

# Interactions of the Zika virus 3' UTR with Host Cellular Proteins

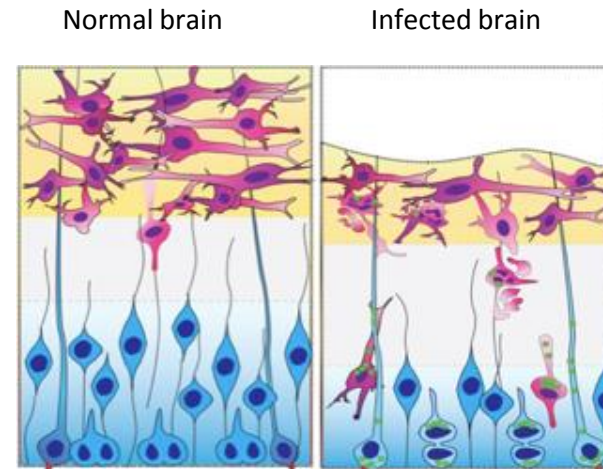
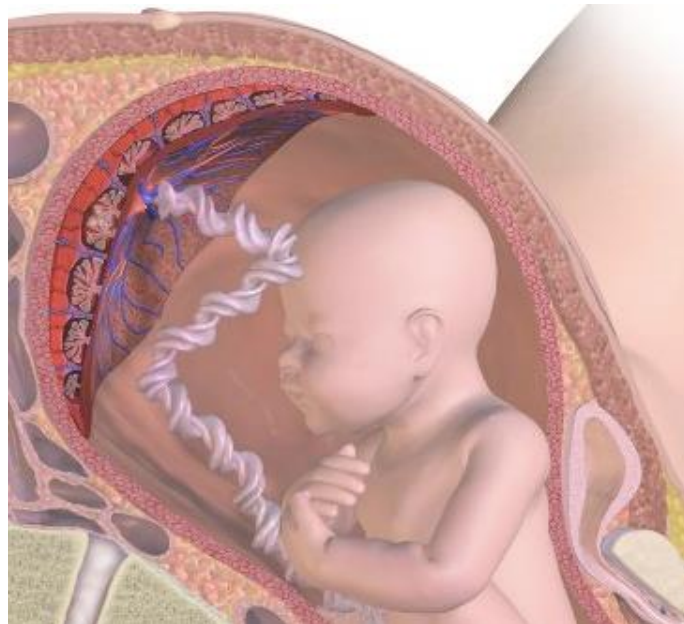
Zika

Ezra Kosviner

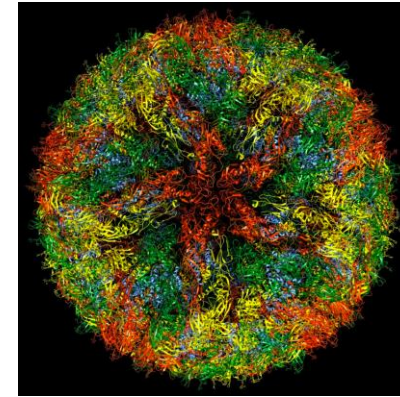
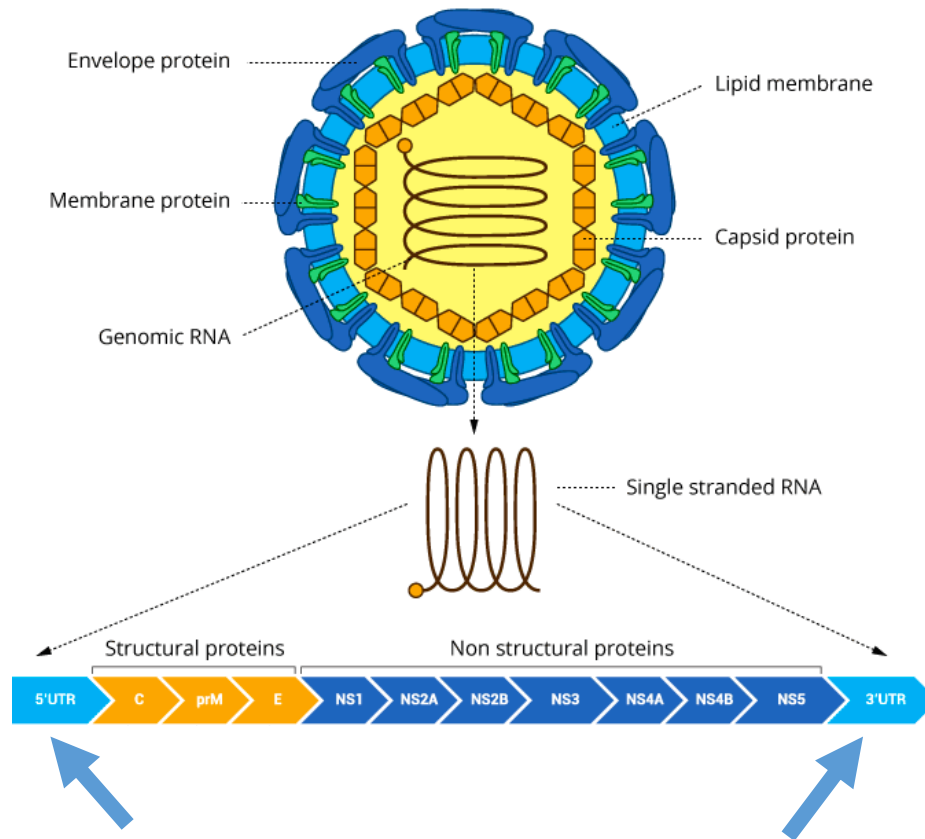
Arias/Acosta-Alvear Labs

MCDB 8/4/2017

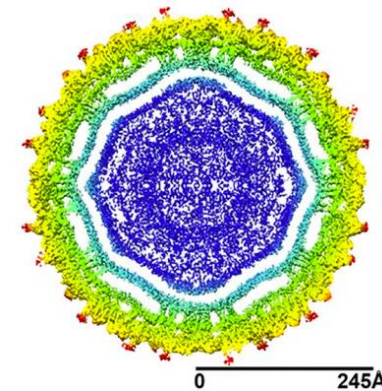
# How does Zika virus spread and why do we care?



