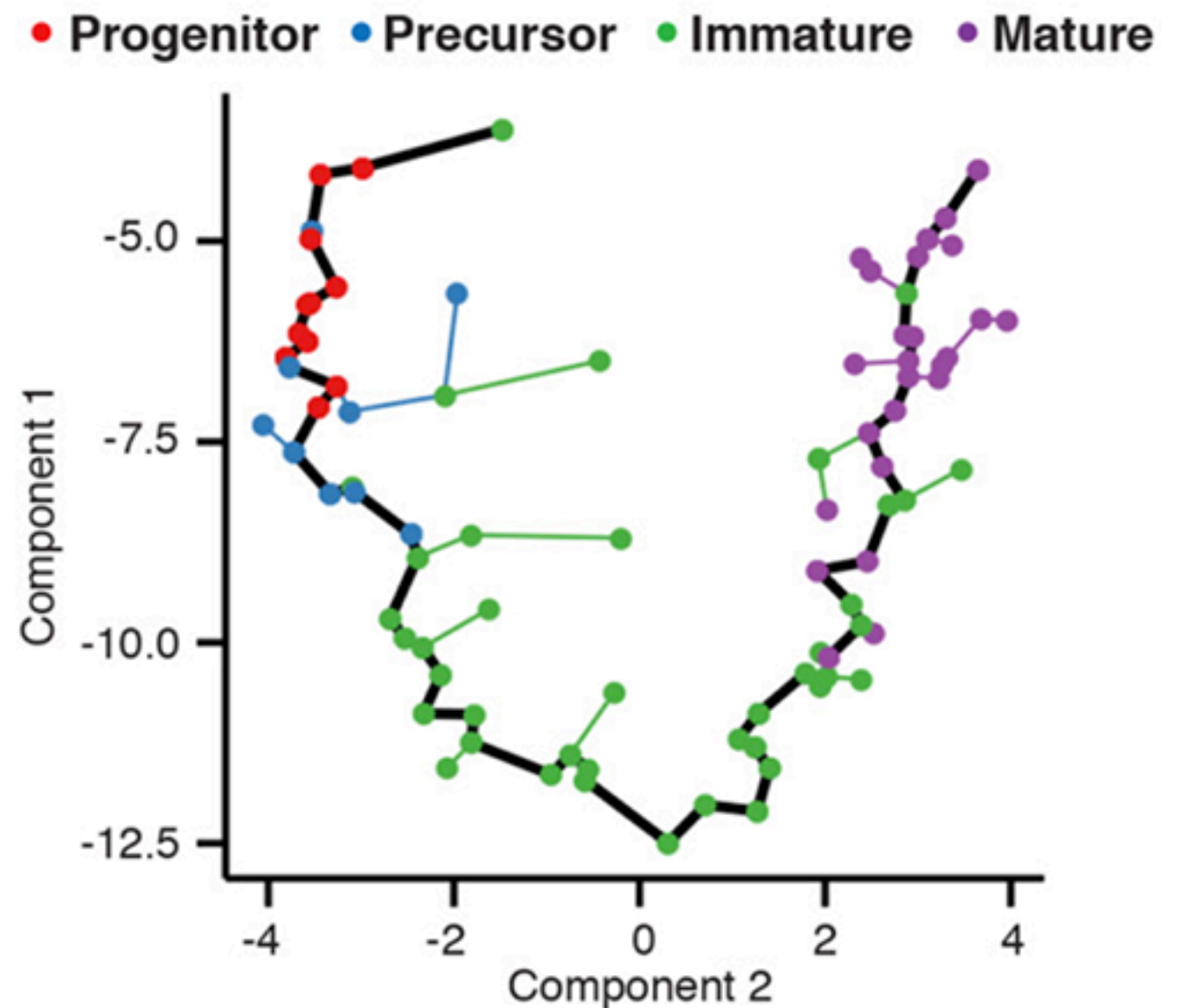


Trajectory Analysis

- ▶ Biotechnology has improved to such a point that we can extract and analyse RNA materials within individual cells.
- ▶ One of the hottest question is how cells develop and knows their fate? What role does each gene play in this process?



(Way Too Complicated) Mathematics Of Cell Trajectories

► The idea is to find:

1. a tree network \mathcal{G}
2. a low-dimension representation Z of the original data X
3. a function $f_{\mathcal{G}}$ that maps Z to X

s.t. we can preserve the similarities between individual cells in the original data.

$$\min_{\mathcal{G}} \min_{f_{\mathcal{G}}} \min_Z \sum_{(V_i, V_j) \in E} w_{i,j} \|f_{\mathcal{G}}(z_i) - f_{\mathcal{G}}(z_j)\|^2$$