**NOTE: This is an official document by Indexademics. Unless otherwise stated, this document may not be accredited to individuals or groups other than the club IDX, nor should this document be distributed, sold, or modified for personal use in any way.**

**IDX G9 Biology H STUDY GUIDE ISSUE 6**

**By Arianna**

**17.2 Evolution as genetic change in Populations**

(1)Natural Selection on Single gene traits

* selection on aparticulor phenotype→change in allele frequeny→evlution

(2)Natural Selection on Polygenetic trait

* selection on a range of phenotype→change allele frequency→evolution
* ① Directional selection ② Stabalizing selection② Disruptive selection

①**Directional Selection**

* selection on one extreme end of phenotypes
* when indiuduals at **one end of the curve** have higher fitness than individuals in the middle/ at the other end
* Example: Beak size of finchesbeak size

② **Stabalizing selection**

* selection on common/intermediate forms of phenotypes, eliminated the extreme forms
* happens when indidiuals near the **center of the curve** have higher fitness than individuals at the other end
* Example: Selection on birth weight of infants birth mass

③ **Disruptive Selection**

* selection on **both extheme ends of plenotypes**, eliminate the intermediate forms →one population divided into two distinct groups
* when individuals at the outer ends of the curve have higher fitness than individuals near the middle of curve
* Ex. When in the environment contains less medium sized seeds,bird with small/large beaks have higher fitness
* **Genetic drift**: Random genetic change in small populations, alleles can become more/less common simply by chance
* random change in allele freauency
* small population
* indiuduals with particular allele may have more descendants than other indiuduals, just by chance
* over time, a series of chance occurences can cause an allele to become more/less common in a population

1. **Genetic bottlenecks effect**

* Ex: a disaster may kill many indiuduals in a population and the surviving’s gene pool contain different allele frequencies from original gene pool
* a change in allele frequency following a dramatic reduction in size of popalation
* due to change in environment (disaster/ disease)
* only a small portion of population survived, leading to change in allele frequency

1. **The founder effect**

* change in allele frequency that may occur when a few indiuduals from a population migrate to and colonize a now habitat
* due to migration of a small subgroup of population
* a few individuals become isolated from a larger populaton and establish a new population
* now population 's allele frequency is different from the original population's
* when a populaton is in genetic equilibium/no evolution→allele frequencies remain constant
* **meiosis & fertillzation do not change allele frequency** as they do not produce new alleles nor selecting on the alleles. They only create different combinations of alleles
* **Hardy-weinburg Principle**
* 5 conditions reauired for genetic equilibrium: ① Large population ② No mutation ③ No sexual selection (Random mating) ④ No migration ⑤ No natural selection
* p+q=1; (p+q)^2=1; p^2+2pq+q^2=1
* p=frequency of dominant allele A; q=frequency of recessive allele a; p^2=frequency of genotype AA; q^2= frequency of genotype aa; 2pq= frequency of genotype Aa