# Zika virus structure



[www.virology.ws/2016/04/05/structure-of-zika-virus/](http://www.virology.ws/2016/04/05/structure-of-zika-virus/)

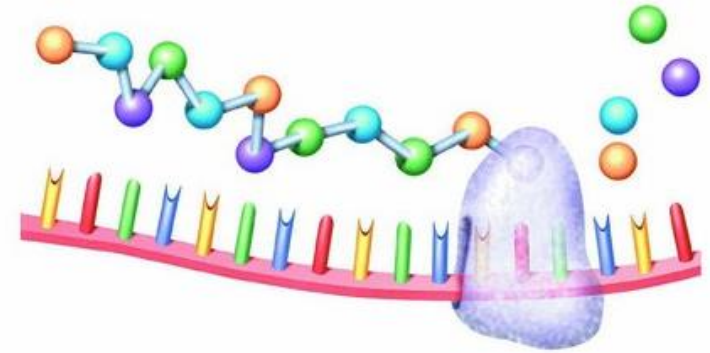


Sirohi D. et.al . Science, Mar 2016

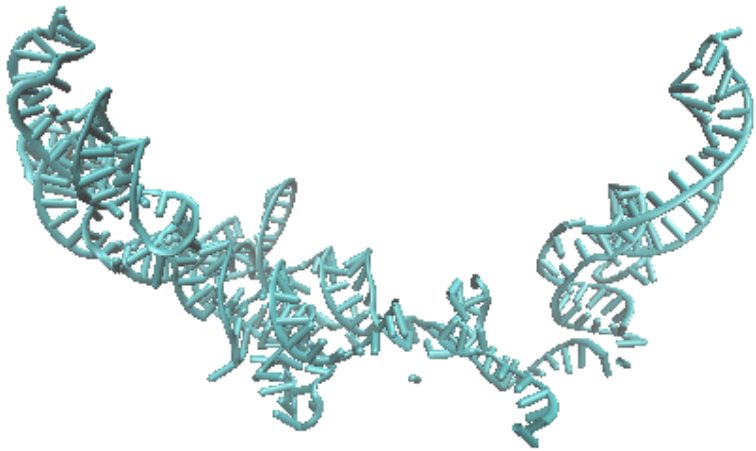
Untranslated Regions

# Biology Central Dogma

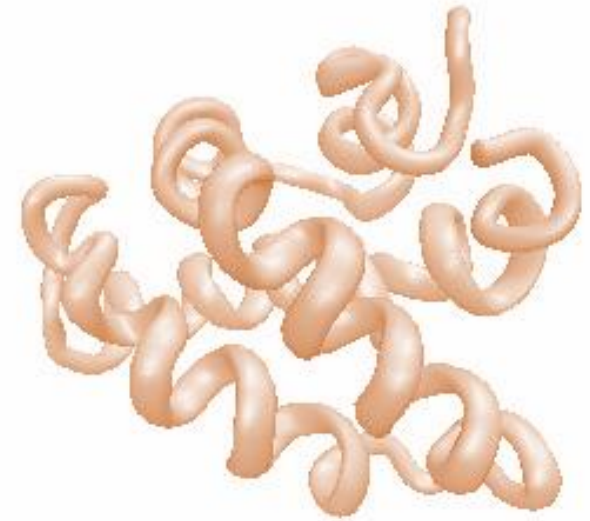
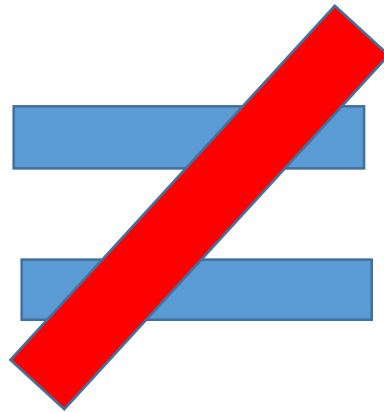
DNA → RNA → Protein



