

Regulating Gene Expression

Biology

How cells control which genes are on, and when.

Levels at which expression can be controlled.

1

Transcriptional

Promoters, enhancers, transcription factors. The main control point.

2

Post-transcriptional

Alternative splicing, mRNA stability, microRNA.

3

Translational

Initiation factors, mRNA availability.

4

Post-translational

Folding, cleavage, phosphorylation, degradation.

5

Epigenetic

DNA methylation and histone modification.

THE LAC OPERON

Lactose absent: repressor binds, no transcription

Lactose present: it binds the repressor, transcription proceeds

An inducible system — off by default

The trp operon is the mirror image: repressible, on by default, switched off when tryptophan is abundant.