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Genetics of PTC Worksheet

Observations and Analysis

Table 1.	Phenotypes				Allele frequency based on H-W Equation	
	Tasters ($p2$ + 2pq)		Nontasters (q^2)		p	q
Class Population	#	%	#	%		
North American Population	0.55		0.45			

Questions

1. What is the percentage of heterozygous tasters in the class?

2. How do the proportions of each phenotype in the class compare with the average in the North American population?

3. PTC is a very bitter chemical. What would be an evolutionary advantage to disliking very bitter foods?

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Hardy-Weinberg Equilibrium Worksheet

Observations and Analysis

Table 1a. Group Frequency

	Parent Genotype	Offspring 1	Offspring 2
F_0	Aa		
F_1			
F_2			
F_3			
F_4			
F_5			

Table 1b. Class Frequencies

	AA	Aa	aa
F_0	——		——
F_1			
F_2			
F_3			
F_4			
F_5			

Table 1c. F_5 Calculations

F_5 # of A alleles	
F_5 # of a alleles	
F_5 p	
F_5 q	

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Selection Worksheet

Observations and Analysis

Table 2a. Group Frequency

	Parent Genotype	Offspring 1	Offspring 2	Homozygous Recessive Offspring (aa)
F_0	Aa			
F_1				
F_2				
F_3				
F_4				
F_5				

Table 2b. Class Frequencies

	AA	Aa	aa
F_0	——		——
F_1			
F_2			
F_3			
F_4			
F_5			

Table 2c. F_5 Calculations

F_5 # of A alleles	
F_5 # of a alleles	
F_5 *p*	
F_5 *q*	

Questions

1. How do the new frequencies of *p* and *q* compare to the initial frequencies in Case 1?

2. Predict what would happen to the frequencies of *p* and *q* if you simulated another five generations.

3. In a large population would it be possible to completely eliminate a deleterious recessive allele? Explain.

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Heterozygous Advantage Worksheet

Observations and Analysis

Table 3a. Group Frequency

	Parent Genotype	Offspring 1	Offspring 2
F_0	Aa		
F_1			
F_2			
F_3			
F_4			
F_5			
F_6			
F_7			
F_8			
F_9			
F_{10}			
F_{11}			
F_{12}			
F_{13}			
F_{14}			
F_{15}			

Table 3b. Class Frequencies

	AA	Aa	aa
F_0	——		——
F_1			
F_2			
F_3			
F_4			
F_5			
F_6			
F_7			
F_8			

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F_9			
F_{10}			
F_{11}			
F_{12}			
F_{13}			
F_{14}			
F_{15}			

Table 3c. Calculations

F_5 # of A alleles	
F_5 # of a alleles	
F_5 p	
F_5 q	
F_{10} # of A alleles	
F_{10} # of a alleles	
F_5 p	
F_5 q	
F_{15} # of A alleles	
F_{15} # of a alleles	
F_5 p	
F_5 q	

Questions

1. Explain how the changes in the frequencies of p and q in Case 2 compare with Case 1 and Case 3.

2. Do you think the recessive allele will be completely eliminated in either Case 2 or Case 3?

3. What is the importance of heterozygotes in maintaining genetic variation in populations?

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Genetic Drift Worksheet

Observations and Analysis

Table 4a. Group Frequency

	Parent Genotype	Offspring 1	Offspring 2
F_0	Aa		
F_1			
F_2			
F_3			
F_4			
F_5			

Table 4b. Class Frequencies

Population 1				Population 2				Population 3			
	AA	Aa	aa		AA	Aa	aa		AA	Aa	aa
F_0	——		——	F_0	——		——	F_0	——		——
F_1				F_1				F_1			
F_2				F_2				F_2			
F_3				F_3				F_3			
F_4				F_4				F_4			
F_5				F_5				F_5			

Table 4c. Calculations

Population 1		Population 2		Population 3	
# of A alleles		# of A alleles		# of A alleles	
# of a alleles		# of a alleles		# of a alleles	
p		*p*		*p*	
q		*q*		*q*	

Questions

1. Explain how the initial genotypic frequencies of the three populations compare to the F_5 frequencies.

2. What do your results indicate about the importance of population size as an evolutionary force?

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