# Functional RNAs

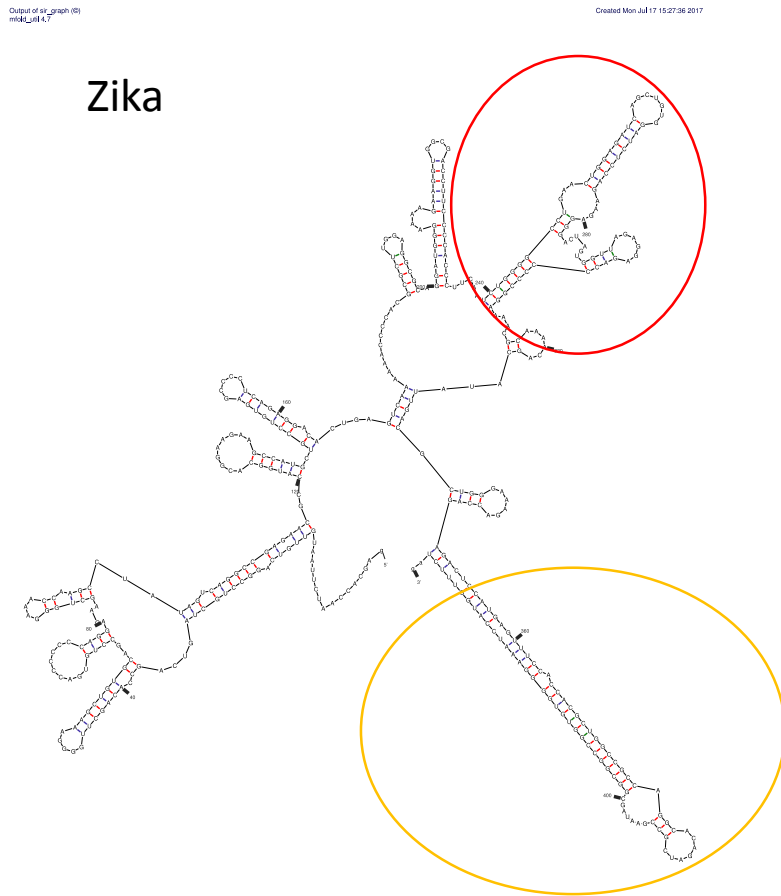


ZIKV 3' UTR

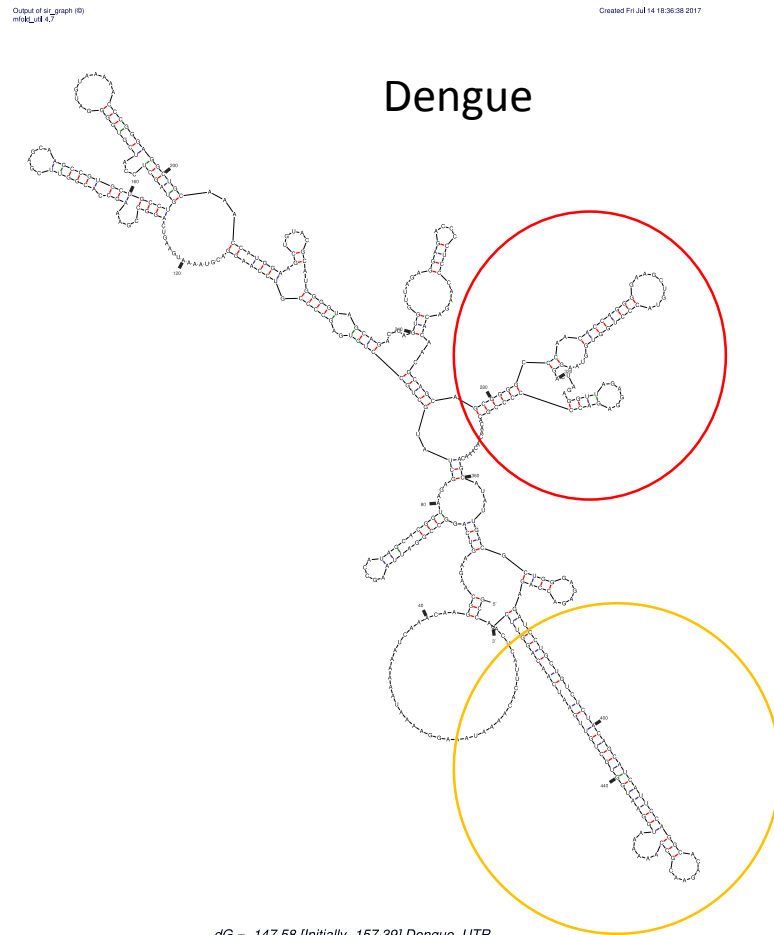


Generic Protein

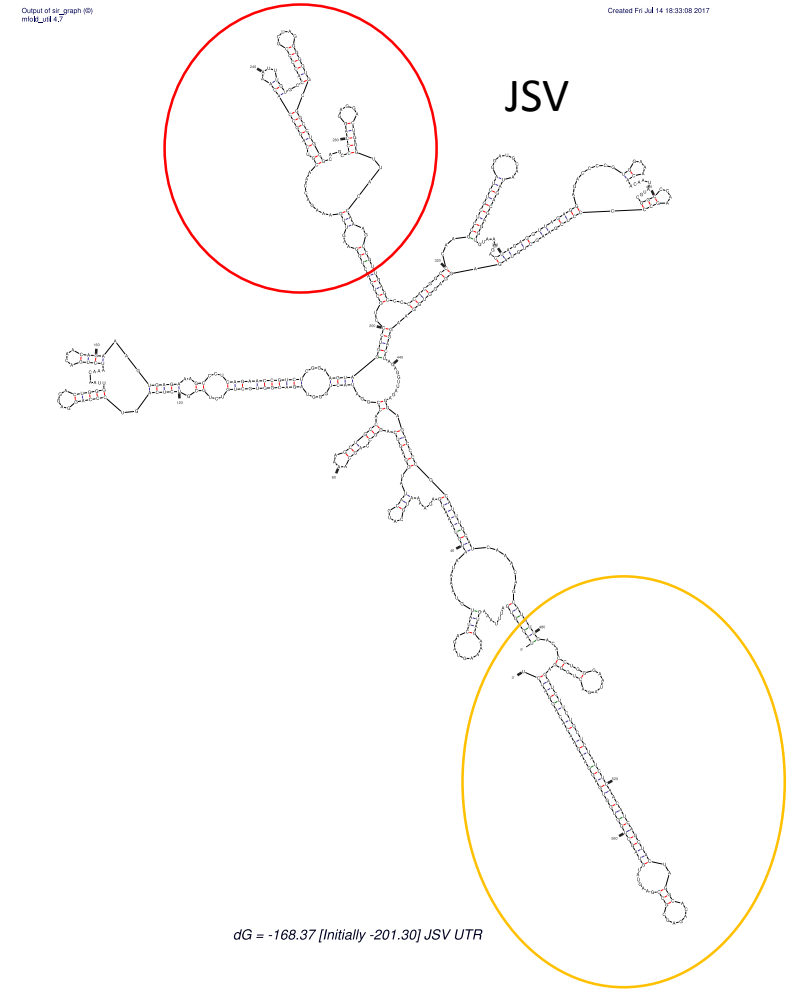
# Conserved Structures in Mosquito-born Viruses



