What is the Difference Between Founder Effect and Bottleneck Effect

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The **main difference** between Founder effect and bottleneck effect is

- that **founder effect describes the loss of genetic variation due to the establishment of a new population by a very small number of individuals from a large population whereas**
- **bottleneck effect describes the decrease of genetic variation due to a sharp reduction in the population size by environmental events such as droughts, floods, fires, earthquakes, diseases, etc.** Furthermore, the Founder effect is one origin of the bottleneck effect, while the bottleneck effect can have different origins.

Founder effect and bottleneck effect are two types of genetic drift in which random events eliminate genes from a population. Generally, genetic drift causes big losses in genetic variation.

What is Founder Effect

The founder effect is one of the two types of genetic drift. Generally, it occurs due to the migration of a very few individuals from the main population. Then, these individuals inbreed to produce a new colony with two main characteristics. They are the reduced genetic variation in comparison to the original population and the presence of a non-random sample of genes of the original population. The new population is different from the original population by means of genotypes as well as phenotypes. Therefore, in extreme cases, the founder effect leads to speciation.

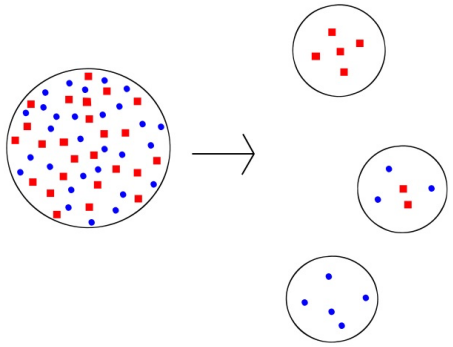


Figure 1: Founder Effect

Furthermore, the new population may carry rare alleles of the original population at high frequencies. For example, Huntington's Disease becomes more common among the Afrikaner of South Africa than in most other populations. Usually, the Afrikaner population is descended from few colonists of the original Dutch population.

What is the Bottleneck Effect

The bottleneck effect is the second type of genetic drift, occurring due to a rapid decrease in the size of an original population. Generally, environmental events such as fires, earthquakes, floods, droughts, diseases, etc. are responsible for the bottleneck effect. Human activities, such as genocide can cause a bottleneck effect as well. Significantly, this reduces the variation in the gene pool with the emergence of a small population with a smaller genetic diversity. However, genetic diversity can only increase through gene flow from another population.

