Mapping RNA Structure Back to DNA Sequence

1) Use foam RNA nucleotides to construct a 10 ribonucleotide strand, 5' to 3'.

2) Add ***12 random ribonucleotides*** for the hairpin turn. I used GGGUUUCCCAAA so that I knew where the turn was.

3) Then create the hairpin turn and fill in the final 10 nucleotides *with the complementary nucleotides* so that they base pair with the first 10. This is called a stem loop structure. We will be seeing more of these later in the module. Now we will "reverse transcribe" or map this RNA sequence back to DNA to see how it would look in our genome.

4) Open up the RNA into one long strand and write down your sequence below.

5) Create the complementary sequence in DNA by making an RNA-DNA duplex and then write out that resulting sequence.

6) Finally separate the RNA and DNA duplex and create the complementary DNA, making double-stranded DNA. Write out the complementary DNA sequence under the first DNA sequence.

RNA: 5' _ 3'

DNA: 3' _ 5'

DNA: 5' _ 3'

7) Have two people each read one of the DNA strands at the same time, starting from the 5' end to the 3' end. What do you notice?

- You have discovered a genomic palindrome! What could a palindrome in our genome mean?
- What might it mean structurally and functionally?
- How might that relate to clustered regularly interspaced short *palindromic* repeats found in CRISPR?

Spend some time discussing this with your colleagues. Do all palindromes result in RNA stem loop structures? Can you think of other palindromes you may have learned about that are recognized by specific proteins? How might have these sequences evolved? There are no silly questions. In fact, researchers are still learning a lot about genomic sequences like this!