dG = -171.97 [Initially -173.90] 17Jul17-15-27-32



dG = -147.58 [Initially -157.39] Dengue\_UTR



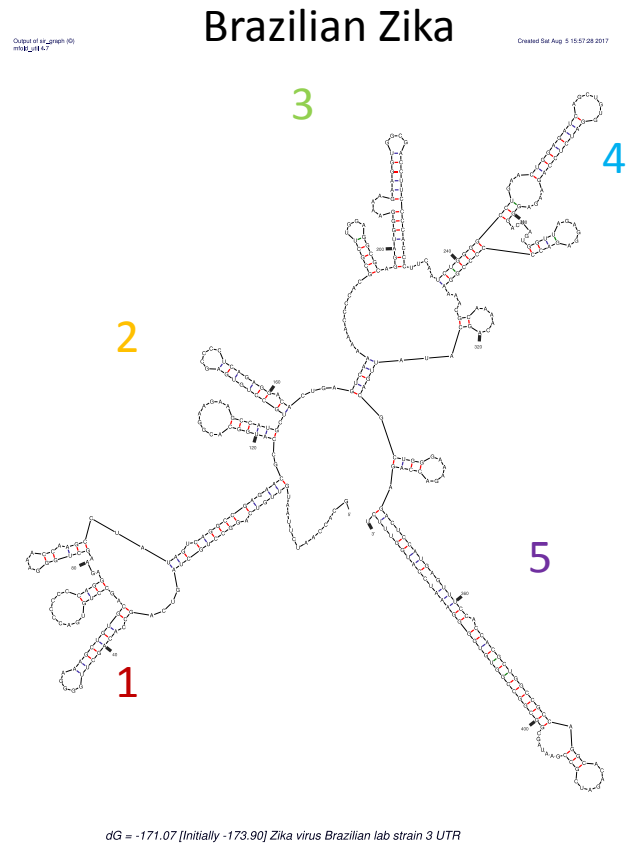
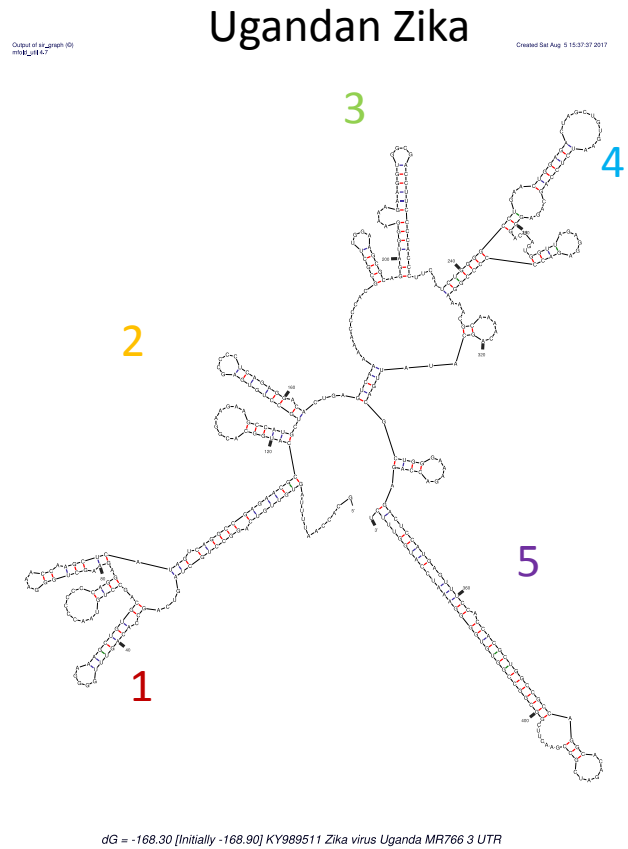
dG = -168.37 [Initially -201.30] JSV UTR

# Uganda VS Lab Brazilian UTR Homology

Is the UTR similar between viral strains?

Uganda	GCACCAATTTTAGTGTTCAGGCCCTGCTAGTCAGCCACAGTTTGGGAAAGCTGTGCAG	60
Lab	GCACCAATCTTAATGTTGTCAGGCCCTGCTAGTCAGCCACAGCTTGGGAAAGCTGTGCAG	60
	***** **	
Uganda	CCTGTAACCCCCCAGGAGAAGCTGGGAAACCAAGCTCATAGTCAGGCCGAGAACGCCAT	120
Lab	CCTGTGACCCCCCAGGAGAAGCTGGGAAACCAAGCCTATAGTCAGGCCGAGAACGCCAT	120
	*****	
Uganda	GGCACGGAAGAAGCCATGCTGCCTGTGAGCCCTCAGAGGACACTGAGTCAAAAAACCCC	180
Lab	GGCACGGAAGAAGCCATGCTGCCTGTGAGCCCTCAGAGGACACTGAGTCAAAAAACCCC	180
	*****	
Uganda	ACGCGCTTGGAAAGCGCAGGATGGGAAAAGAAGGTGGCGACCTTCCCCACCCTTCAATCTG	240
Lab	ACGCGCTTGGAGGCGCAGGATGGGAAAAGAAGGTGGCGACCTTCCCCACCCTTCAATCTG	240
	*****	
Uganda	GGGCCTGAACTGGAGACTAGCTGTGAATCTCCAGCAGAGGGACTAGTGGTTAGAGGAGAC	300
Lab	GGGCCTGAACTGGAGATCAGCTGTGGATCTCCAGAAGAGGGACTAGTGGTTAGAGGAGAC	300
	*****	
Uganda	CCCCCGGAAAACGCAAAACAGCATATTGACGCTGGGAAAGACCAGAGACTCCATGAGTTT	360
Lab	CCCCCGGAAAACGCAAAACAGCATATTGACGCTGGGAAAGACCAGAGACTCCATGAGTTT	360
	*****	
Uganda	CCACCACGCTGGCCGCCAGGCACAGATCGCCGAATTCGGCGGCCGGTGTGGGAAATCC	420
Lab	CCACCACGCTGGCCGCCAGGCACAGATCGCCGAATAGCGCGGCCGGTGTGGGAAATCC	420
	*****	
Uganda	ATGGTTTCT	429
Lab	ATGGTTTCT	429
	*****	

