Module 6: Alternative Splicing

Answer Sheet

**Q1.** Given that exons are shown by the black boxes, and introns are shown by thin lines with arrowheads in the FlyBase Genes track, what does this tell us about the first intron of *tra-RB* compared to that of *tra-RA*?

**Q2.** Given what you know about the initiation of translation, which of the 3 possible reading frames is used for both the tra-RA and tra-RB products?

**Q3.** Give the coordinate for the last base of the first exon for tra-RA

**Q4.** Give the coordinate for the last base of the first exon for tra-RB

**Q5.** What is the consensus sequence for the 5’ splice site (donor site)?

**Q6.** What are the coordinates for the 5’ splice site in tra-RA?

**Q7.** What are the coordinates for the 5’ splice site in tra-RB?

**Q8.** What is the phase at this splice site?

**Q9.** What are the coordinates for the first base of the second exon in tra-RB?

**Q10.** What is the consensus sequence for the 3’ splice site?

**Q11.** What are the coordinates for the 3’ splice site in intron 1 of tra-RB?

**Q12.** What phase do we anticipate?

**Q13.** Given this, what is the reading frame for tra-RB exon2?

**Q14.** Does this make sense, given the location of stop codons?

**Q15.** What are the coordinates for the first base of the second exon in *tra-RA*?

**Q16.** What is the consensus sequence for the 3’ splice site?

**Q17.** What are the coordinates for that sequence in intron 1 of tra-RA?

**Q18.** Given the phase at the donor site, what phase are we looking for here?

**Q19.** Given this, what is the reading frame for tra-RA exon 2?

**Q20.** Does this make sense, given the location of stop codons?

**Q21.** From your analysis of the RA isoform of *tra* in Module 5, how many amino acids does the tra-RA protein product have?

Now look at the tra-RB isoform:

**Q22.** What are the coordinates for exon 1?

**Q23.** Given the reading frame that you established for tra-RB, does translation continue through exon 2, or is it terminated by a stop codon?

**Q24.** What are the coordinates for the translated portion of exon 2?

**Q25.** How many amino acids does the protein translated from the tra-RB isoform have?

**Q26.** Is it likely that the protein translated from tra-RB could play the same functional role played by the protein translated from tra-RA?

**Q27.** Gene model for tra-RB:

Coordinate for start of translation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Coordinate for last base of exon 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Coordinate for first base of exon 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Coordinate for last base of exon 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Coordinate for first base of exon 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Stop codon coordinates: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Summary Question 1.** How does the polypeptide translated from the tra-RB isoform differ from the polypeptide translated from the tra-RA isoform? What are the consequences of these differences on protein function?

**Summary Question 2.** Discuss how the bigger mRNA leads to creation of a smaller polypeptide!!

**Summary Question 3.** Consider how alternative splicing could allow many different proteins to be encoded by the same gene.

**Summary Question 4.** Based on the gene structure of the two isoforms of *tra* shown in the "FlyBase Genes" track, provide a hypothesis that could explain this difference in RNA-Seq read coverage between the adult males sample and adult females sample.