Chapter 13.4 Gene Regulation

All of your cells contain the same DNA. Your nerve cells do not look like or act like skin cells, so how do they know what to do and what proteins to produce?

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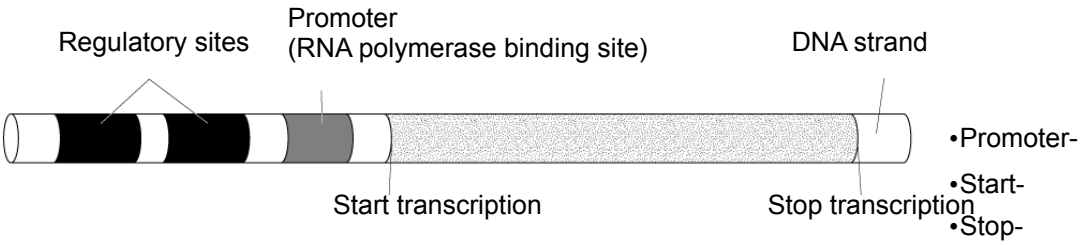
– When a gene is actually transcribed and translated, it is said to be _____.

I. Basic Structure of a Gene

- When looking at a gene sequence, there are several important regions that enzymes and other proteins recognize.



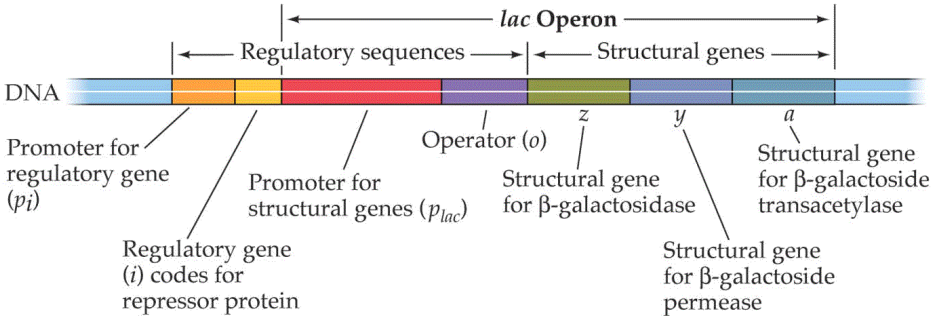
•Promoter-
•Start-
•Stop-
•Regulatory sites-

II. Prokaryotic Gene Regulation

- Prokaryotes have a single chromosome and are unicellular and they turn genes on and off _____.
- Operon- group of genes that operate together for a function, can be _____ or _____.
- A _____ molecule can block, or repress, transcription by binding to a region called the _____.
  - Inducible- in presence of a substance, _____ _____
  - Repressible- in presence of a substance, _____ _____

Example: *lac* Operon

- The *lac* operon is a series of genes in _____ that operates together to metabolize (use as food) lactose, the sugar found in _____.
  - Lactose is a disaccharide made of _____ and _____.
  - In the ***presence*** of lactose, certain enzymes must be produced to break them down

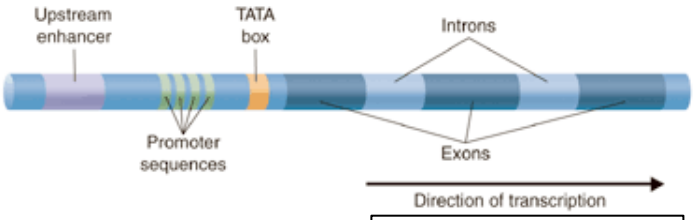


- P (promoter)-
- O (operater)- region that a repressor can bind, _____ from transcribing
- Gene Z- codes for β-galactosidase which _____
- Gene Y- codes for Permease, which _____
- Gene A- codes for a protein whose function is unknown

Steps in the Lac Operon

- In absence of lactose, a repressor binds to the operator, blocking _____
    1. In the presence of lactose, lactose binds to the repressor causing it to _____
    2. RNAP transcribes gene Z (codes for β-galactosidase) and gene Y (codes for permease)
    3. Ribosomes _____ β-galactosidase and permease
    4. β-galactosidase _____
    5. Permease allows lactose to flood into the bacterial cell
    6. Once lactose is all broken down, _____ _____
    7. This stops _____ of β-galactosidase and permease

III. Eukaryotic Gene Regulation



Exons get expressed
Introns get cut out

- No operons, genes are regulated individually
- Similar process, but much more complex than prokaryotic gene regulation
    - Prokaryotes have no cell specialization
- After fertilization and mitosis occurs thousands of times, cells specialize into their life-long functions through a process called _____
- Differentiation is controlled by _____.
    - Some genes get turned off _____ (your liver cells do not express genes that make proteins in the skin)
    - Like _____ of what cells become what part of the body
    - Manipulation of these genes can alter what body parts grows where