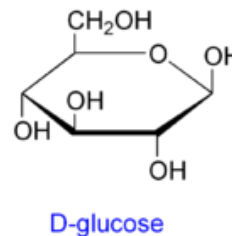
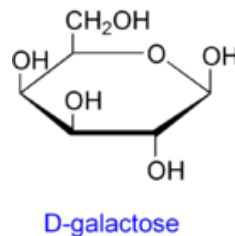
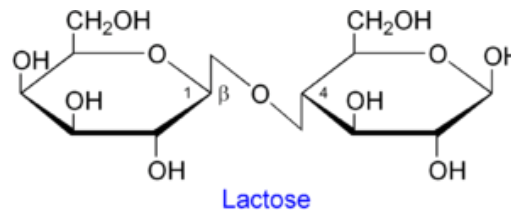


Regulation of Transcription in prokaryotes

- -35 and -10 sequences determine the rate of a bacterial gene transcription – “strength of the promoter”
- Cell might need some proteins all the time. These proteins are synthesized continuously at the same rate. This is called *constitutive* gene expression.
- Other proteins could be synthesized in response to an external stimulus, e.g. certain nutrient present in the growth medium.

Lactose operon

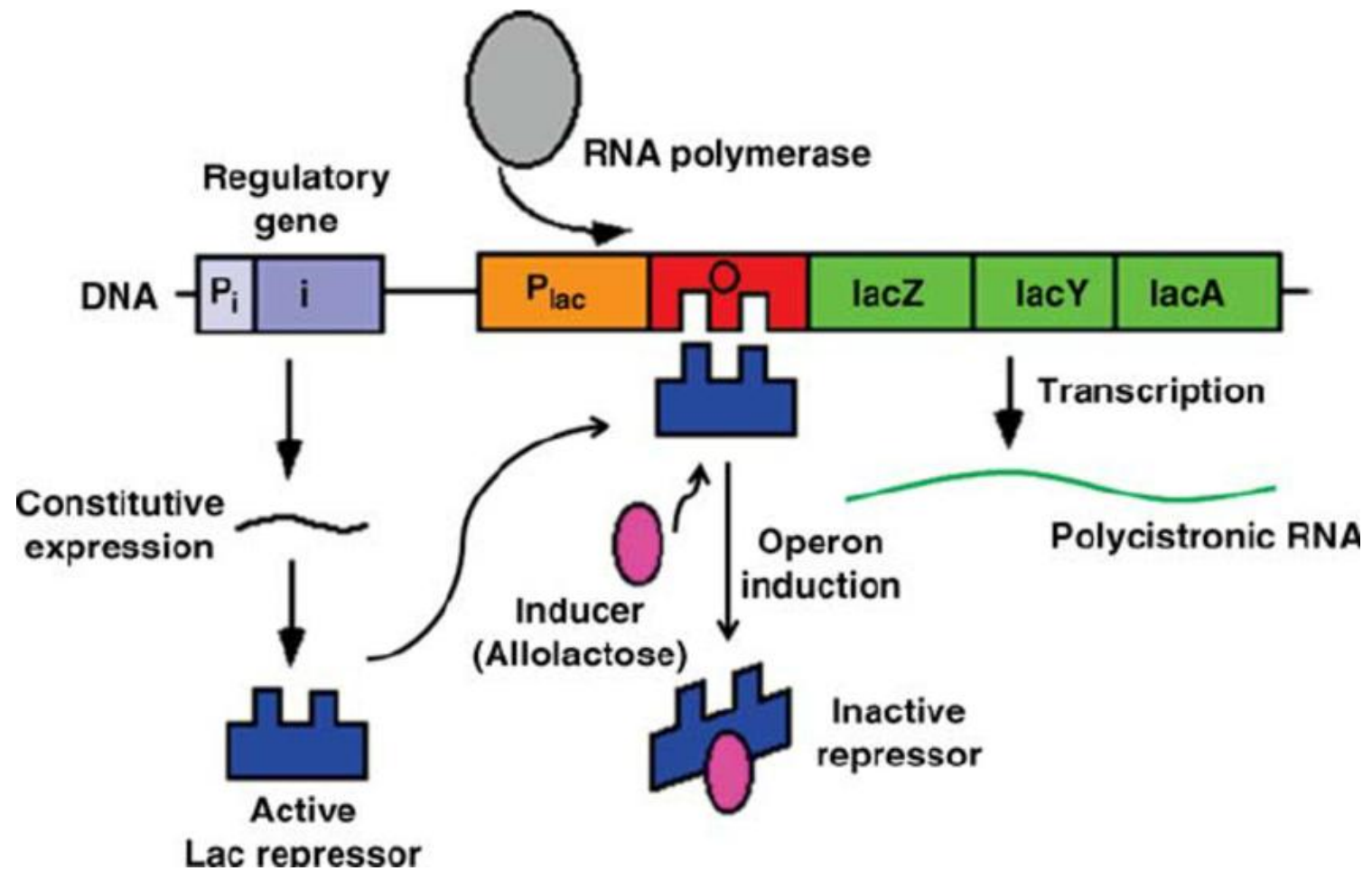
- A cluster of genes under the control of a single promoter is called operon.
- The lac operon (lactose operon) is an operon required for the transport and metabolism of lactose in *Escherichia coli*

