Source: KBBiologyMasterIndex

1 | SNP

Single Nucleotipe Polymorphism: pairs of single-base pair variations of genes that are not uncommon (>1%), and hence not quite considered a mutation.

SNPs could be in any part of the genome: sometimes in a gene, but more often in a non-coding region.

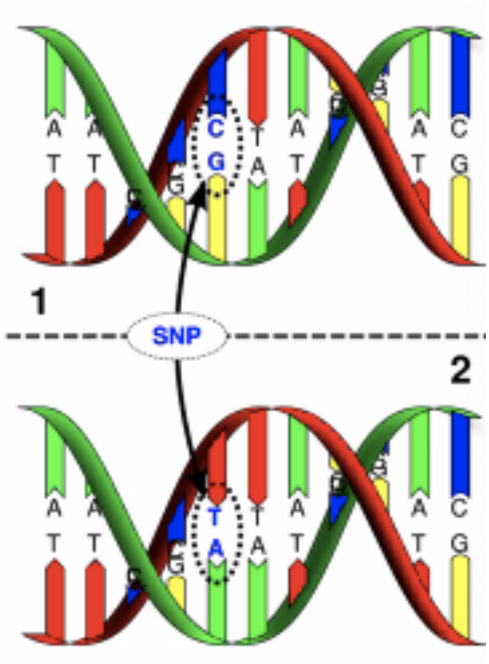

Figure 1: Pasted image 20210505134813.png

These could do absolutely nothing, but they could also create large trait differences (sickle-cell is a SNP).

The DNA by mail kits are actually just looking for SNPs!

Multiple SNPs come together to form a “Haplotype”; they are SNPs that are fairly close together that frequently occur in sequence (like the chain of three SNPs A something something G something something T would be a haplotype.)

People of the same haplotype are likely of same ancestry.

1.1 | SNP Guidelines

- No medical SNPs; so avoid SNPs that could be associated with heavy medical information
- No SNPs that could potentially give you PTSD

1.2 | the Reaction

- Each student’s PCR reaction will only amplify 500-800 nucleotide region
- Find SNPs that have specific traits independently, because most SNPs are polygenic (they tell you info only if you discover many different SNPs, which is complicated and hard)

- SNPs are sometimes discovered using Genome Wide Association Studies, which is challenging to deal with because they may be flawed

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1.3 | Polymerase Chain Reaction (PCR)

A reaction by which the DNA replication process is attempted to be replicated out of the cell in preparation to sequence one's DNA

PCR provides a way of creating *lots* of copies of a *small* strand of DNA

1.3.1 | Reaction Need

- The DNA Portion (duh)
- A buffer to host the liquid
- Primers - Bit of RNA to help DNA polymerase get going
- DNA Polymerase - The Enzyme to Copy the DNA => Typically, the TAQ Polymerease is used because it is from a bacterial that's quite resistant to heat
- DNA Nucleotides - to build the replicated DNA

1.3.2 | Steps

1. Denaturation
    1. Cook the DNA ("denature it"/heat it) to seperate the two strands of the DNA
2. Annealing
    1. Cool the Cooked DNA, and dump in the primers
    2. The specific temperature in this step is important because it controlls where the primer binds, and hence which part of the DNA you want to amplify
3. DNA Synthesis => make more copies of the DNA
    1. This needs a slightly higher temperature than annealing, but which one depends on what polymerase you used
4. Go to step 1

Note: the DNA polymerase may run over, so we just keep repeating this and it will slowly become more successful as the DNA polymerease repeats its work repeatedly.

BTW: if you read carefully, you will realize that you made TWO DNA double-strands out of a single double strand. So exponential growth baybee and then you could get lots of copies of that region.

1.3.3 | But, why?

In order to have enough copies for gel electroprorisis (like, the rRT-PCR COVID test) or, for things like crime forensics, you need many copies of the same DNA for a clearly detectable result for analysis that may have a high threshold.