

Genetic drift also known as allelic drift or the Severall Wright effect is the change in the frequency of an existing gene variant (allele) in a population due to random sampling of organisms. The alleles in the offspring are a sample of those in the parents and chance has a role in determining whether a given individual survives and reproduces.

A population's allele frequency is the fraction of the copies of one gene that share a particular form. Genetic drift may cause gene variants to disappear completely and thereby reduce genetic variations. It can also cause some alleles to become much more frequent and even fixed. When there are few copies of an allele, the effect of genetic drift is larger and when there are many copies the effect is smaller. Although genetic drift happens in populations of all sizes its effects tend to be stronger in small populations.

Genetic Drift Examples:

- American Bison was once hunted to such an extent that it became endangered. The population which have recovered today shows very little genetic variations.
- A couple with brown and blue eyes have children with brown or blue eyes. Even if there is a 50% chance of having blue eyes, brown eyes being the dominant allele, all children might have brown eyes in the future generations as a matter of chance.

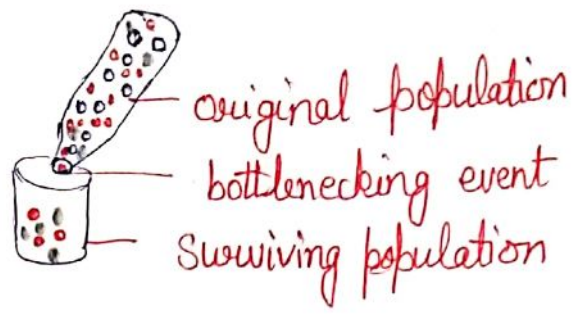
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Thus, genetic drift unlike natural selection does not take into account an allele's benefit (or harm) to the individual that carries it. That is, a beneficial allele may be lost, or a slightly harmful allele may become fixed purely by chance.

THE BOTTLENECK EFFECT:-

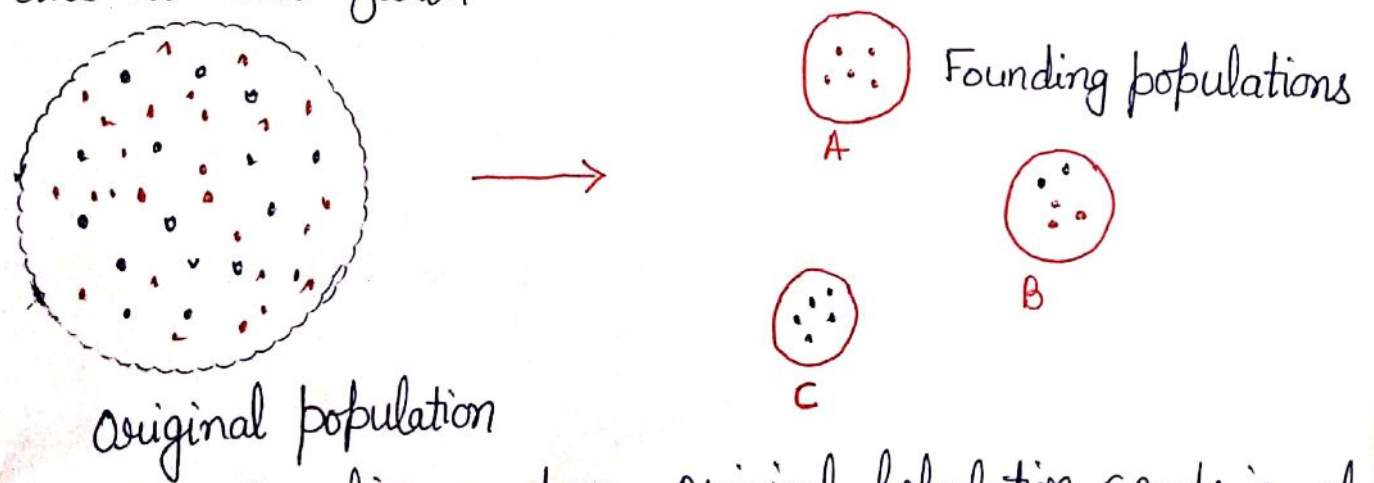
The bottleneck effect is an extreme example of genetic drift that happens when the size of a population is severely reduced. Natural disasters like earthquakes, floods, fires etc. can decimate a population, killing most individuals and leaving behind a small, random assortment of survivors. The allele frequencies in this group may be very different from those of the population prior to the event and some alleles may be missing entirely. The smaller population will also be more susceptible to the effects of genetic drift for generations (until its numbers return to normal), potentially causing even more alleles to be lost.

Bottleneck effect reduces genetic diversity. This can be explained as; imagine a bottle filled with marbles, where the marbles represent the individuals in a population. If a bottleneck effect occurs, a small random assortment of individuals survive the event and pass through the bottleneck (into the cup) while the vast majority of the population is killed off (remains in the bottle). The genetic composition of the random survivors is now the genetic composition of the entire population. eg. Elephant seals recently experienced a population bottleneck caused by humans



THE FOUNDER EFFECT:-

The Founder effect is another example of drift, one that occurs when a small group of individuals, breaks off from a larger population to establish a colony. The new colony is isolated from the original population, and the founding individuals may not represent the full genetic diversity of the original population. That is, alleles in the founding population may be present at different frequencies than in the original population and some alleles may be missing altogether. There is a difference between bottleneck effect and founder effect as bottle neck effect occurs as a result of catastrophe and founder effect due to colonization.



On the figure above, original population comprise of red and blue circles. Random groups that depart to establish new colonies are likely to contain different frequencies of blue and red circles than the original population.

(4)

So, the allele frequencies in the colonies may be different relative to the original population. Also, the small size of new colonies means they will experience strong genetic drift for generations.

ROLE OF GENETIC DRIFT IN EVOLUTION :

- Affects the genetic makeup of the population.
- Allele fixing.
- Decreases gene diversity.
- Produces a new population genetically distinct from its original population.
- Play a role in the evolution of new species.
- It causes non-adaptive evolution.