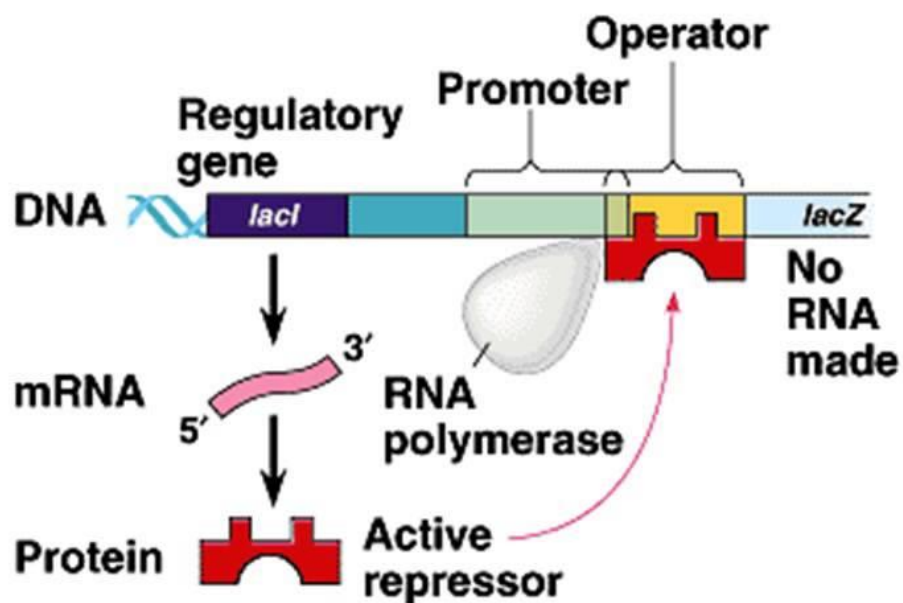


The lac operon consists of three structural genes, and a promoter, a terminator, regulator, and an operator. The three structural genes are: lacZ, lacY, and lacA.

