E-Content

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"Directional Selection"

In directional selection, the population changes towards one particular direction along with the change in environment. This produces more and more adapted individuals in the population. Selection process favours individuals that are best adapted to new situations or to new ecological opportunities. Such selection is said to be directional since the norm for the population is shifted with time in one direction.

In a changing environment, average individuals (modal phenotypes) may not be the fit members of the population. Under such a situation, directional selection occurs and the population mean shifts toward a new phenotype (Figure1) that is better adapted to the altered environment. Directional selection occurs most often under environmental changes and when populations migrate to new areas with different environmental pressures. Directional selection allows for fast changes in allele frequency, and plays a major role in speciation.

In population genetics, directional selection, is a mode of natural selection in which an extreme phenotype is favoured over other phenotypes, causing the allele frequency to shift over time in the direction of that phenotype. Under directional selection, the advantageous allele increases as a consequence of differences in survival and reproduction among different phenotypes. The increases are independent of the dominance of the allele, and even if the allele is recessive, it will eventually become fixed.

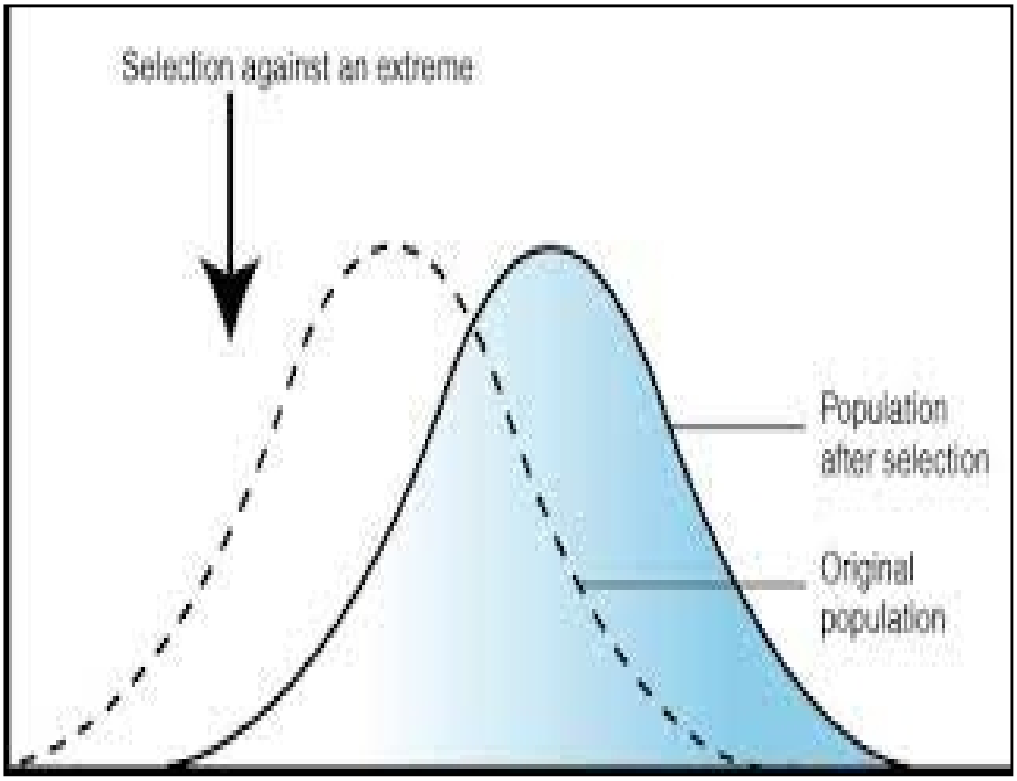

Figure 1: Graphical presentation of the Directional selection

Examples of Directional Selection:

Industrial melanisms

Directional selection can be demonstrated in Industrial melanisms in many species of moths. The peppered moth, *Biston betularia* is a normal lightly pigmented form and its melanic (darkly pigmented variant) form is *Biston carbonaria.* These two species of the genus *Biston* are different due to a single gene. The 'dark gene' is dominant. Since, the middle of the last century, the melanic forms have been widespread in the industrial areas where the vegetation became blackened due to pollution. In polluted regions, the normal light forms have been replaced by melanic forms. But in non-polluted regions, the normal light forms are still present. Predation of the moths by birds is the chief selective which promoted industrial melanism. The melanic forms are protectively coloured on polluted blackened vegetation.

They become prominent in non-polluted regions, where the light forms well protected.

Darwin's Finches

Also known as Galapagos finches, these little birds were of particular interest to Darwin while he was on his famous discovery expedition. Darwin noticed that the species on different islands where remarkably varied, while undeniably coming from the same source. In recent years, scientist Peter and Rosemary Grant have been studying the finches. In the past thirty years, they have witness all sorts of selection on the finches and the evolution that ensued. In one very drastic example of directional selection the Grants observed as birds with larger beaks were selected for, after only one season of an extremely drastic form of directional selection.

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