Chapter 8
Control of gene expression

This is vital to understand
-some mutations that cause cancer and other diseases
-ways to improve crop yields, alter levels of key proteins in organisms used for biofuels
-ways to metabolically engineer organisms for drug and nutrient production
-basic aspects of development and evolution

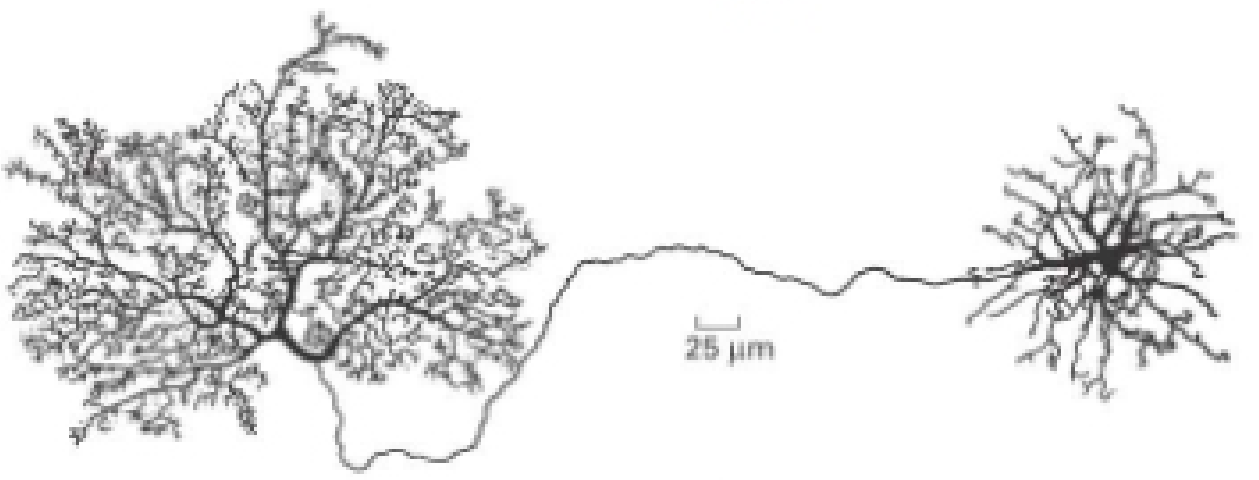
- Exam next Tuesday

Objectives:
Understand the basic mechanisms of gene expression in prokaryotes and eukaryotes

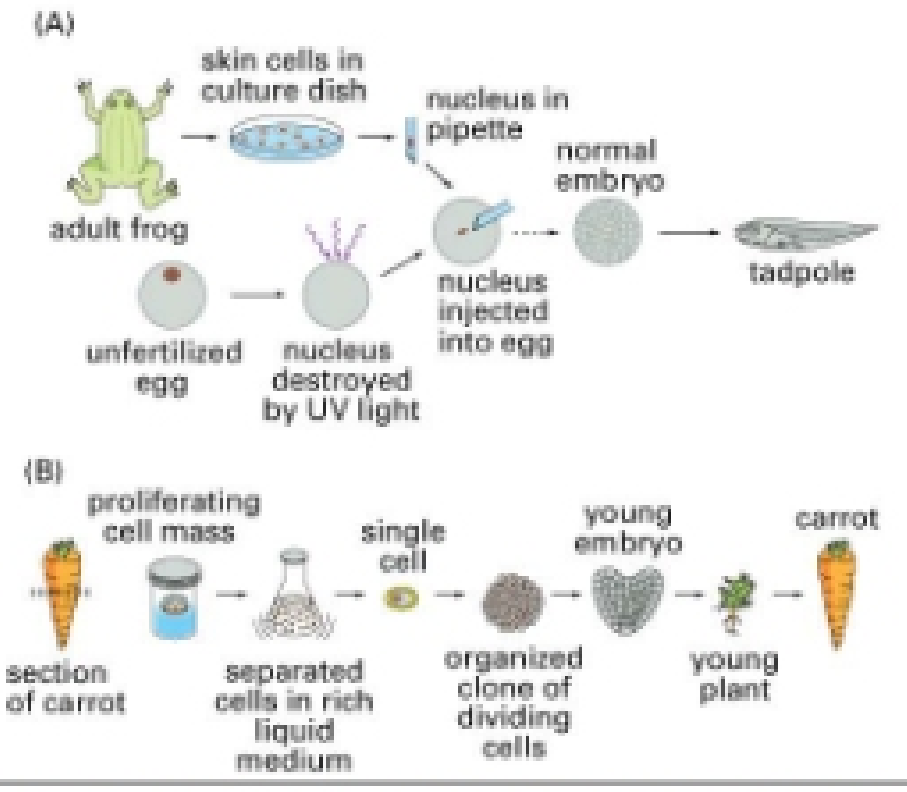
Be able to:

