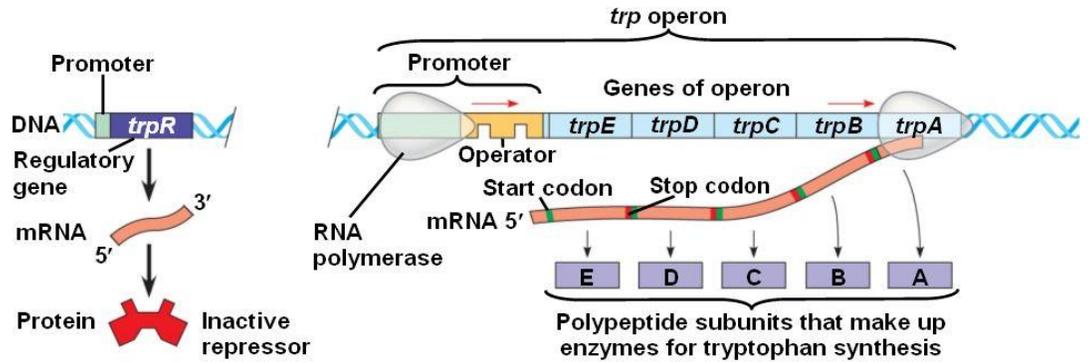
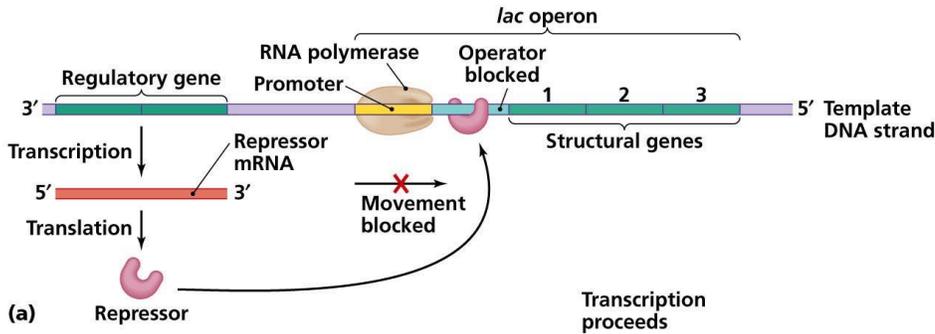


Control Mechanisms (lac & trp operons)



1. Complete the comparison of the *lac* Operon and the *trp* Operons as a means of gene regulation

	<i>lac</i> Operon	<i>trp</i> Operon
Regulates production of:		
Number of genes and how they are controlled		
What binds to the operator & when does this occur		
High levels of what substance affects how this operon how?		

2. Why are genes under regulation?

3. What is the function of the promoter?

4. What is the function of the operator?

5. What happens if lactose levels are low? Put the following list in order (1-5)

	RNA polymerase is blocked from transcribing the genes for the lactose metabolizing enzymes
	When RNA polymerase binds to the promoter, it cannot get past the LacI repressor protein
	The enzymes β -galactosidase, β -galactoside permease, and transacetylase are not required by the cell due to low levels of lactose
	Lactose does not bind to the repressor protein, LacI
	LacI, a repressor protein, is bound to the operator, which follows the promoter

6. What happens if tryptophan levels are high? Put the following list in order (1-4)

	The trp repressor-tryptophan complex can now bind to the operator of the trp operon
	Tryptophan does not need to be produced by the trp operon
	Tryptophan will bind to the repressor protein, changing its conformation
	RNA polymerase is blocked from transcribing the genes needed to synthesize tryptophan

7. The gene that regulates the production of the LacI protein is found further upstream of the *lac* operon. Explain the potential ramifications to the functioning of the *lac* operon and the production of its products under the following conditions:

- a) A mutation is found in the LacI gene
- b) A mutation is found in the second gene of the *lac* operon
- c) The RNA polymerase has difficulty binding to the promoter

8. A researcher was trying to determine whether two molecules (A and B) were corepressors or inducers in their respective operon systems. Data was collected regarding the levels of protein and the amount of gene transcription for the genes in their respective operons. The data is shown below.

	Level of protein	Transcription of gene 1	Transcription of gene 2
Molecule A	High	Low	Low
	Low	High	High
Molecule B	High	High	High
	low	low	Low

- a) Determine whether molecule A and molecule B are inducers or corepressors. Justify your answers.
- b) Identify which system resembles the *lac* operon system and which resembles the *trp* operons system
- c) State a generality about operon systems involving an inducer and about operon systems involving a corepressor.