Dna the master code for all living things

Bacteria, zebras, mosquitoes, anacondas, essentially all living things have one thing in common which makes them what they are. It is DNA. It is one of the greatest biological discoveries in the history of mankind. It is not only related to biology but is tied to the study of chemistry as well because of the convoluted molecular structure. DNA is short for the molecule deoxyribonucleic acid. RNA or ribonucleic acid is another nucleic acid derived from DNA and used as a template to make proteins, the product of the genetic code.

In an article, “ What is DNA? ” written by James Randerson, DNA is described as, “... he master code for life ... the instruction book that each organism uses to run its body and govern its behavior, a book that each creature hands on to its offspring, either in full or in part. ” In other words it describes how at times not the whole book (DNA) is passed down from parent to progeny. A father and mother both contribute their DNA making the son similar but not identical to his father and mother. Also, because DNA stores all genetic information including diseases, which can be passed down from generation to generation. These diseases are the effect of a mutation in the DNA structure.

In 1868, a Swiss physician and biologist extracted a phosphorus containing substance. He called it nuclein because he found it in the nuclei of several cells. He managed to extract this substance from discarded surgical bandages, specifically by examining the pus cells (pus cells are white blood cells). James Watson, an American geneticist, and Francis Crick, a British physicist studying in the University of Cambridge, began examining x-ray

images made by Rosalind Franklin and Maurice Wilkins. In 1953, James and Francis constructed the first three-dimensional model of the DNA structure.

The model showed all nitrogenous bases, pentoses (sugar), and phosphate groups. Several years later, James Watson, Francis Crick, and Maurice Wilkins received the Nobel Prize for Physiology or Medicine. Before the three-dimensional model, Erwin Chargaff discovered a pattern between the base pairs. He discovered that the amount of adenine is the same amount of thymine. the same is true for the other base pair guanine and cytosine. Chargaff’s discovery led him to understand the basic pairing rules. You might wonder what makes our DNA different from the DNA of a sheep, sea urchin, or a turtle.

Based on the studies of Chargaff and the rest of his colleagues at Columbia University, the four nitrogenous bases occur in different ratios in the DNAs of different organisms and that the bases have a numerical relationship. For example, The base composition (mol percentage) of Homo Sapiens is 30. 9 % adenine, 19. 9% guanine, 19. 8% cytosine, and 29. 4% thymine. This shows that Chargaff’s study was very helpful for James Watson and Francis Crick’s three-dimensional model of a DNA molecule. I chose to research DNA because it is a very interesting topic to discuss.

It makes me who I am, my hair, eye, and skin color, my height and weight, overallhealth, metabolism, etc. I find both biology and chemistry my favorite subjects and DNA because it is a key molecuel that defines health. In the future I plan to become a M. D. (MedicalDoctor). I will definitely have to be familiar with this molecule and what DNA sequences mean in case I needed

to diagnose a patient with a certain genetic disease. By examining his or her genetic code I could determine possible diseases. I really enjoy any type of problem solving. I could utilize this knowledge to explore disease in my ownfamily, specifically my dad’s side.

From my grandfather to my own father and uncles, everyone has minor cardiovascular diseases caused by high cholesterol. I want to discover what mutation in my family’s DNA that causes this condition and develop treatments to improve their health. DNA molecules are located in the nucleus of a cell. When they are tightly packed together they are known as chromosomes. The structure of DNA is very complicated. DNA is a double helix molecule. The structure looks like a twisted ladder. A double helix is the molecular structure created from double-stranded molecules of nucleic acids held together by hy drogen bonding between nucleotides.

Nucleotides contain three characteristic components: (1) a nitrogenous base, (2) a pentose (sugar), and (3) phosphate group. Four nitrogenous bases make up DNAs support of the double helix: adenine (A), guanine (G), cytosine (C), and thymine (T). These bases are split into two groups. (A) and (G) are in the purine base group and (C) and (T) are in the pyrimidine base groups. In the structure of DNA base pairs are formed between the four bases. A base pair is when two nitrogenous bases (a purine to a pyrimidine or vice versa) are linked by weak hydrogen bonds.

