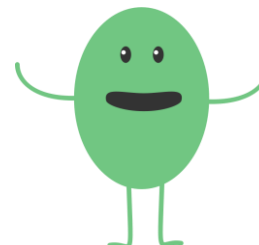


Snork Synthesis Lab

Lab Directions

This activity, modified from the original at The Biology Corner, will help you practice your understanding of protein synthesis. Submit your lab answers according to the directions and grading rubric below.



Overview:

In this simulation, you will examine the DNA sequence of a fictitious organism, the Snork. Snorks were discovered on the planet Dee Enae in a distant solar system. Snorks only have **one chromosome with ten genes on it**. Your job is to analyze the genes of its DNA and determine what traits the organism has and then create a sketch of the organism (You can be creative here).



There are 10 genes on the Snork chromosome.

Goal: Transcribe and translate all 10 genes for one snork. Then, draw a picture of your snork based on your work.

Directions:

For simplicity, the gene sequences are much smaller than **real** gene sequences found in living organisms. Each gene has two possible versions that result in a different trait being expressed in the snork. *Example: the gene for legs can result in either 2 or 4 legs*

Snork Genes	Amino acid sequence (abbreviations used)	Trait expressed (outward appearance)
1 Body Hair	val - ser - leu val - ser - lys	hairless hairy
2 Body Style	tyr - pro - glu - glu - lys val - pro - thr - glu - lys	plump skinny
3 Legs	leu - leu - leu - pro leu - leu - ser - ala	2 legs 4 legs
4 Head Shape	ala - val - val val - ala - ala	round head square head
5 Tail	his - ile his - his	tail no tail

6 Body Pigment	ser - pro - val val - phe - tyr	blue pigment (hair/skin) red pigment (hair/skin)
7 Eyes	asp - ile - leu - leu - pro - thr asp - ile - pro - pro - pro - thr	small slanted eyes large round eyes
8 Mouth	val - asp - asp - ala asp - asp - asp - ala	circular mouth rectangular mouth
9 Ears	phe - ser - gly phe - phe - gly	pointed standing-up ears rounded floppy ears
10 Arms	arg - tyr - cys - lys arg - arg - asp - thr	long spaghetti like arms short stumpy arms

1. Choose a snork below (do not choose our example, Snoopy.)
2. **Transcribe** the DNA into mRNA.
3. **Translate** the mRNA given into an amino acid sequence to determine the trait (how the organism looks) based on the sequence. (**Use the codon wheel or table given to you in the content to do this step.**)
4. Draw your Snork!

First, let's try an example. You can see Snoopy's DNA below. Each gene is in order (1-10) and is separated by a slash to keep you organized.

Snoopy Snork DNA:

CAT AGG GAG / ATG GGG CTC CTT TTT / AAT AAT GAC GGG / C
TAA / AGA GGG CAT / CTA TAA GAA GAC GGG TGT / CAA CTA C
CCA / GCG GCA CTG

		Second letter				
		U	C	A	G	
First letter	U	UUU Phe UUC UUA Leu UUG	UCU Ser UCC UCA UCG	UAU Tyr UAC Stop UAG Stop	UGU Cys UCC UGA Stop UGG Trp	U C A G
	C	CUU Leu CUC CUA CUG	CCU Pro CCC CCA CCG	CAU His CAC CAA 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 AAG	AGU Ser AGC AGA AGG	U C A G
	G	GUU Val GUC GUA GUG	GCU Ala GCC GCA GCG	GAU Asp GAC GAA GAG	GGU Gly GGC GGA GGG	U C A G

*Transcribe the DNA into mRNA. Remember that there are no T's in mRNA.
Example: if the DNA codon reads CAT, the matching mRNA codon is*

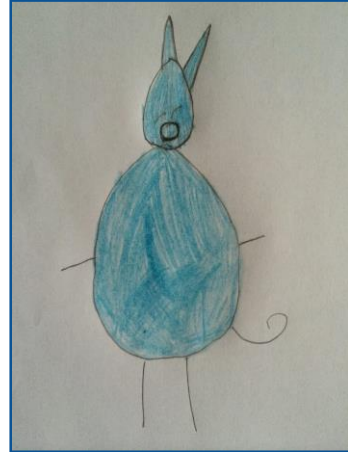
Snoopy Snork mRNA:

GUA UCC CUC / UAC CCC GAG GAA AAA / UUA UUA CUG CCC / GCU GUU GUA / CAU AUU /
UCU CCC GUA / GAU AUU CUU CUG CCC ACA / GUU GAU GAU GCC / UUU UCU GGU / CGC
CGU GAC

Now, use your codon wheel or table to find the amino acid that matches each codon.

**Note that abbreviations were used for amino acids.* (This table is enlarged below for your reference.)*

Write down the amino acids in order for each gene, as shown. Then compare each protein (amino acid chain) to the trait table above to find out the appearance of your Snork!



Amino Acid Sequence:

- 1: val, ser, leu (= hairless in table above)
- 2: tyr, pro, glu, glu, lys (= plump)
- 3: leu, leu, leu, pro (= 2 legs)
- 4: ala, val, val (= round head)
- 5: his, ile (= tail)
- 6: ser, pro, val (= blue)
- 7: asp, ile, leu, leu, pro, thr (= small, slanted eyes)
- 8: val, asp, asp, ala (= circular mouth)
- 9: phe, ser, gly (= pointed ears)
- 10: arg, arg, asp (= short arms)

Now draw your Snork using the information you translated!

(Sample drawing courtesy of a young biologist!)

Now, you will choose one of the following Snorks and do the same thing!

Snicker Snork DNA:

CAG TCG GAA / CAA GGG TGT CTT TTT / GAG AAT TCA CGC / CAA CGC CGA /
GTG TAA / AGA GGG CAT / CTA TAA GGG GGG GGG TGG / CTA CTG CTG CGT /
AAG AAA CCC / GCG GCC CTG

Snuffle Snork DNA:

CAT AGA TTT / CAA GGA TGA CTT TTC / GAA GAG GAG GGG / CAA CGC CGA /
GTA GTG / CAT AAA ATA / CAT TAA GAA GAC GGG TGT / CAA CTG CTG CGT /
AAG AGC CCA / TCT ATA ACA

Snapple Snork DNA:

CAG TCG TTT / ATG GGG CTT CTC TTT / GAG AAT TCA CGC / CGA CAA CAC /
 GTA GTA / CAA AAA ATG / CTA TAG AAT GAC GGG TGG / CTG CTG CTA CGG /
 AAA AGA CCC / TCT ATA ACA

Be sure to double check your work so that you do not make any silly mistakes!

mRNA Table with Amino Acid abbreviations

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

Data/Results

1. Which snork did you select for this activity?
2. What was it's mRNA nucleotide sequence? Please include spaces and slashes as you see in DNA.
3. What was it's amino acid sequence? Include slashes or write each of 10 characteristics on separate lines.
4. Include an original picture of your snork with the 10 labeled characteristics. You may hand-draw your snork and take a picture/scan it in, or you can create it using a drawing program (see the list of options in the sidebar in the content.)

From
http://cms.gavirtualschool.org/Shared/Science/Biology17/DNARNAProteinSynthesis/Biology_DNARNAProteinSynthesis_Shared6.html