Katherine Filpo Lopez

Professor Kerri-Ann Norton

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Lab Report #1: Simulating the Theory of Central Dogma in Molecular Biology

Introduction

The purpose of this lab was to model the way DNA and RNA interact in the cell and how all of these interactions contribute to the functionality of all living organisms. The theory of central dogma follows the way that proteins, which carry out many important processes in organisms are made.Central dogma, in three simple terms: replication, transcription, and translation. Replication is the way that DNA is replicated then made into a copy called RNA through a process called transcription, then this copy is then transcribed into amino acids which in turn make proteins. This assignment was to simulate this process and a couple of others that sometimes have a role in this process such as ligase and nuclease, but not to make the proteins.

Methods

In order to simulate these processes, I used strings for the DNA and RNA sequences and functions that all had a distinct purpose. Almost all the functions I wrote all had a sequence as an input and all return at least another sequence that has been changed in some way. I have one function that is different then all the others and its purpose is to test if a sequence is DNA or not, and returns a 1 or 0 which is used in my reverseTranscription function.

Results

The code works and is pretty simple in a comprehensive way. It is not too wordy and short. Because I worked on the reverseTranscription function the most so it is the most important for me

def reverseTranscription(sequence):

if (isDNA(sequence) == 0):

if (sequence.isupper() != 'True'):

return sequence.upper() + "\n" + sequence.upper().replace("U", "T")

else: return sequence.replace("U", "T")

elif (isDNA(sequence) == 1):

return sequence.upper() + "\n" + replication(sequence.upper())

And when run it works well for both DNA and RNA. For a case of RNA, it makes the sequence uppercase and returns that and the DNA version as it should.

A critique I have/desire that I wish I could properly code is the testing if a sequence is lowercase in a more global way but I don’t know how to do this other than to code yet another function, which is possible but I would have to call it every single time I start another function, which I don’t want to do.

Conclusion

The code worked well, and simulated replication and transcription to my satisfaction.

Credit/Acknowledgements:

I worked with three classmates to make some parts of this code; their names are Sam, Parker and Hannah. I also took some inspiration from Olivia’s code. I used this site as a reference for some unfamiliar code <https://www.geeksforgeeks.org/isupper-islower-lower-upper-python-applications/>.