

Central Dogma of Biology

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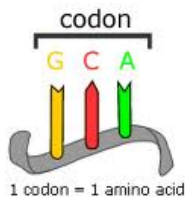
Replication, Transcription and Translation

‘The process of producing proteins is irreversible’



Genes are the segments of DNA which has all genetic information of the organisms. It decides the phenotype of the organism. (Phenotype – external appearance) Inside a gene, the DNA sequence of bases along a DNA strand decides [messenger RNA](#) sequence and this mRNA sequence then decides one or more sequences of protein.

Genetic Code:



Translation rules determine the relationship between the gene nucleotide sequences and the protein [amino-acid](#) sequences. This is known commonly as coding of the genes or with the famous term [genetic code](#). Each sequence is denoted by codons. The 3 letter word is the codon which forms the sequence. This genetic code is written as AAA, AUG, ATT & etc.

Transcription

[RNA polymerase](#) induces the gene coding to copy in to the messenger RNA or mRNA. Ribosome then decodes the RNA copy and reads the RNA genetic sequence by base-pairing the mRNA to [transfer RNA](#) or tRNA which carries amino acids. 64 possible genetic codes are discovered. Because there are 4 bases A T G C in 3-letter combinations.

		Second letter				
		U	C	A	G	
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } Ser UCC } UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } Leu CUC } CUA } CUG }	CCU } Pro CCC } CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } Arg CGC } CGA } CGG }	U C A G
	A	AUU } Ile AUC } AUA } Met AUG }	ACU } Thr ACC } ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } Val GUC } GUA } GUG }	GCU } Ala GCC } GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } Gly GGC } GGA } GGG }	U C A G

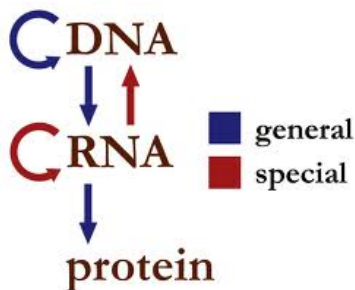
		second base in codon				
		T	C	A	G	
Third letter	T	TTT Phe TTC Phe TTA Leu TTG Leu	TCT Ser TCC Ser TCA Ser TCG Ser	TAT Tyr TAC Tyr TAA stop TAG stop	TGT Cys TGC Cys TGA stop TGG Trp	T C A G
	C	CTT Leu CTC Leu CTA Leu CTG Leu	CCT Pro CCC Pro CCA Pro CCG Pro	CAT His CAC His CAA Gln CAG Gln	CGT Arg CGC Arg CGA Arg CGG Arg	T C A G
	A	ATT Ile ATC Ile ATA Ile ATG Met	ACT Thr ACC Thr ACA Thr ACG Thr	AAT Asn AAC Asn AAA Lys AAG Lys	AGT Ser AGC Ser AGA Arg AGG Arg	T C A G
	G	GTT Val GTC Val GTA Val GTG Val	GCT Ala GCC Ala GCA Ala GCG Ala	GAT Asp GAC Asp GAA Glu GAG Glu	GGT Gly GGC Gly GGA Gly GGG Gly	T C A G

There are 20 [standard amino acids](#) identified. Here this table helps you to understand the amino acids and see, more than one 3 letter code referring a codon. Also you can see in the above picture there are 3 codons are mentioned as Stop Codons. Why? Can you guess? These three codons end the coding regions. They also called as 'nonsense' codons. These are the three codons named TAA, TGA and TAG.

Replication

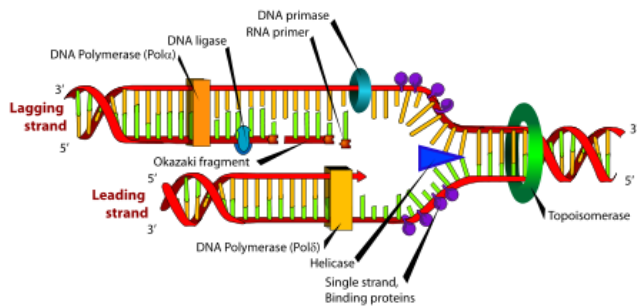
The enzyme helicase and topoisomerase always unwinds the DNA double helix. After this unwinding process

- One [DNA polymerase](#) produces the [leading strand](#) copy.
- Another DNA polymerase binds to the [lagging strand](#).



This enzyme creates the discontinuous segments before the [DNA ligase](#) starts its work. That is this DNA ligase always binds the broken nucleotide sequences.

For growth of any organism [cell division](#) is very important. Because of the cell division only the organism can grow rapidly and get the complete physical structure. But along with cell division, the DNA also should replicate. Then only the genome sequences would be doubled and both the daughter cells will be having same genetic sequences.



In the [DNA replication](#) process the two strands of DNA are separated and then each strand's [complementary DNA](#) sequence is recreated by an enzyme called DNA polymerase. This enzyme helps to complement this strand with the other strand which has the complementary sequences.

Translation

Mature mRNA finds its way to a [ribosome](#) during translation. Translation ends with a UAA, UGA, or UAG stop codon

Want to know more about DNA Translation process? [Click here](#) to schedule live online session with e Tutor!

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Reference Links:

- http://en.wikipedia.org/wiki/DNA#Transcription_and_translation
- http://en.wikipedia.org/wiki/Central_dogma_of_molecular_biology#Translation
- [http://en.wikipedia.org/wiki/Translation_\(biology\)](http://en.wikipedia.org/wiki/Translation_(biology))
- <http://www.youtube.com/watch?v=5bLEDd-PSTQ>
- <http://www.youtube.com/watch?v=WsofH466lqk>

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