

- Gene expression

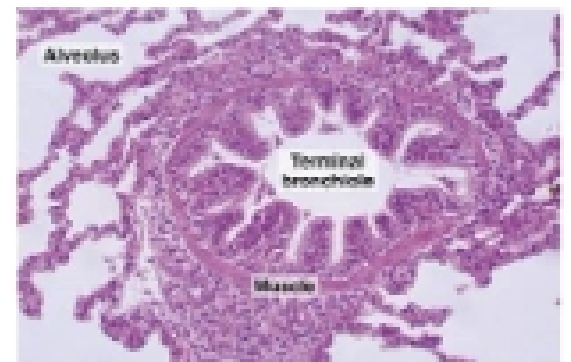
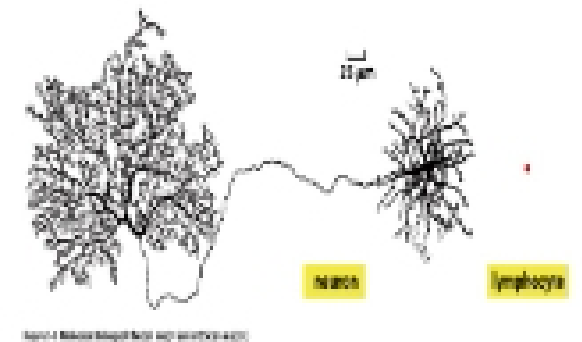
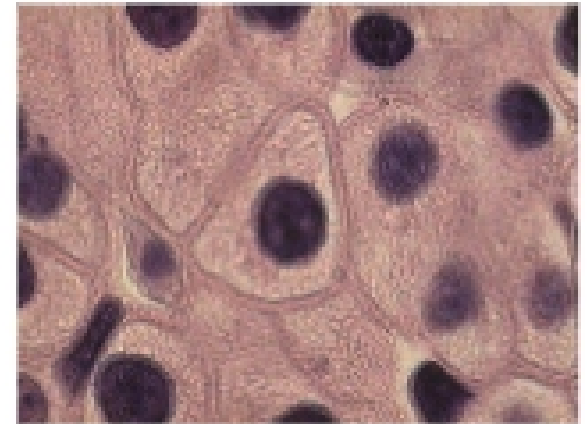
- Gene control

