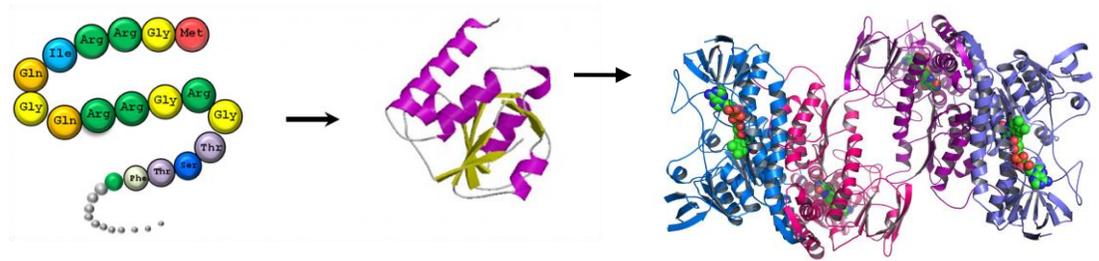


Proteins and Protein Synthesis

- Proteins

- : large complex molecules that make up body structures, hormones, enzymes & antibodies
- : are composed of subunits called amino acids
- : there are 20 different amino acids
- : each species (ie. human) has certain proteins that are similar (making it identifiable as human) & his own individual protein make-up (making it unique within a species)
- : it is the sequence and number of amino acids within a protein that determine the type of protein present



- Protein Synthesis

- : the process through which cells make proteins
 - = uses the instructions on the DNA
- : the sequence of the nitrogenous bases on a DNA molecule provide the chemical code for a protein, however 1 base does not represent 1 amino acid
- : on a single DNA strand three adjacent bases in a specific pattern form what is called a triplet code or codon
 - = corresponds to a specific amino acid (p. 230)
 - triplets allow for 64 different combinations = most amino acids have more than 1 codon
- : not all codons correspond to amino acids
 - 'initiator' codons turn protein synthesis 'on'
 - 'terminator' codons turn protein synthesis 'off'
- : DNA synthesizes proteins with the help of another nucleic acid called Ribonucleic Acid

- RNA Structure:

: single stranded molecule

: made of nucleotides containing:

- ribose sugar
- same bases as DNA except **URACIL** instead of thymine

: three kinds of RNA --

1. mRNA (messenger)

= **the blueprint for protein construction**

- carries messages from the nucleus to the ribosomes

2. rRNA (ribosomal)

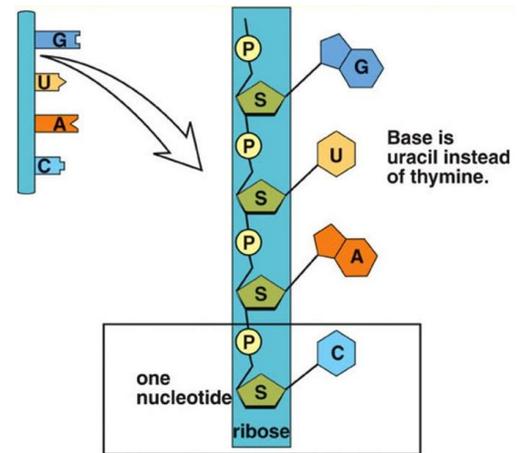
= **construction site where protein is made**

- part of the ribosome

3. tRNA (transfer)

= **delivers proper amino acids to the right site at the right time**

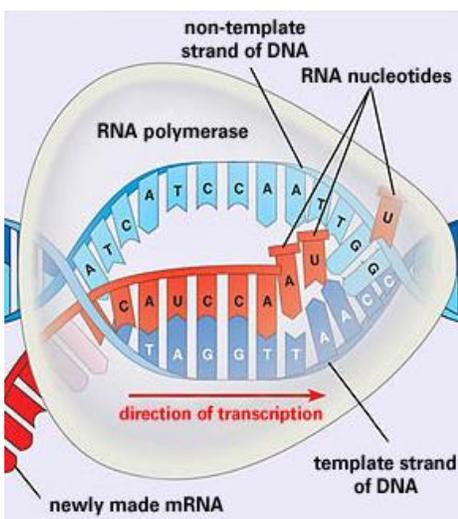
- matches amino acids to the triplet codes that they match
- one end of the molecule has an attachment site for amino acids
- the other end contains an **anti-codon**
 - = 3 exposed bases which match a particular codon on mRNA
 - Cytosine bonds with Guanine
 - Uracil bonds with Adenine



Process of Protein Synthesis

a) **Transcription (in nucleus)** (p. 226)

= **use DNA to make RNA**



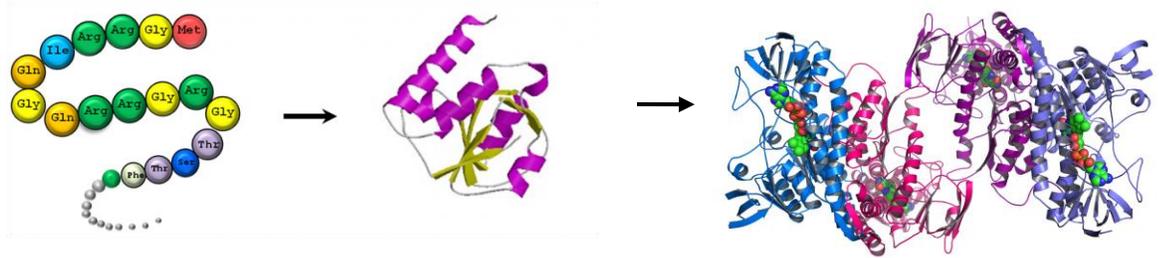
- 1) DNA **uncoils** (enzyme breaks H bonds)
- 2) DNA unzips, only **1 side** of the DNA will be transcribed
- 3) Make mRNA by out of nucleotides using a uracil based nucleotide instead of **thymine**
- 4) after mRNA is made, H bonds reform & DNA coils again
- 5) mRNA is processed before becoming functional
 - = A **'cap & tail'** is added
 - = stabilizes molecule and delineates correct direction
- 6) mRNA leave the **nucleus** and carries the code to the **ribosomes** in the cytoplasm

