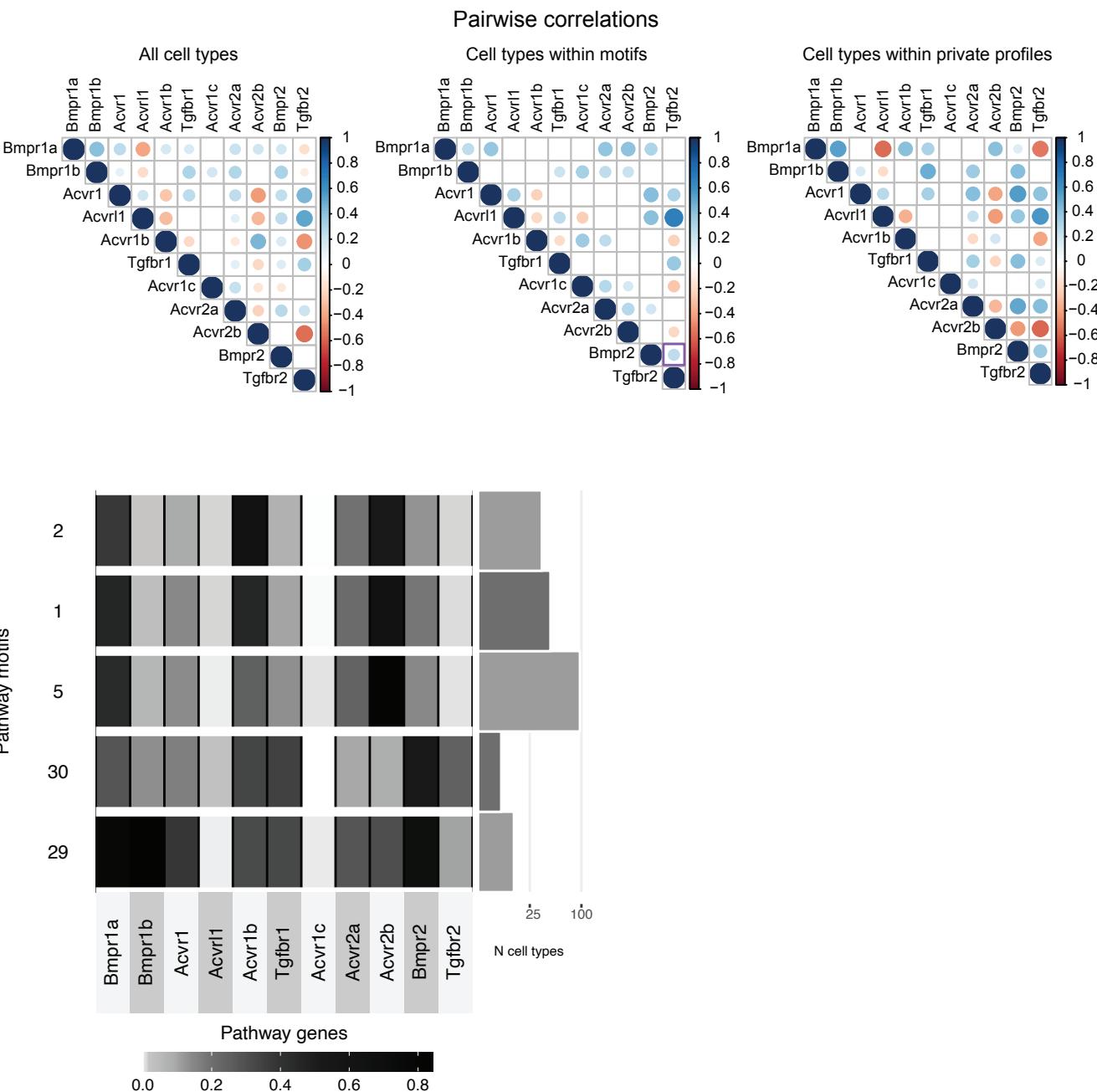
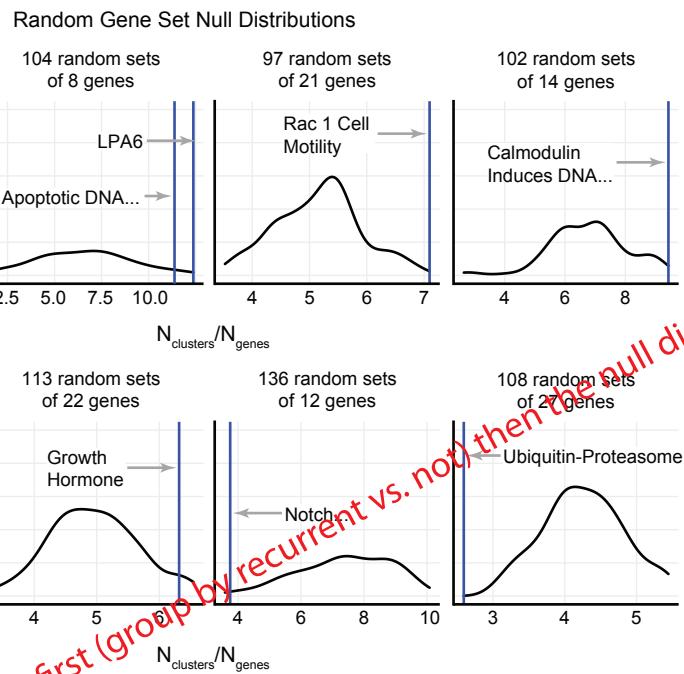
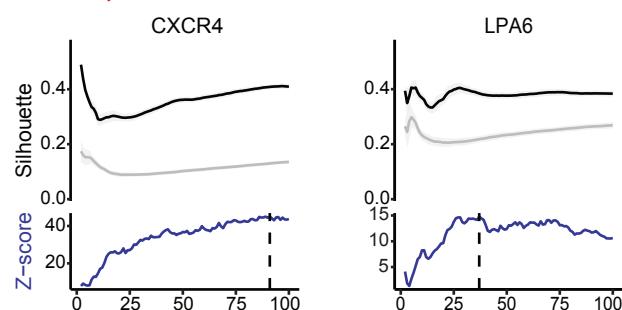