- DNA binding and regulatory motifs

- Genetic switches

- Molecular mechanisms leading to cell types

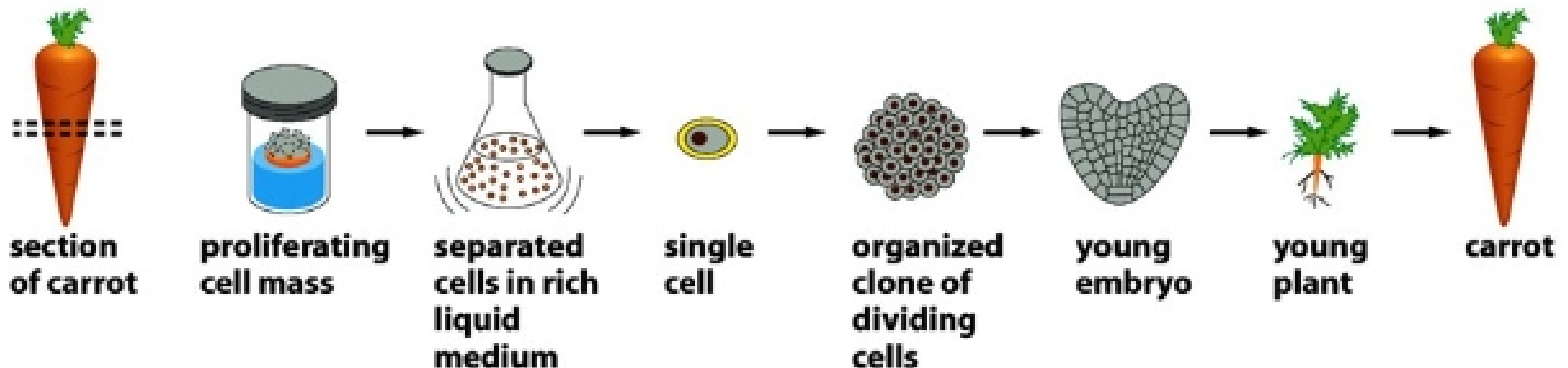
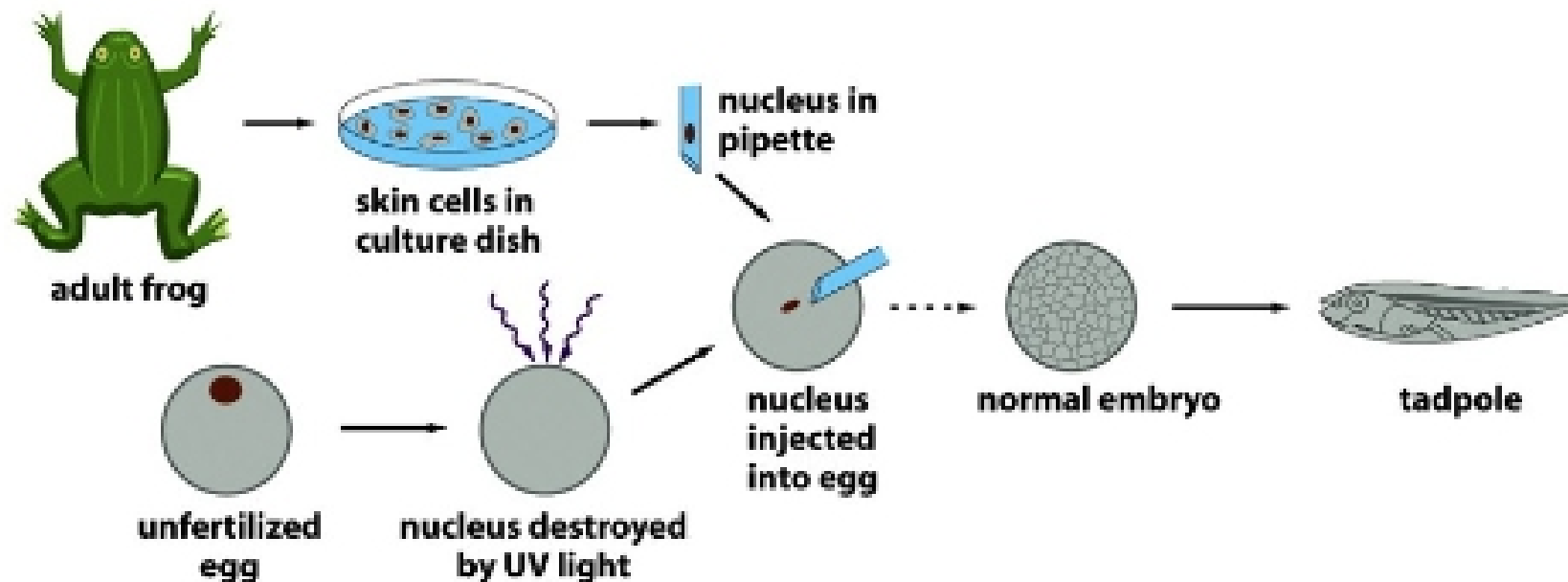
- Post-transcriptional control



- All cell types have the **same DNA**

- differentiate via producing **different proteins**

- We know this from classic experiments with frogs and plants



- Basic observations:
 - **Many proteins are shared** between all cell types
 - Polymerases, histones, ribosome...
 - Some proteins are highly abundant in specialized cells
 - Hemoglobin
 - Typically human cell expresses 30-60% of its genes
 - Bacteria express ~25% of their genes
 - Expression patterns **highly specific to cell lines**
 - **Microarray evidence**/used to find origin of tumors
 - Differences in expression are not enough to explain differentiation
 - **Post-translational modification**
 - **Alternative splicing**