

← Non-adaptive evolutionary events: sampling effects

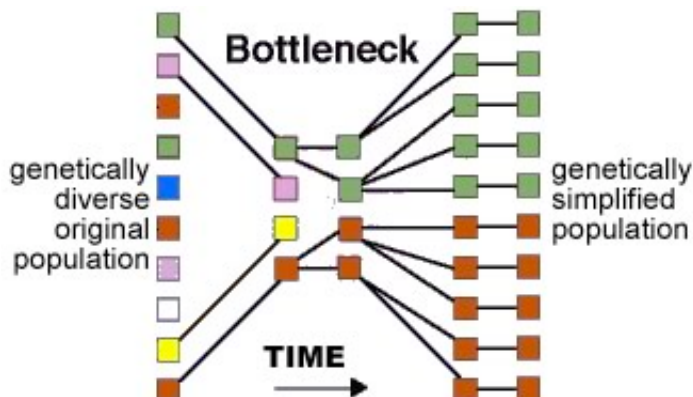
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Non-adaptive evolutionary mechanisms.

You might think that all evolutionary processes are by their very nature adaptive, but that is not the case.

Accidents can "select" a small subset of organisms from the larger population.

Founder effects and evolutionary bottlenecks occur when a new population is based on a small, randomly selected group of individuals.



The **founder effect** applies when a small group of individuals first colonizes a new and isolated territory, such as an island

An **evolutionary bottleneck** occurs when some disaster or disease reduces a once large population to a small one very quickly.

The original, large population is likely to have had a large and diverse set of alleles within it. The smaller founder/post-bottleneck populations will often have, by chance, a less diverse set of alleles.

it is possible that alleles that were rare in the original population are common in the founder/post-bottleneck population.

These traits may or may not be adaptive in the new environment; in some cases they can be detrimental, and mutation and natural selection will then work to eliminate them or ameliorate their effects.

There is strong evidence for an evolutionary bottleneck during the course of [human evolution](#).

Once a population is small, the effects of **genetic drift** can become quite profound. This is due to sampling of the population, independent of the effects of selection. You can see these effects using the [java genetic drift applet](#).

Run the applet → [Java Genetic Drift applet](#)

In the applet population, there is no selection, just sampling effects.

These non-selective, sampling-based effects are one reason that it can be difficult to determine whether a particular trait is adaptive or not. It really depends upon the history of the population.

The end result of founder effects, bottlenecks, and **genetic drift** is that certain traits can be over-

represented by chance.

**Here's a
Question!**

- Based on the Java Genetic Drift applet - is it possible for an allele to go from 5% to 100% of the population simply by genetic drift?
- Is it possible for a genetic bottleneck to lead to a population with a higher frequency of a deleterious trait than was present in the population before the bottleneck? How does this occur
- What limits the "size" of the founder effect or a bottleneck effect?
- Assume that all members of a population that pass through a bottleneck have a deleterious trait; can the population survive and, if so, how would selection act on the population after the bottleneck?



Use [Wikipedia](#) | revised 25-Aug-2008