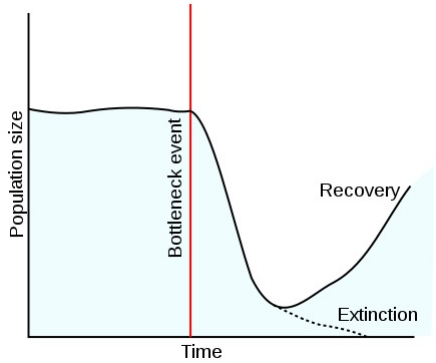


Figure 2: Bottleneck Effect

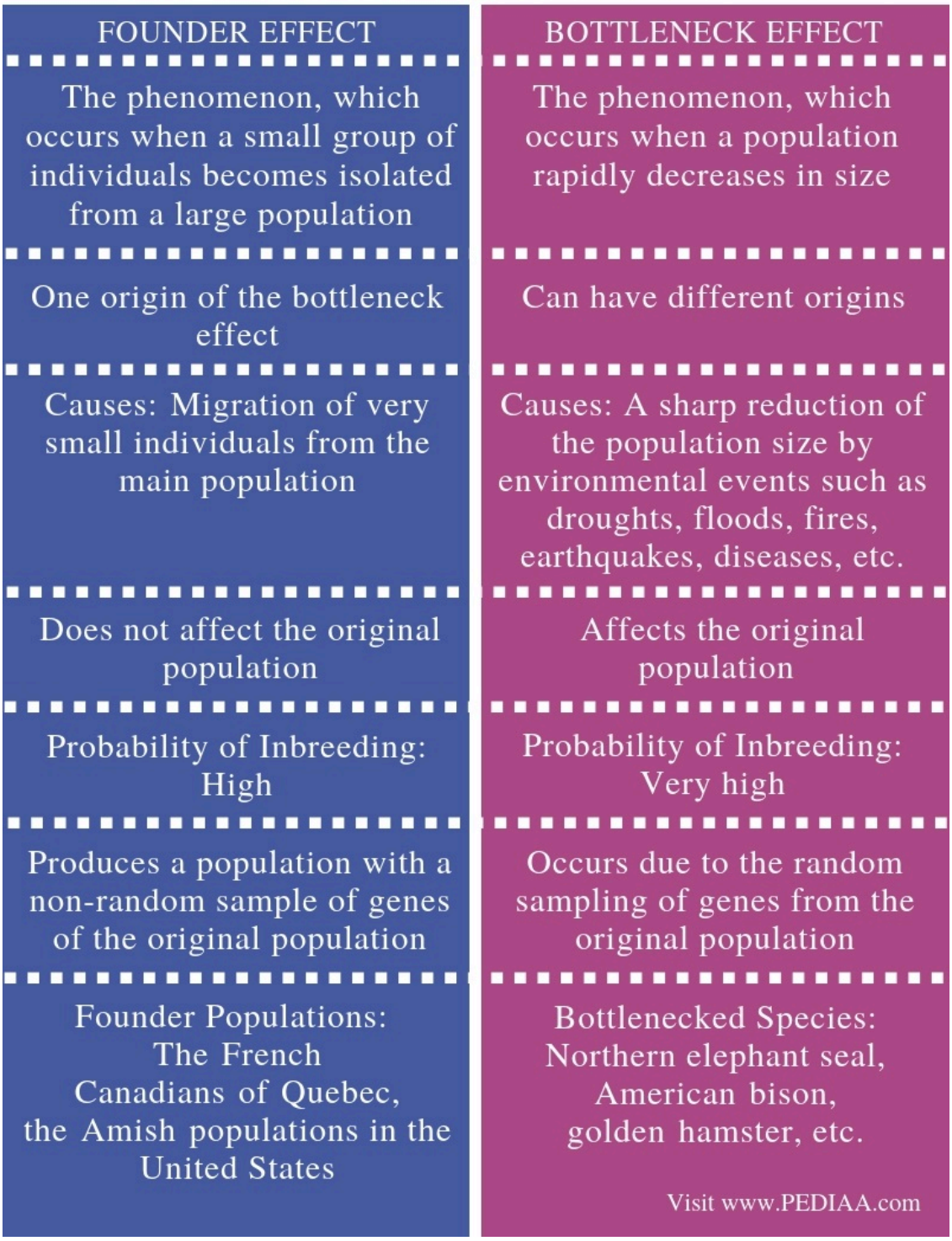
Moreover, as an example, hunting reduced the population size of northern elephant seals at the end of the 19th century. However, they have increased the size of their population to over 30,000 in the present. Besides, they show a much less genetic variation in comparison to that of the southern elephant seal population.

Similarities Between Founder Effect and Bottleneck Effect

- Founder effect and bottleneck effect are the two types of genetic drift.
- Both reduce the genetic variation of a particular population in the form of the allelic frequency reduction.
- After undergoing these types of genetic drifts, the population increases in size through inbreeding.
- Both of them cause speciation.

Difference Between Founder Effect and Bottleneck Effect

FOUNDER EFFECT VERSUS BOTTLENECK EFFECT



Founder effect refers to the phenomenon which occurs when a small group of individuals becomes isolated from a large population while the bottleneck effect refers to the phenomenon which occurs when a population rapidly decreases in size.

Correspondence

The founder effect is one origin of the bottleneck effect, while the bottleneck effect can have different origins.

Causes

Migration of very small individuals from the main population causes founder effect while a sharp reduction of the population size by environmental events such as droughts, floods, fires, earthquakes, diseases, etc. causes bottleneck effect.

Effect on the Main Population
The founder effect does not affect the original population, while the bottleneck effect affects the original population.

Probability of Inbreeding
The probability of inbreeding is high in founder effect while the probability of inbreeding is very high in the bottleneck effect.

Gene Pool
Moreover, the Founder effect produces a population with a non-random sample of genes of the original population while the bottleneck effect occurs due to the random sampling of genes from the original population.

Examples
The French Canadians of Quebec and the Amish populations in the United States are two examples of founder populations while northern elephant seal, American bison, golden hamster, etc. are bottlenecked species.

Conclusion
The founder effect is one of the two types of genetic drift, causing the reduction of genetic variation due to the migration of very few individuals from the main population. Generally, it is one of the many origins of the bottleneck effect. In contrast, the bottleneck effect is the second type of genetic drift, causing the reduction of genetic variation due to a sharp reduction of population size by an environmental event such as earthquakes, fires, floods, etc. Significantly, genetic drift reduced the allele frequency of a population. However, the main difference between the Founder effect and bottleneck effect is the cause of the reduction of genetic variation.

References:
1. "Bottlenecks and Founder Effects." *Understanding Evolution*, Available Here.

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