3.11: Variation, selection, and speciation

Darwin and Wallace’s breakthrough conclusion was that genetic variation within a population would lead to altered reproductive success among the members of that population. Some genotypes, and the alleles of genes they contain, would become more common within subsequent generations because the individuals that contained them would reproduce more successfully. Other alleles and genotypes would become less common, or disappear altogether. The effects of specific alleles on an organism’s reproductive success will, of course, be influenced by the rest of the organism’s genotype, its structure and behaviors, both selectable traits, and its environment. While some alleles can have a strong positive or negative impact on reproductive success, the effects of most alleles are subtle, assuming they produce any noticeable phenotypic effects at all. A strong positive effect will increase the frequency of the allele (and genotype) associated with it in future generations, while a strong negative effect can lead to the allele disappearing altogether from the population. An allele that increases the probability of death before reproductive age is likely to be strongly selected against, whereas an allele that has only modest effects on the number of offspring an organism produces will be selected for (or against) more weakly.

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