- Draw and describe the basic steps involved in cloning a plant or animal
- List 6 different steps where the activity of a protein can be controlled
- Describe 3 types of DNA-binding motifs in proteins
- Explain the basic mechanism of the bacterial trp operon
- Explain the mechanism of the bacterial lac operon
- Be able to predict the expression of the lac operon under high or low glucose, high or low lactose, and in the presence or absence of mutations of key regulatory components, and be able to defend your answer
- Compare and contrast bacterial and eukaryotic transcription regulation
- Compare and contrast promoters and enhancers
- Design a gene latch circuit – once a signal turns the gene on, the gene stays on

Cells from the same organism can be so…different!
How does this happen?



Cloning shows that different cell types contain the same DNA

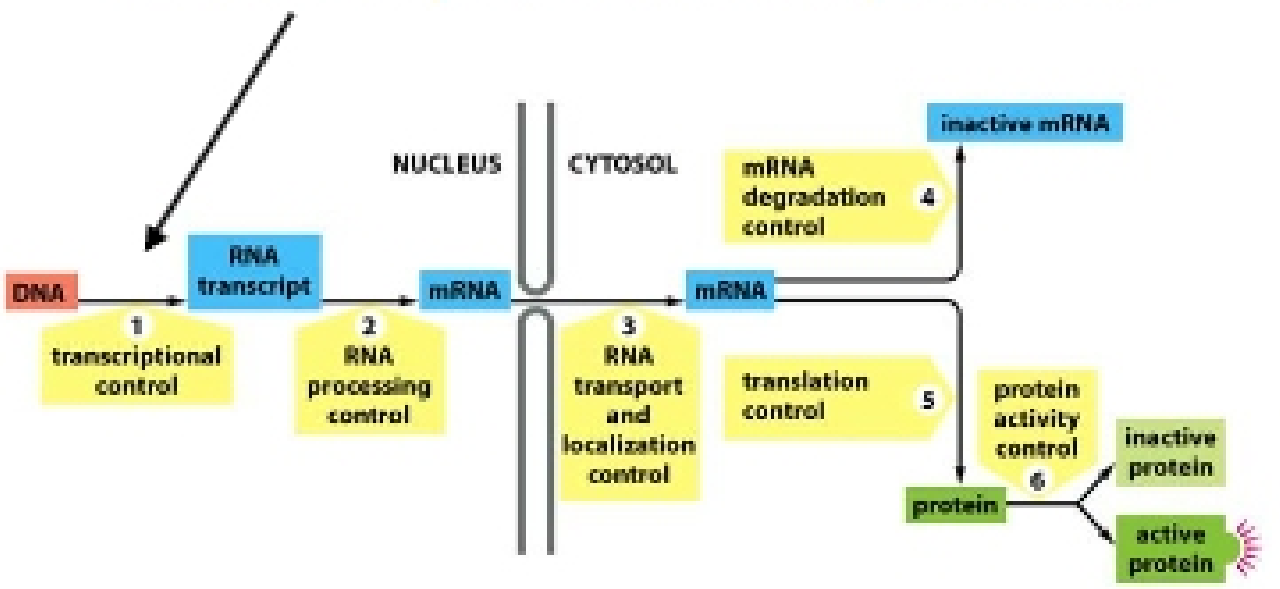


Cell differentiation must be due to changes in gene expression

First cat was cloned at A&M named “cc”

Epigenetic effects may prevent efficient cloning of most mammals from somatic cells.

Gene expression can be regulated at many steps
But **transcriptional control** is paramount



Early stage regulation – very economical, but takes time

Late stage regulation – very fast, but not necessarily economical.