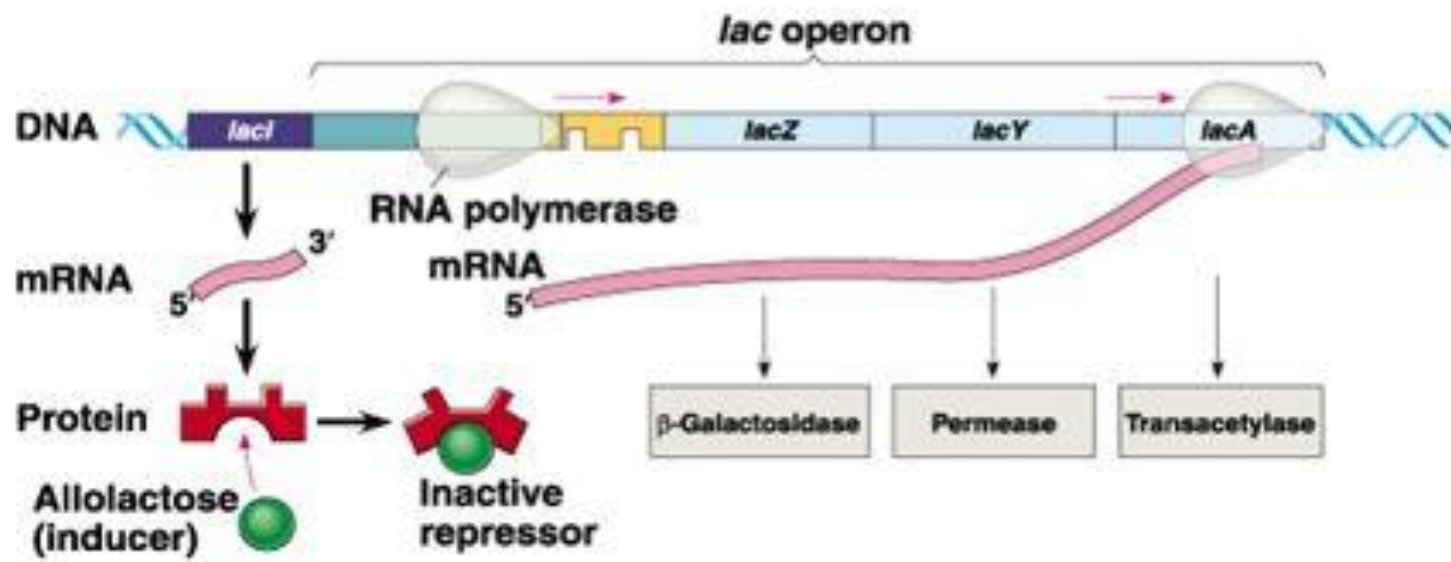
- lacZ encodes β -galactosidase (LacZ), an intracellular enzyme that cleaves the disaccharide lactose into glucose and galactose.
- lacY encodes Beta-galactoside permease (LacY), a transmembrane symporter that pumps β -galactosides including lactose into the cell using a proton gradient in the same direction.
- lacA encodes β -galactoside transacetylase (LacA), an enzyme that transfers an acetyl group from acetyl-CoA to β -galactosides.

Only lacZ and lacY appear to be necessary for lactose catabolism.



