

Central Dogma Models

Biology

Your objective for this assignment is to produce physical, paper models that will allow you to simulate and visualize the processes of transcription and translation. Your models do not need to accurately represent the shape of each molecule involved, but there should be a clear physical connection that allows the molecules to interlock where appropriate. You need to make the following physical shapes as part of your model:

1. One of each DNA nucleotide (A, C, G, and T). These nucleotides should allow for a physical connection between each other to form a strand of DNA and should NOT connect with RNA nucleotides to form a strand. There should be a physical connection between A and T bases and between C and G bases to indicate how two DNA strands might form a double helix.
2. One of each RNA nucleotide (A, C, G, and U). These nucleotides should connect to each other to form a strand (but should NOT connect with your DNA nucleotides to form a strand). There should be a physical connection between your RNA A and DNA T, your RNA C and DNA G, your RNA G and DNA C, and your RNA U and DNA A. This will allow you to align your RNA bases along your DNA bases to form a strand of mRNA.
3. Two tRNA molecules – the bulk of these molecules do not need to have any indication of the particular bases involved, but the each anticodon should physically interlock with a series of three different mRNA bases (you won't be able to use codons with repeated bases since you only have one of each RNA base). Your tRNA molecules should have an interlocking attachment to the appropriate amino acid (identified by the three letter abbreviation on the codon table below).
4. Four amino acids – two copies of two different amino acids that correspond to the tRNA anticodons you've chosen. These amino acids should interlock to form proteins.

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

Codon table showing mRNA sequences

When your models are complete, you should be able to use them to demonstrate the processes of transcription and translation. Good quality models should be intuitive for other students to use as well! When your model is done, spend some time practicing with it until you feel that you have a strong working fluency with the concepts and vocabulary of the Central Dogma.