

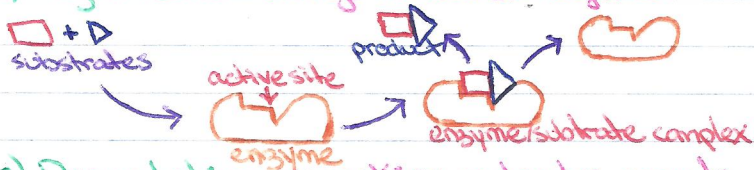
Recombinant DNA (rDNA)

- combines DNA from 2 different species
 - gene from 1 organism placed into DNA of another
- ex. Insulin - from human to bacteria
Hemophilia - blood clotting factors
hGH - human growth hormone

ENZYMES

- * enzymes are proteins produced by translation.
- * enzymes are catalyst speeding up reactions by:

1) Synthesis - brings molecules together



2) Degradation - breaking molecules apart



ENZYME INHIBITORS

2 TYPES:

1) Competitive - bind to active site, preventing substrate from binding.

2) Non-competitive - bind to part of enzyme but NOT active site, changes shape of active site, prevents substrate binding.

ex. Heavy metals - mercury, lead

* Enzyme Co-factors → ions that activate enzymes, allow

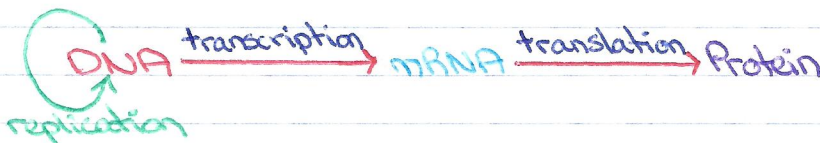
* Co-enzymes → allow proper function to work at peak reaction rate.

GENE

- the length of DNA that codes for one protein.

PROTEIN SYNTHESIS

- Protein production occurs outside the nucleus in the cytoplasm.
- DNA creates a mRNA to carry the code out of the nucleus.



FACTORS AFFECTING REACTION RATE

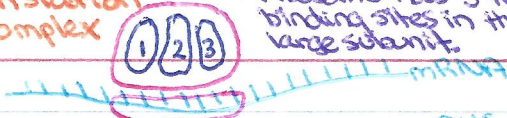
- ① Temperature (optimal ^{human body} temperature 37°C)
 - ↓ temp slows rate
 - ↑ temp causes enzymes to denature (cook)
 - ↗ changes shape of active site preventing substrate binding
- ② pH
 - optimal pH depends on location
 - enzymes denature if placed outside their optimal pH
- ③ Concentration
 - ↑ substrate concentration ↑'s reaction rate

TRANSCRIPTION

3 STEPS: Creating a complimentary RNA strand from a DNA template.

- ① Promotion** (occurs at the start of a gene)
 - RNA polymerase binds to DNA at promoter region.
 - DNA double helix unwound & unzipped.
- ② Formation**
 - RNA polymerase moves down DNA strand pairing RNA nucleotide.
 - when end of gene reached, RNA polymerase removed & new mRNA released. *free floating in nucleus.*
- ③ Modification**
 - Introns removed leaving only Exons (sections needed)
 - mature RNA molecule remains, exits nucleus & enters cytoplasm.

TRANSLATION

3 STEPS: Translation Complex  - ribosome has 3 tRNA binding sites in the large subunit.

- ① Initiation** (^{small} ribosomal subunit binds to mRNA @ start codon)
 - a tRNA with anticodon, UAC and methionine bond to start codon.
 - large ribosomal subunit binds next.
- ② Elongation** (second tRNA binds to front binding site)
 - Peptide bond forms between the 2 amino acids present.
 - ribosome moves one codon down mRNA, 1st tRNA released & new tRNA enters forming polypeptide.
- ③ Termination** (stop codon is reached)
 - release factor binds to front site and translation complex breaks up releasing the polypeptide.

DNA REPLICATION

3 STEPS: Cells divide for growth or healing

- ① Unzipping**
 - double helix unwound & hydrogen bonds broken
 - DNA Helicase is the enzyme
- ② Complementary Base Pairing**
 - 2 identical strands produced by semi-conservative replication.
 - DNA Polymerase: bring DNA nucleotids and pairs them up forming new daughter strand.
- ③ Sealing**
 - DNA Ligase checks sugar-phosphate backbone for breaks.