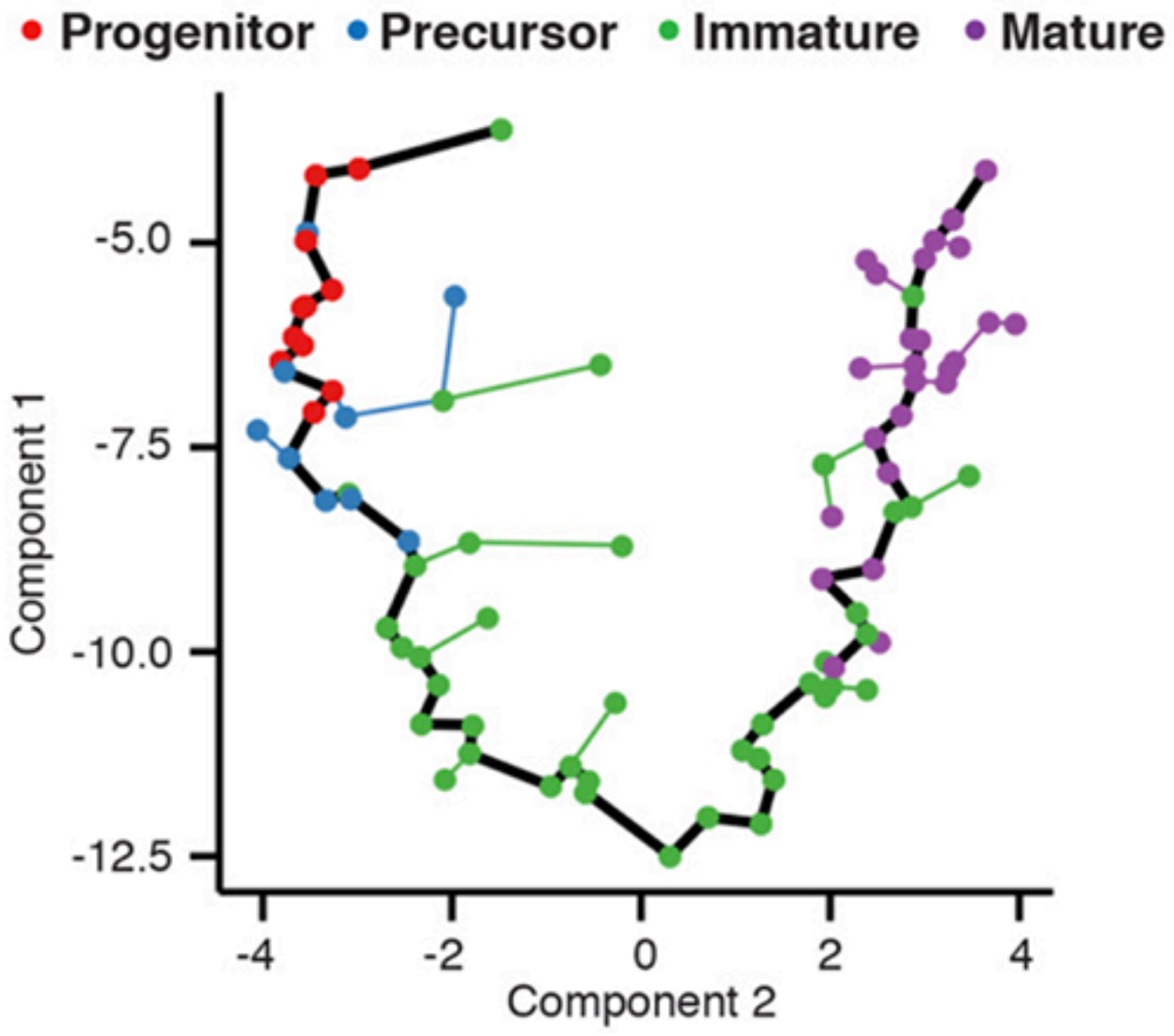
Trajectory Analysis

- 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.

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