Adenine (A) and thymine (T) form a base pair and guanine (G) and cytosine C) form a base pair. In the structure of DNA (A) and (T) are held together by two hydrogen bonds, while (C) and (G) are held together by three hydrogen

bonds. The next components of DNA form the backbone of the two spiraling strands. The backbones consist of alternating phosphate and pentose (sugar). Two kinds of pentoses are found in nucleic acids, deoxyribose and ribose. Deoxyribose is basically the same as ribose but it has one less oxygen atom in it’s structure. The phosphate group is connected to the pentose (deoxyribose or ribose) on the backbone of the DNA structure.

They are both held together by covalent bonds. The pentose is also connected to the nitrogenous base. When a pentose (sugar) and a base combine it is called a nucleoside. An example of a nucleoside, is when the base thymine bonds with the pentose (sugar) deoxyribose, deoxythymidine forms. The nucleoside then combines with the phosphate to make the nucleoside a nucleotide. In the article “ How DNA Works,” Craig Freudenrich explains how the “ hydrogen bonds between phosphates cause the DNA strand to twist.

The nitrogenous bases point inward on the ladder and form pairs with bases on the other side. This makes DNA look somewhat like a spiraling staircase. DNA functions to store the complete genetic information required to specify the structure of all the proteins of each species of organism, to program in time and space the orderly biosynthesis (the process of converting simple nutrients like: sugars, lipids, and amino acids into complex products like, proteins and vitamins) that make cell and tissue, and organs which determine the activities of an organism throughout its life cycle, and determine the distinctiveness of the given organism.

DNA also has another function. It is meant to be replicated so copies can be passed down from cell to cell and generation to generation. The National Human Genome Research Institute describes the transfer occurs “ In sexual reproduction, organisms inherit half of their nuclear DNA from the male parent and half from the female parent. However, organisms inherit all of their mitochondrial DNA from the mother. This occurs because only egg cells, and not sperm cells, keep their mitochondria during fertilization.

To complete these instructions, DNA sequences are transcribed into messages made of RNA and ultimately translated into sequences of amino acids to produce proteins. DNA genetic information is composed of specific long sequences of A, T, G, and C. The process begins with the sequences being transferred to a single strand RNA molecule. RNA is only slightly different from DNA. The important difference between them is that one of the pyrimidine bases are not the same. Thymine is a principal pyrimidine in DNA, while uracil is a principal pyrimidine in RNA.

The new RNA (mRNA) molecule is a messenger containing transcribed code from the DNA molecule. The mRNA travels out of the nucleus into the cytoplasm. According to The National Human Genome Research Institute, in the cytoplasm “ the information contained in the mRNA molecule is translated into the “ language” of amino acids, which are the building blocks of proteins. This language tells the cell's protein-making machinery the precise order in which to link the amino acids to produce a specific protein.

This is a major task because there are 20 types of amino acids, which can be placed in many different orders to form a wide variety of proteins. ” Proteins

do most of the work in our bodies; they move molecules in our bodies, they help us move by making our muscles, they help create our immune system that helps protect from any infections in our body or illnesses, and much more. DNA is one of the greatest discoveries my man. It was not discovered by a singlehuman beingbut several. DNA is what makes a female human to give birth to a baby girl not to a baby giraffe or cub.

DNA is passed down from generation to generation by sexual reproduction. Half of the father’s genes and half of the mother’s go to their son or daughter. Your DNA is not the same as your brother’s because sometimes you get more from your mom’s side or more from your dad’s side, it all depends. It is extraordinary how we are made from a string of DNA molecules that construct our body and make us who we are. DNA is now at a point where we use it for many reasons, not just for research. DNA forensics is one of the most practical ways of using DNA.

Forensics is the application of many sciences to discover aspects about a crime. A government website describing DNA forensics, lists many examples of DNA uses for Forensic Identification. They include: “ identification of potential suspects whose DNA may match evidence left at crime scenes; exoneration of persons wrongly accused of crimes; identification of crime and catastrophe victims; establishment of paternity and other family relationships; identification of endangered and protected species as an aid to wildlife officials (could be used for prosecuting poachers); detection of acteria and other organisms that may pollute air, water, soil, andfood; Matching organ donors with recipients in transplant programs; determination of pedigree for seed or livestock breeds; and authentication of consumables

such as caviar and wine. ” It is great that DNA has been incorporated into forensics. Hopefully, in the near future, DNA technologies will be incorporated in a variety of other applications.