Figure 4 Supplement 1

B



A



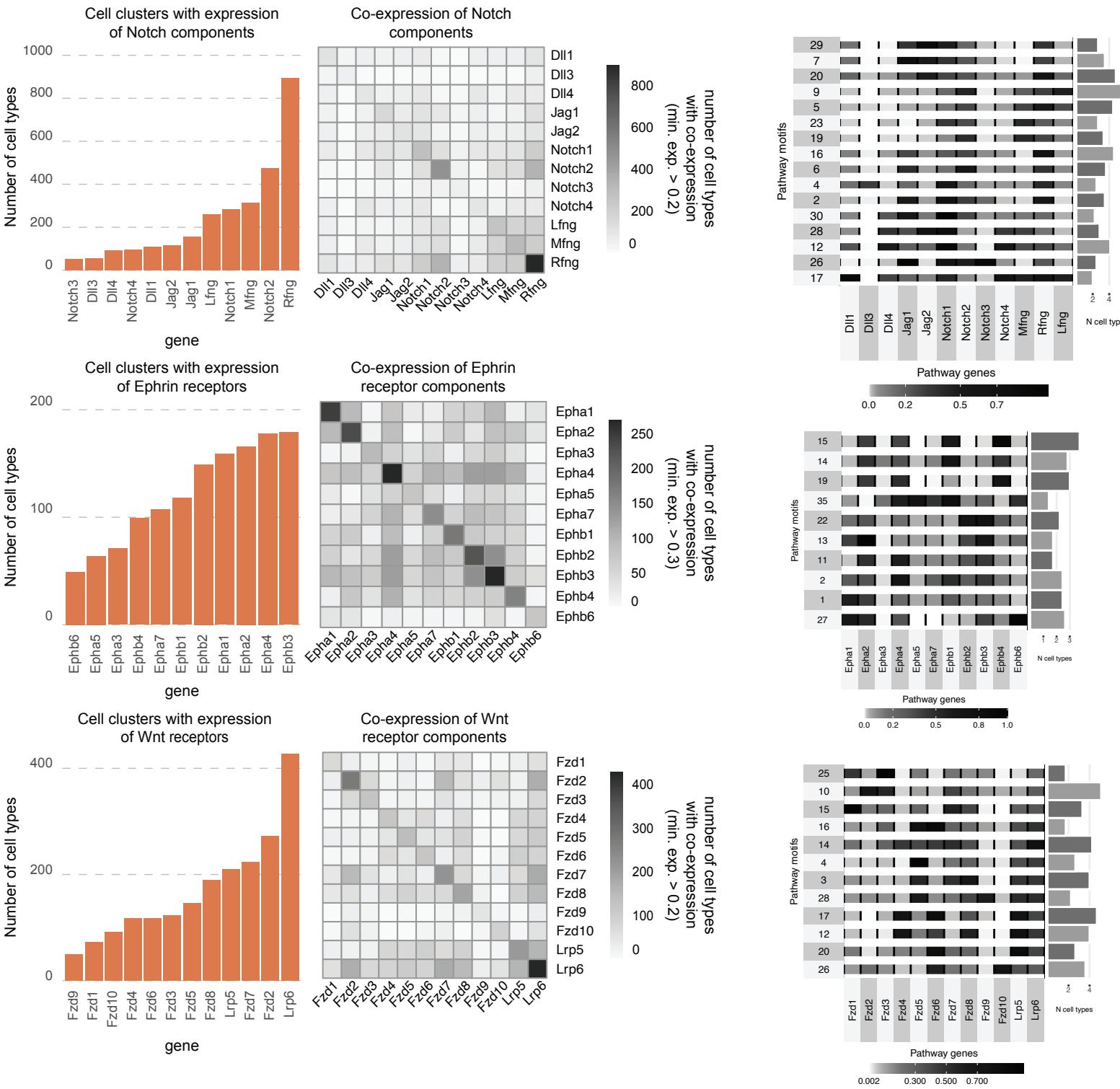
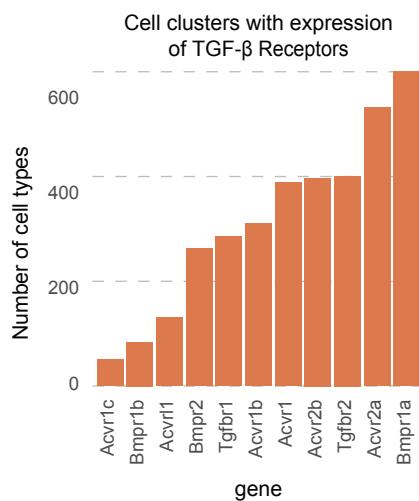
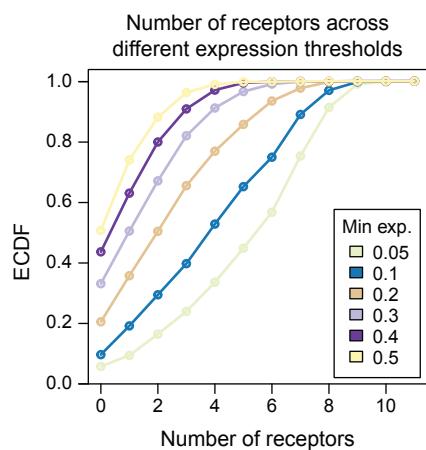


Figure 2, Supplement 2

A



B



C