** rRNA and tRNA are made this way as well

Proteins and Protein Synthesis

- Proteins

- : large complex molecules that make up _____
- : are composed of subunits called _____
- : there are _____ different amino acids
- : each species (ie. human) has certain proteins that are similar (making it identifiable as human) & his own individual protein make-up (making it unique within a species)
- : it is the _____ & _____ of amino acids within a protein that determine the type of protein present



- Protein Synthesis

- : the process through which cells make proteins
 - = uses the instructions on the _____
- : the sequence of the nitrogenous bases on a DNA molecule provide the _____ for a protein, however 1 base does not represent 1 amino acid
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 - _____ codons turn protein synthesis 'off'
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: single stranded molecule

: made of nucleotides containing:

- ribose sugar

- same bases as DNA except _____ instead of thymine

: three kinds of RNA --

1. mRNA (messenger)

= _____

- carries messages from the nucleus to the ribosomes

2. rRNA (ribosomal)

= _____

- part of the ribosome

3. tRNA (transfer)

= _____

- matches amino acids to the triplet codes that they match

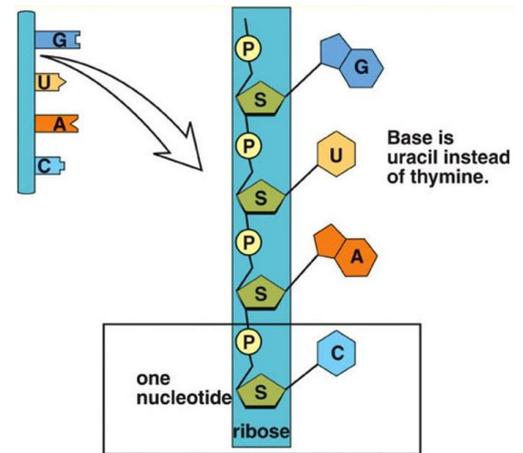
- one end of the molecule has an attachment site for amino acids

- the other end contains an _____

= 3 exposed bases which match a particular codon on mRNA

- Cytosine bonds with Guanine

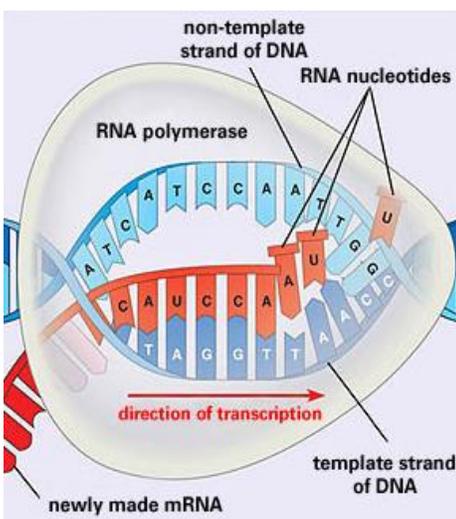
- Uracil bonds with Adenine



Process of Protein Synthesis

a) Transcription (in nucleus) (p. 226)

= _____



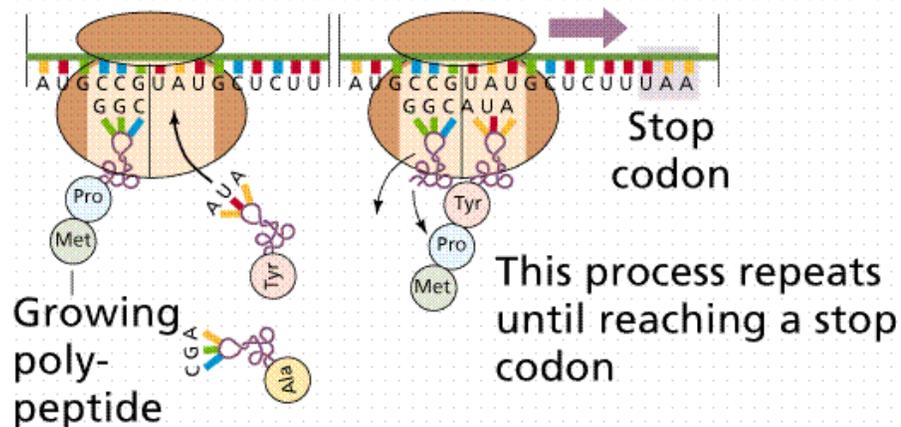
- 1) DNA _____ (enzyme breaks H bonds)
- 2) DNA unzips, only _____ of the DNA will be transcribed
- 3) Make mRNA by out of nucleotides using a uracil based nucleotide instead of _____
- 4) after mRNA is made, H bonds reform & DNA coils again
- 5) mRNA is processed before becoming functional
 - = A _____ is added
 - = stabilizes molecule and delineates correct direction
- 6) mRNA leave the _____ and carries the code to the _____ in the cytoplasm

** rRNA and tRNA are made this way as well

Translation (on ribosomes) (p. 232)

= _____ (protein)

- 1) mRNA attaches to the _____
- 2) tRNA picks up free amino acids in the _____ and carries them to the mRNA
- 3) codons on mRNA determine the order _____ are delivered by tRNA
- 4) as the process continues, amino acids are fused into a chain = _____



<http://www.lpscience.fatcow.com/jwanamaker/animations/Protein%20Synthesis%20-%20long.html>

