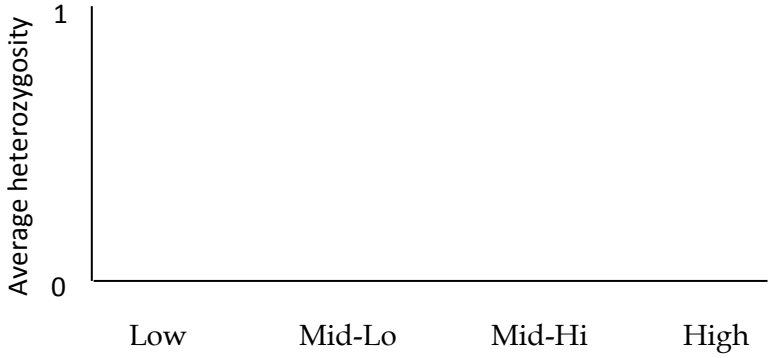
Student Worksheet

Part 1: Inbreeding on an Elevational Gradient

1. Before you start your analysis, develop a prediction. Based on your class discussions and what you know about pikas, do you think pika populations will be healthier (have higher heterozygosity) at high, middle-high, middle-low, or low elevations? Sketch what you think an average heterozygosity bar graph would look like at these four elevations if your prediction is true.



Why do you predict this?

15. What do you see? Revisit your prediction from # 1. Were you correct? Why/why not? What do you think is driving this pattern? Think about the ideal habitat and climate constraints of the pika, remembering that they don't do well in hot temperatures.

Part 2: Identifying adaptive loci (SNPs)

1. What are the allele frequencies for each SNP in each population?

	SNP1306		SNP3453		SNP3603	
	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2
Low						
Mid-Lo						
Mid-Hi						
High						

2. Looking at these three SNP loci, which appears to be adaptive (undergoing selection)? Which allele for this SNP may represent a low-elevation adaptation, which a high-elevation adaptation? How can you tell?

3. There are many different possible functions for an elevation-adapted gene region like this. Do you have any guesses on what this gene might do? Use your creativity to guess the function of this gene.

4. How would you figure out if you're right about the function of this gene? Describe an experiment (or observational study) that you could use to figure out this function.

5. What about the other two SNPs you analyzed? Do they appear to be adaptive? Why/why not? Describe the allele patterns you see in these two loci and why you might see the pattern you do.

6. Based on the results of both Part 1 and Part 2 of this lesson, do you think low elevation pikas are adapted to their warmer, drier environment? Or are these populations going to disappear too?