

Chapter 17**HOW GENE EXPRESSION IS CONTROLLED**

OVERVIEW: How gene expression (synthesis of specific proteins from genetic code) is controlled; operon theory as a model of genetic feedback control

STRATEGY: First, review your lecture and study notes for mastery of the *first question*: "How are genes expressed"? (Assign. #29) Then, before reading on into Chapter 17, pages 401-404, consider the importance of a *second question*, "How is gene expression controlled"? Without control, a chaotic array of all kinds of proteins can come cascading into the cytoplasm. When you understand the seriousness of the challenge, begin to study this marvelous process of genetic control.

VOCABULARY:

cell differentiation
operon
structural gene
repressor gene

repressor protein
operator gene
inducible enzyme
genetic feedback control

LEARNING GOALS:

1. Define and review the process of *gene expression*. Then, explain why it is so crucial that gene expression be controlled in cells.
2. Use the terms above and Figures 17-4 and 17-5 to explain how gene expression is controlled.
3. Review and revise your answer to the "Puzzling Problem" of Assignment #29; then write answers to Question 5. at the end of Chapter 17. Leave space to add more.

APPLICATION QUESTIONS:

1. The operon theory is based upon gene expression in bacteria, so-called "simple prokaryotic organisms." Propose a scenario in which an operon system, complete with proteins, RNA polymerase, DNA, etc., would evolve spontaneously within the primordial sea as required by the evolution model. What obstacles would have had to be surmounted for chance appearance of this component of life?
2. What really controls metabolism – DNA or the environment of an organism? Base your answer upon your understanding of the lactose operon.

NETWORKING: Visit the BIO 100 "Internet Sites" page to study the "Lactose Operon Model" for Control of Gene Expression with some additional background and some details beyond the scope of our study.

LECTURE EMPHASIS will be upon the following topics:

1. Review of processes of gene expression
2. Importance of the control of gene expression
3. Control of gene expression as proposed by the Operon Theory – and implications.