

3 - Allele and Phenotype Frequencies in Rock Pocket Mouse

Procedure

1. 1
 - I. Fur color through melanism
 - II. Dark are more likely to survive in a dark environment and the same is true for light in light
 - III. Frequencies in dark colored mice are in part governed by the MC1R gene
2.
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Part 1

1. $q = 0.5$ because $q^2 = 4/16 = 0.25$ therefore $q = 0.5$
2. $q = 0.4$ because $p + q = 1$ and $p = 0.6$
3. $p^2 = 0.04$ because $q^2 = 640/1000 = 0.64 \therefore q = 0.8$ and $p + q = 1 \therefore p = 0.2$

Part 2

1. Light = $120/168 = 71\%$ and Dark = $48/169 = 20\%$
2. Light = $3/57 = 5\%$ and Dark = $54/57 = 95\%$
3. 3
 - I. $dd = 71\%$
 - II. $Dd = 26\%$
 - III. $DD = 3\%$
4. 4
 - I. $dd = 5\%$
 - II. $Dd = 34\%$
 - III. $DD = 61\%$
5. Dark colored, as on the light colored ground, there is still a whole 20% of dark colored mice, whilst on the dark ground, there is only 5% light colored mice. This likely means that dark ground has a higher pressure to have dark colored fur
6. Their visibility to predators and therefore survival before reproduction
7. This shows that natural selection is nonrandom and can indeed happen similarly in two separate places individually. Similar factors will likely produce similar results through evolution and natural selection.
8. We need to see how the color changes over time to see if any adaptation is actually happening. If it does not change then there is no pressure acting upon the population and it should stay in Hardy-Weinburg Equilibrium

Part 3

1. As s increases, p increases more aggressively over each generation, as q inversely directly decreases. When s is 0, there is no change as there is no pressure.
2. The selection constant s is related to natural selection because it represents the amount of selective pressure upon a certain population, pushing to change the phenotypic ratios. The higher the selection

constant is, the more the environment favors a certain phenotype, and pushes the population to have that phenotype.

3. 3

- I. About 936 generations
- II. About 100 generations
- III. About 0.22