**Lab 8 : Human and Population Genetics (Important Questions to Consider)**

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**Questions and Answers:**

1. **Which of your genotypes would you be able to better determine if you considered the phenotypes of your parents and siblings?**
   * **Answer:** Recessive
   * Genotypes related to visible traits such as tongue rolling, widow's peak, or dimpling may be better determined by observing family phenotypes. Traits that follow simple Mendelian inheritance patterns make it easier to infer the genotype based on family traits.
2. **Why don't recessive traits always eventually disappear from populations?**
   * **Answer:** Recessive traits persist because carriers (heterozygous individuals) do not exhibit the trait but can pass it on to offspring. In large populations, genetic drift and random mating ensure that recessive alleles remain in the gene pool.
3. **What fraction of recessive alleles are "hidden" in heterozygotes for each of the eight single-gene traits that you studied?**
   * **Answer:** In a population at Hardy-Weinberg equilibrium, the frequency of heterozygotes is calculated as 2pq. This represents the fraction of recessive alleles hidden in carriers for each trait. Here’s the fraction of hidden alleles foreach trait: A notebook with writing on it

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Tongue Rolling :

Recessive student(rr) 3

=3\*2 =6 recessive alleles

Heterozygous students = 48% of 20 =

0.48\*20 = 9.6

= 10  heterozygous individuals

10\*1= 10 hidden recessive alleles

Total recessive alleles:

6 + 10 = 16

Fraction hidden:

(10/16 )\*100 = 62.5 %

Like this for each trait we need to calculate and we got this table below:

|  |  |  |  |
| --- | --- | --- | --- |
| Trait | Hidden Alleles | Total Recessive Alleles | Fraction Hidden(%) |
| Tongue Rolling | 10 | 16 | 62.5 |
| Widow's Peak | 2 | 38 | 5.3 |
| Thumb Crossing | 10 | 20 | 50 |
| Attached Earlobes | 9 | 13 | 69.2 |
| Dimpled Chin | 6 | 32 | 18.8 |
| Mid-Digital Hair | 10 | 24 | 41.7 |
| PTC Tasting | 7 | 31 | 22.6 |
| Lactose Tolerance | 3 | 37 | 8.1 |

1. **Why might you expect the locus that governs lactose tolerance/intolerance to not be in Hardy-Weinberg equilibrium?**
   * **Answer:** Lactose tolerance is influenced by natural selection. In populations where dairy farming is prevalent, individuals with lactose tolerance have a selective advantage, causing allele frequencies to shift rather than remain in equilibrium.
2. **What may have led to errors in your determining your total ridge count, and how confident are you in the reliability of the heritability for this trait that you calculated?**
   * **Answer:** Errors may arise from inconsistent ridge counting, poor quality of fingerprints, or subjective measurement. Confidence in heritability relies on accurate data collection, a large sample size, and minimizing environmental variation.

A fingerprints on a piece of paper

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A document with a fingerprint

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1. **Is another characteristic that is apparently heavily influenced by both genes and environment? What other human characteristics are likely to be influenced by both genes and environment?**
   * **Answer:** Height and weight are heavily influenced by both genetic predisposition and environmental factors such as nutrition and lifestyle. Other traits like intelligence and skin tone are also subject to genetic and environmental interaction.