LS1201

Introduction to Biology II

Assignment-1

Why do you think it is important to study genetics?

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April 26, 2022

Genetics is one of the most important branches of biology that deals with heredity and variations in living beings. The importance of genetics was apparent from prehistoric times, when crops, plants and animals were chosen through selective breeding, which is the process of breeding plants and animals for specific genetic traits. Genes relate to the areas within the DNA, a molecule that comprises of a chain of four different kinds of nucleotides. The arrangement of these nucleotides defines the genetic information for the living organism. The nucleotide sequence is interpreted by cells to create a chain of amino acids that produce proteins. The gene code is nothing but the association between the nucleotide sequence and the amino acid series.

Genes are the instructions inside each of your cells. They control how we look and how our body works. Since everyone has slightly different genes, everyone has a different set of instructions. Genes are one reason why we are unique! The study of genetics is essential because it helps scientists identify and understand diseases. By gaining a deeper understanding of the body, scientists can determine how likely members of the population are to inherit illness and help people manage their risks accordingly. Around nine in 10 diseases arise because of genetic susceptibility. With the study of genetics, it is possible to predict some of them and reduce the risks. Although scientists do not entirely understand all genetic determinants of disease, research helps them reveal more information, giving them a chance to allocate more effective medications and treatments.

There are two major crucial fields where genetics plays a very important role:

1. *Genetic Engineering*: Continual improvement in the field of genetic research has helped us in better productivity of plants for consumption, for instance corn, rice, maize and wheat. We are able to harness better quality seeds and invest in hybrid varieties of plants for better quality food produce. Genetic modification is an emerging field where there is a direct human treatment of an organism's genetic makeup in a way that is not naturally occurring. It also makes use of recombinant DNA technique (a form of artificial DNA that is made by combining two or more sequences that do not happen together under natural circumstances). Organisms that are created in this manner are known to be genetically modified organisms. For example, there are crops that are administered a gene from Arctic fish, so that the plant cannot be affected from frost damage.

2. *Gene Therapy*: Gene therapy has been found to immensely helpful to treat various diseases by inserting a gene into an individual's cells. This has been found to be quite productive in treating various forms of cancers, where harmful mutant alleles have been replaced with functional cells. Gene therapy is still going through a lot of research and development though scientists have initiated the therapy for treating diseases that arise due to single-gene problems like sickle cell anemia, cystic fibrosis, muscular dystrophy etc. It has also been found useful for treating genetic disease like Down's syndrome and PKU and for the manufacture of Human Growth Hormone as a treatment option for dwarfism.