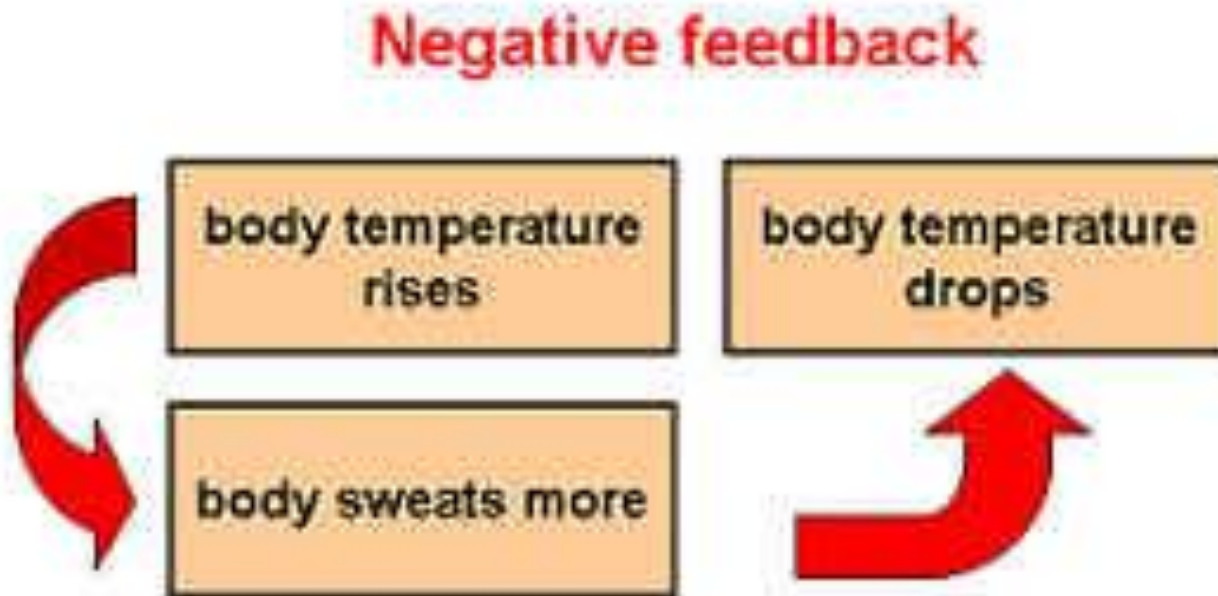


(a) Lactose absent, repressor active, operon off



(b) Lactose present, repressor inactive, operon on

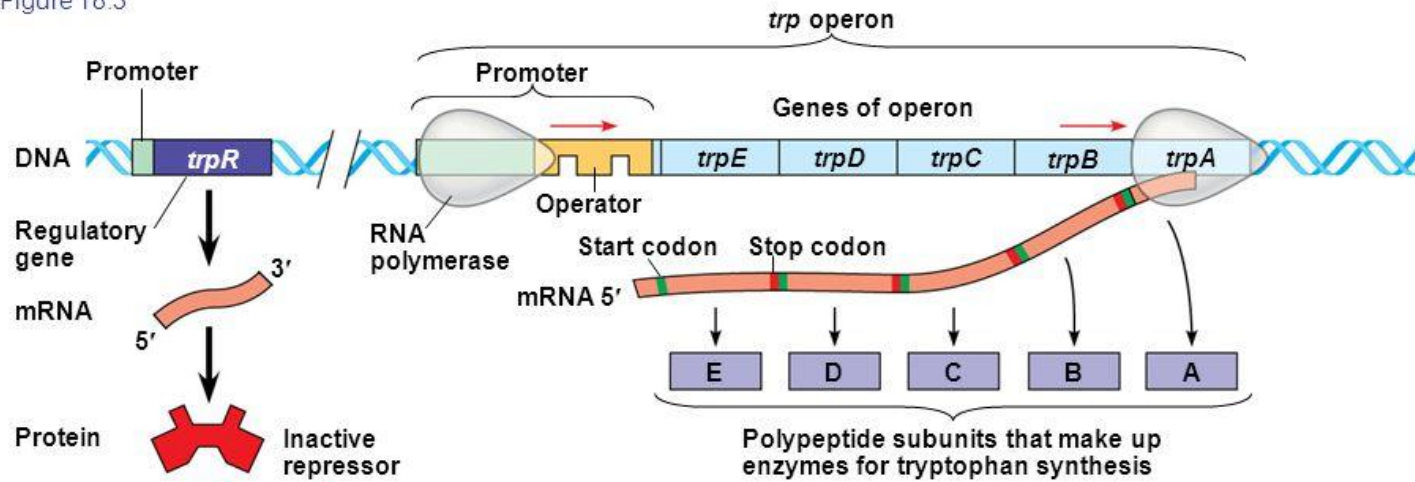
Negative feedback loop



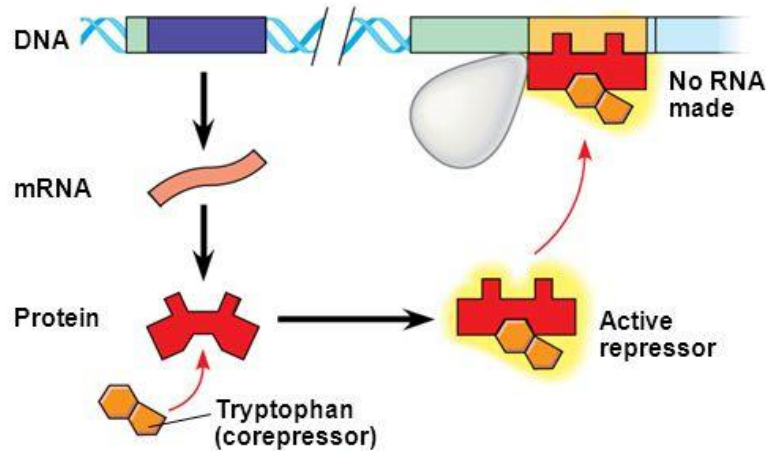
Tryptophan operon

- The trp operon is an operon—a group of genes that is used, or transcribed, together—that codes for the components for production of tryptophan.
- When sufficient amount of tryptophan is present in the cell the expression of the trp operon is repressed. Thus the operon is regulated through the negative feedback loop mechanism.

Figure 18.3



(a) Tryptophan **absent**, repressor inactive, operon on



(b) Tryptophan **present**, repressor active, operon off