Gene regulation in Eukaryotes

Today's topics:
• Control of transcription
  – Combinatorial control
  – Cell-specific transcription
• Chromatin remodeling
• Post transcription gene regulation
  – mRNA processing
  – Micro RNAs
  – Protein degradation

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Control of Transcription in Eukaryotes

Transcriptional synergy

• Combinations of different enhancers affect the strength of transcription

Repressor proteins can inhibit transcription

Activator proteins bind to enhancer sequences

Now transcription can start
All cells have the same genes, but only certain genes are expressed in each tissue.

Different activator proteins in the two cell types.

Liver cell

Lens cell

GFP gene attached to cartilage-specific control elements

Histone acetylation loosens DNA to allow transcription

Long-term control of transcription: methylation
Post-transcription control of gene expression

Alternative RNA splicing

Protein-coding RNA only accounts for ~1.5% of the human genome, but ~90% of the genome appears to be transcribed… What is it??

- rRNAs
- tRNAs
- snRNAs
- small regulatory RNAs

miRNA and developmental complexity

miRNAs (miRNAs)