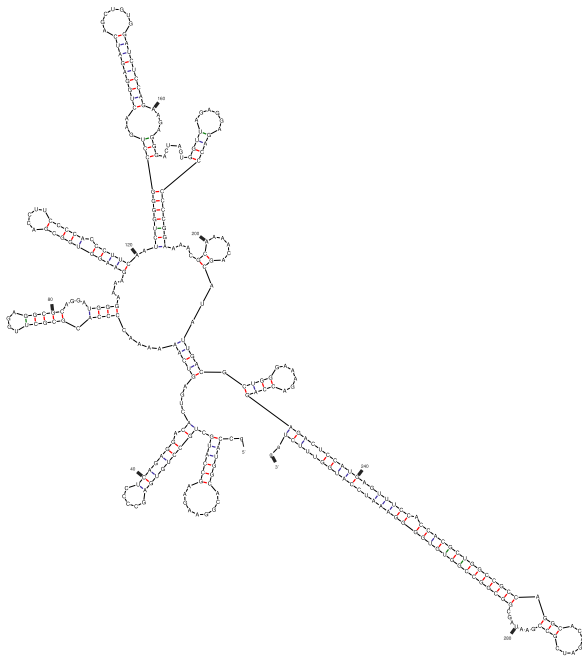
# Ugandan Zika UTR Structure Matching





# Motifs are Stable despite 3' and 5' Modification

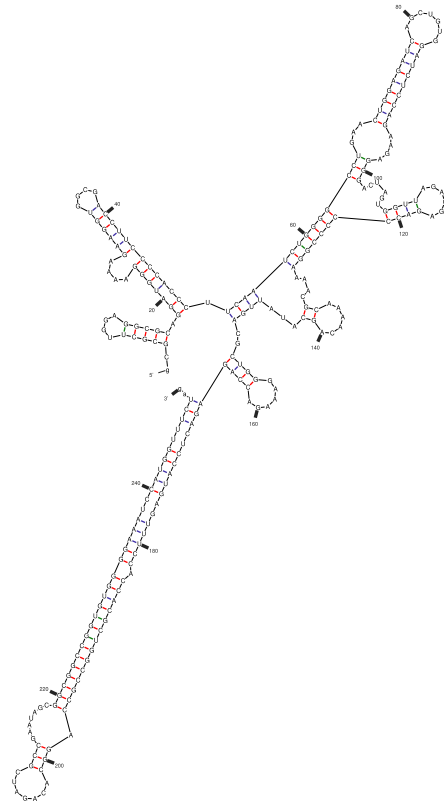
Output of *si\_graph* (5)  
mM2\_Utr4.7



dG = -132.49 [Initially -131.40] M2-M5

Created Mon Jul 17 15:37:11 2017

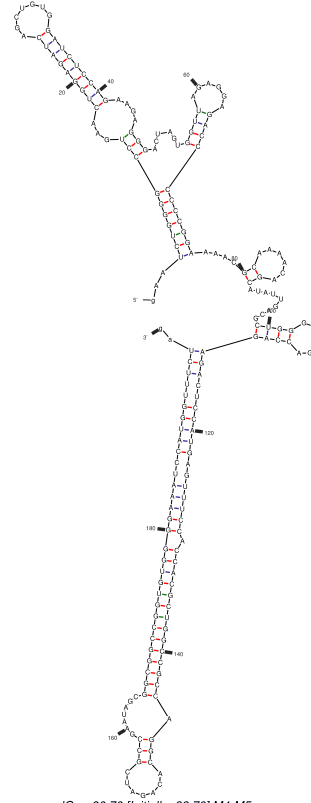
Output of *si\_graph* (5)  
mM3\_Utr4.7



dG = -113.03 [Initially -111.80] M3-M5

Created Mon Jul 17 15:38:42 2017

