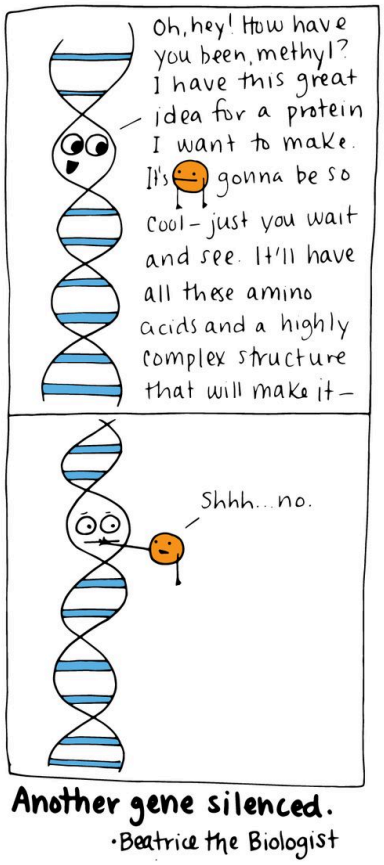
Topic Review Guide[1]: Regulation of Gene Expression

Read: Chapter 18: Regulation of Gene Expression

Watch: Paul Anderson Videos: Development: Timing and Coordination
RNAi
More detailed video



Listen & Look:
Here are key terms you will come across as you begin to learn this material. Familiarize yourself with them! At the end of the topic, create a concept map connecting them to one another.

Key Terms

Gene Regulation Gene Expression	**Prokaryotic Gene Regulation** Operon • Regulatory Gene • Promoter • Repressor protein • Operator • Structural Gene • Substrate Lac Operon Trp Operon Repressible operon Inducible operon	**Eukaryotic Gene Regulation** Transcription Unit Histone Transcription Factors Enhancers Methylation RNAi nucleosomes

Quizlet Deck: https://quizlet.com/_4num4c

Equations to be familiar with: None!

Focus Questions: Use your textbook and/or the video to help you answer these questions.

Prokaryotic Gene Expression

1. What is a plasmid? Why is it valuable to a bacterial cell?
2. What is the advantage to prokaryotes grouping related metabolic gene products into a single operon?
3. Diagram a typical operon. Include and label *structural genes, promoter, RNA polymerase, and repressor protein.* Define each of these terms below your diagram.
4. What determines if the repressor protein for an operon will be attached or detached from the operator?
5. Compare a repressible operon with an inducible operon. How are they similar? How are they different? What determines if an operon will be repressible or inducible? Give an example of each type of operon in a typical prokaryotic cell.
6. Explain the function of the CAP/cAMP system. Why is it necessary?

It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.

Eukaryotic Gene Expression

7. Why do eukaryotic cells need to be able to turn genes on and off as necessary?
8. Diagram a complete eukaryotic transcription unit. Define each part.
9. The major differences in translation between prokaryotes and eukaryotes.
10. How does the control of gene expression lead to differentiation

[1] Topic Review Guides (TRG) inspired by Lee Ferguson, http://www.thebiologyspace.com

of cell function in multicellular eukaryotes?

Topic Review Guide[2]: Regulation of Gene Expression

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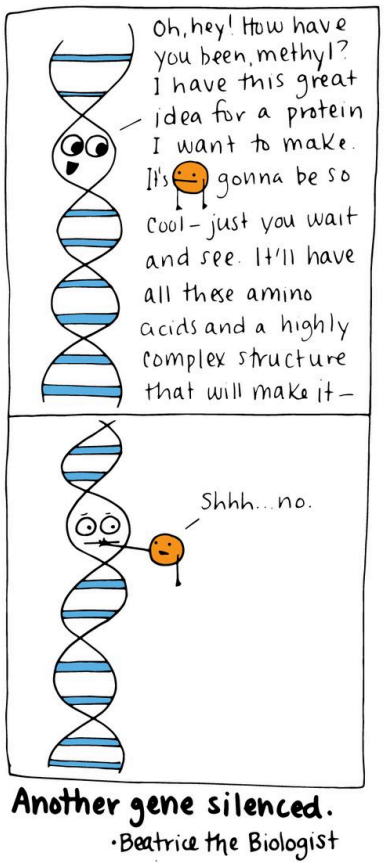
RNAi

More detailed video



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of cell function in multicellular eukaryotes?

11. Explain the relationship between the promoter, enhancers, and transcription factors.
12. Define each of the following terms and explain how each provides a eukaryotic cell with the ability to regulate gene expression:
    a. Nucleosomes
    b. DNA methylation
    c. Transcription factors/enhancers
    d. alternative splicing
    e. mRNA degradation
    f. RNA interference (RNAi)
    g. Protein processing and degradation.
13. Watch the RNAi videos (RNAi, and More detailed video). What selective pressure led to the evolution of the RNAi mechanism? (What advantage is gained by a having this system in place?)
14. Look up what is means to “knock out” a gene. Explain how RNAi can be used for this
15. How is it possible that only 1.5% of the human genome can code for gene products, but humans can be so complex in their physiology?

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