

Promoter Strength

3c) The sequence of nucleotides constituting a promoter is not the same for all promoters--rather, each promoter's nucleotide sequence is a variation on a theme (theme = consensus sequence). Given a group of related sequences, derive a consensus sequence from them.

Example:

5' **TTGACG**

5' **TAGACA**

5' **CTTACA**

5' **TTGAAA**

5' **TTGACC**

5' **TTGTCA**

Consensus sequence:

5' **TTGACA**

What do you think determines whether a given promoter is strong or weak (i.e., whether initiation of transcription occurs at that promoter with high or low frequency)? Why is this important? In thinking about this question, consider that *E. coli* has only a single RNA polymerase that transcribes all genes. Would it be advantageous for an organism to transcribe all of its genes at the same frequency? Why or why not?

The degree to which a given promoter conforms to the consensus sequence determines the strength of that promoter. The closer the sequence to the consensus, the stronger the promoter will be and the more frequently transcription will occur at that promoter.

Promoter strength is important because it determines how often a given DNA sequence is transcribed, effectively giving higher priority for transcription to some genes over others. A gene that codes for a protein that is required in large quantities, for example, might be expected to have a relatively strong promoter. In the *E. coli* example mentioned in this objective the point is that the RNA polymerase can only perform one transcription task at a time and so must prioritize its work to be efficient. Differences in promoters strength are selected for to allow for this prioritization.

The last question (above), will be left for you to consider on your own.

For more information, check out this scientific [abstract](#) on "super ubiquitin" to see how understanding what makes a strong promoter can be an important part of biotech research.

[Download Printable \(PDF\) Version](#)

[Back to Main Menu / Previous Objective / Next Objective /](#)