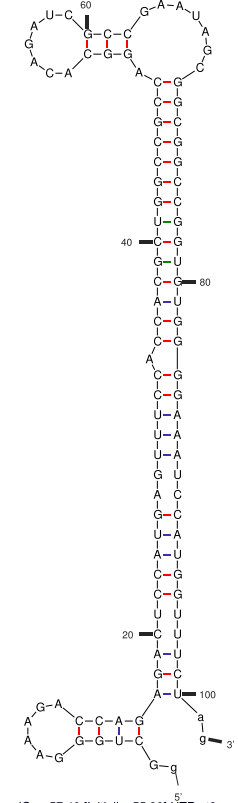
Output of *si\_graph* (5)  
mM4\_Utr4.7



dG = -90.70 [Initially -88.70] M4-M5

Created Mon Jul 17 15:39:23 2017

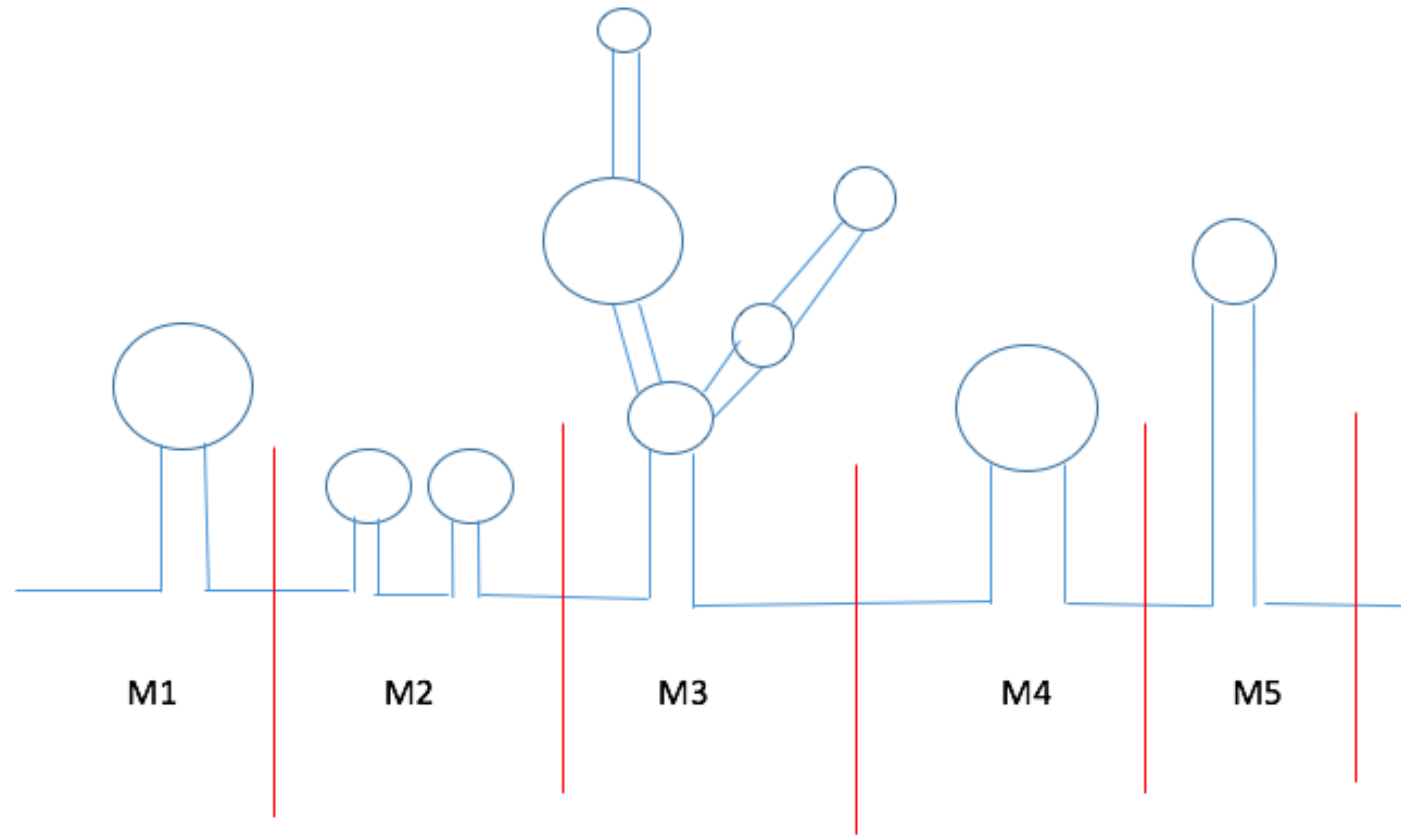
Output of *si\_graph* (5)  
mM5\_Utr4.7



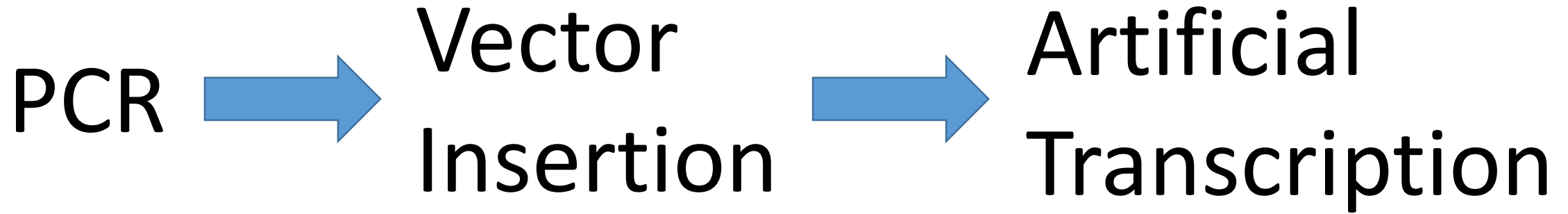
dG = -57.40 [Initially -55.90] UTR pt3

Created Mon Jul 17 15:35:52 2017

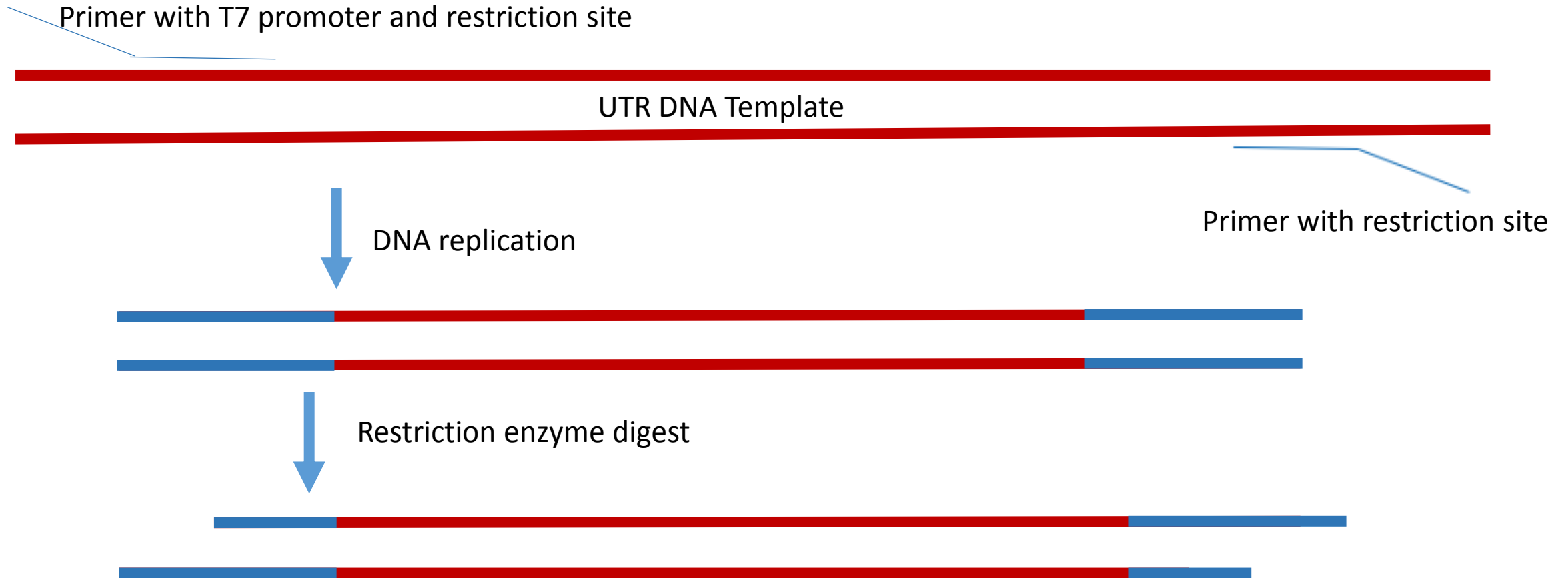
# Dividing the 3' UTR into its significant structures



