Genetic Load Encyclopedia Article

Genetic Load

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Genetic Load

Genetic load is defined as the decrease in capacity for survival of the average individual in a population due to the presence of deleterious genes in the **gene pool**. The process of **mutation** generates detrimental mutant genes, lowers **fitness**, and creates the genetic load.

A fundamental misconception is that most of the individuals in a normal population do not carry genes for genetic diseases. In reality, because **evolution** has for millions of years selected for perfection of performance, most changes or mutations are less effective than the original **gene** copy. The chance of having an abnormal copy, or mutation, of any one particular gene is low, but because humans have so many genes, some harmful ones are always carried. Humans, for example, can have some 2500 genes which, when defective, cause genetic diseases. The deleterious genetic mutations are often hidden because there is a good copy of the gene, which produces a normal protein. When a person has two different copies of a gene, that person is are said to be heterozygous for that particular gene. If the other gene functionally hides one of the gene copies, the hidden copy is described as being recessive. If both copies of the gene are the same then the person is homozygous for that characteristic. If the homozygous trait is deleterious then the gene product will not function properly and the individual will be in some way less healthy than an individual who is heterozygous for the genetic trait.

If the deleterious trait is vital to life, than death or a debilitating disease can result. However, more often, the deleterious genes will into be so severe as to be selected out. Their persistence leads to genetic load. It is the frequency of these problems, rather than the number of different problems, that is the true indicator of genetic health in a population.

Increased homozygosity can result from inbreeding—mating between related individuals. Persistent **inbreeding** reduces variation among offspring and increases the likelihood that any one gene will become homozygous. In contrast, crossbreeding maximizes heterozygosity and improves the hardiness and genetic health of the population. This is referred to as **hybrid** vigor.