

E-Content

entitled

“Disruptive Selection”

Disruptive selection occurs when the extreme values have the highest fitness and the intermediate values are relatively disadvantageous in terms of reproductive effectiveness.

It promotes diversification in living organism. If a previously homogeneous habitat becomes diversified, the interactions between biotic populations and their environment diverge from one other. This initiates the process of adaptive radiation. Evolution of reproductive barriers to make the diverging lines genetically separate will ultimately lead to the permanency of such divergence.

Disruptive selection is inferred to oftentimes lead to sympatric speciation through a phyletic gradualism mode of evolution. Disruptive selection can be caused or influenced by multiple factors and also have multiple outcomes, in addition to speciation. Individuals within the same environment can develop a preference for extremes of a trait, against the intermediate. Selection can act on having divergent body morphologies in accessing food, such as beak and dental structure. It is seen that often this is more prevalent in environments where there is not a wide clinal range of resources, causing heterozygote disadvantage or selection against the average.

Niche partitioning allows for selection of differential patterns of resource usage, which can drive speciation. To the contrast, niche conservatism pulls individuals toward ancestral ecological traits in an evolutionary tug-of-war. Also, nature tends to have a 'jump on the bandwagon' perspective when something beneficial is found. This can lead to the opposite occurring with disruptive selection eventually selecting against the average; when everyone starts taking advantage

of that resource it will become depleted and the extremes will be favoured. (Figure 1)

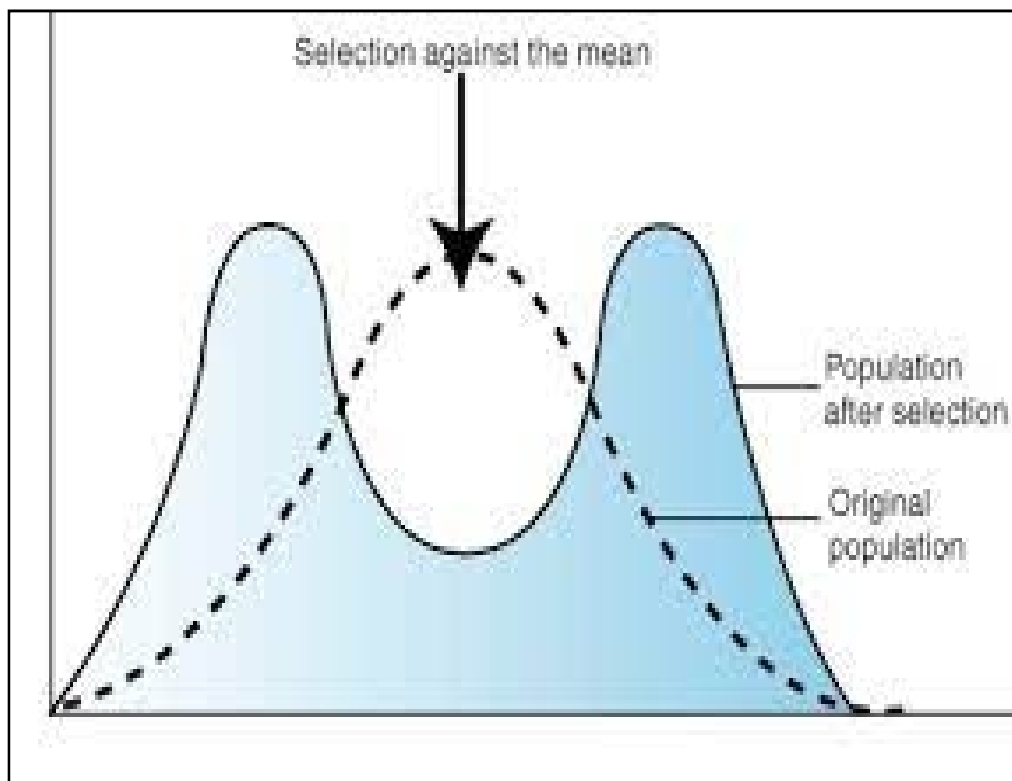


Figure 1: Graphical presentation of the Disruptive selection

Examples of Disruptive Selection

Shell patterns of limpets (marine molluscs) forms a continuum ranging from pure white or dark tan. Limpets typically dwell in one of the two distinct habits, attaching either to white goose-neck barnacles or to tan-coloured rocks. As might be expected, the light-coloured limpets seek the protection the protection of white barnacles, whereas tan limpets live by choice almost exclusively on the dark rocks. Limpets of intermediate shell pattern are conspicuous and are intensively selected against by predatory shore birds. If this disruptive type of selection (favouring the extremes) were to be accompanied by the sexual isolation of the two types of limpets, then two new species could arise.

Disruptive selection is one mechanism that produces and maintains polymorphisms, such as the green-brown colour polymorphisms of many insects. For instance, some butterflies (commonly called "leaf butterflies") mimic leaves; one population may contain both green and brown animals, with the former matching living leaves and the latter dead ones. Through appropriate behaviour and selection of matching resting sites, each colour morph enjoys a relatively high fitness; in contrast, a butterfly intermediate between green and brown would presumably match its surroundings less well and thus have a considerably lower fitness.

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