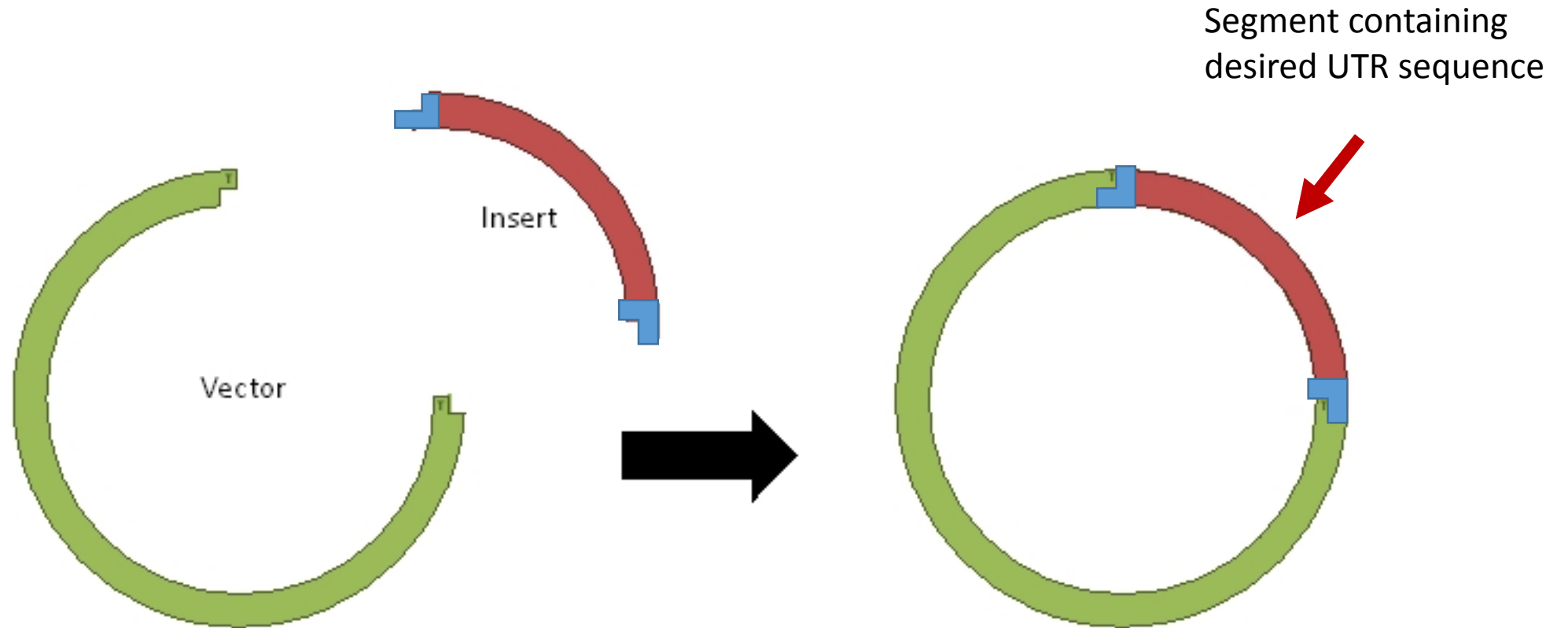
# Methods



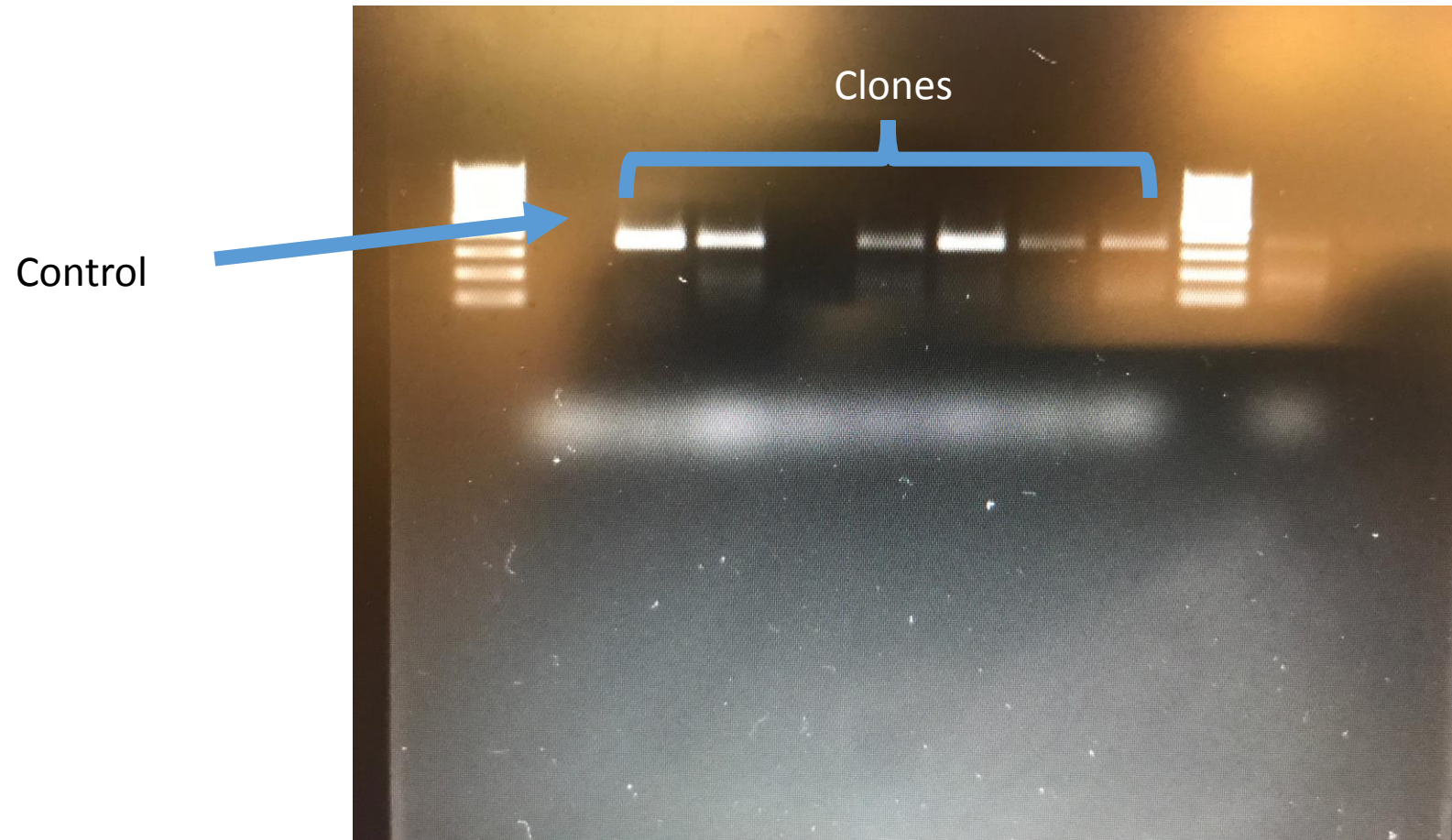
# What is the virus doing with these structures?



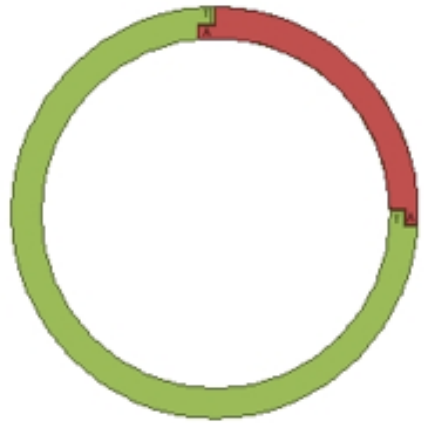
# Inserting my sequence into my plasmid



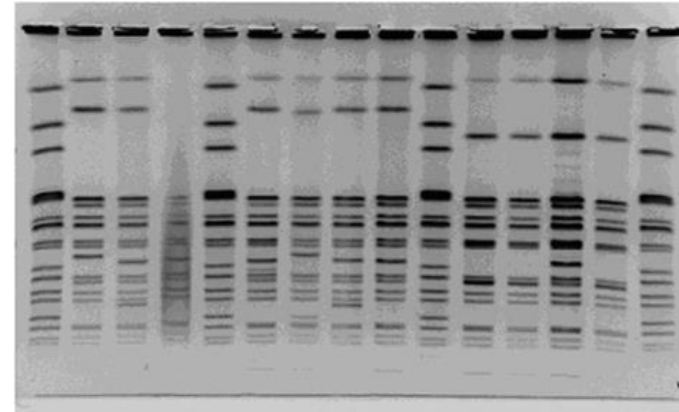
# First Cloning results



# RNA Transcription, Purification, and Folding



*In-vitro* Transcription



Purification  
done by a gel  
electrophoresis

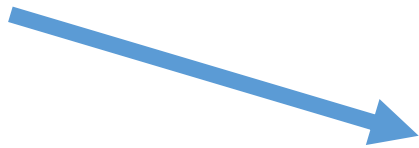


*In-vitro* folding



# How can we identify protein-UTR interactions?

Unidentified  
host protein



ZIKV 3' UTR



# RNA-Protein interaction

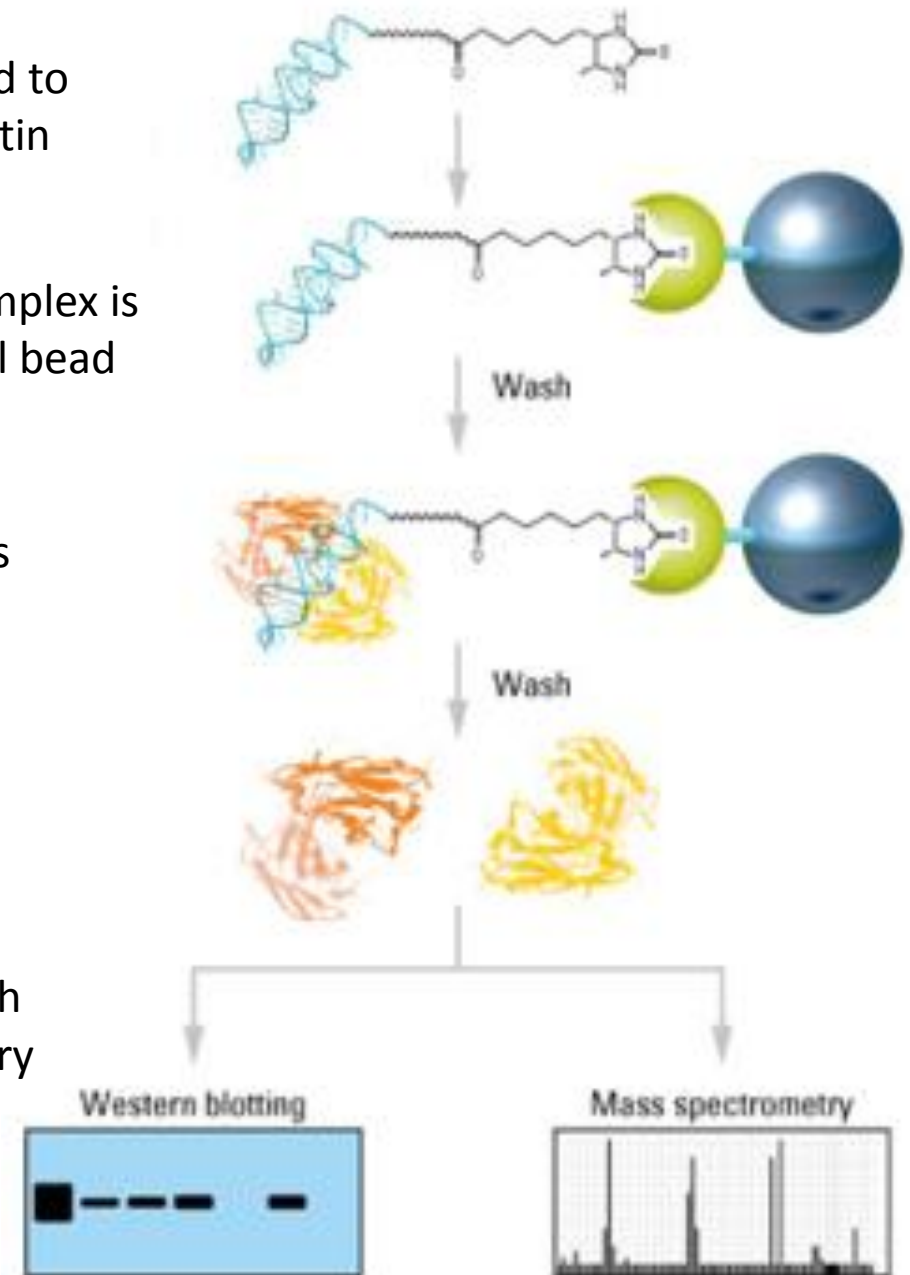
Protein complexes with RNA will shed light on ZIKV-host interactions within human cells

1. RNA is attached to a molecule of biotin

2. Biotin-RNA complex is attached to metal bead

3. RNA complexes with protein

4. Protein is removed from complex and characterized with mass spectrometry and/or Western blot



# Acknowledgement

