Dna: characteristics, history and the importance to forensic science

Science, Genetics

DNA is deoxyribonucleic acid, a self-replicating material which is present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.

History of DNA

It is a common rumour that Francis Crick and James Watson first discovered the concept and molecule that we know as DNA in the 1950's. However, DNA was actually discovered many years before! It was actually by using the work of the pioneers before them that Francis and James were able to come to their cutting-edge conclusion about the configuration of DNA in the year 1953. Around the 1850's Gregor Mendel was the first person to open up a pathway towards the discovery of DNA. In 1857 Mendel conducted an experiment using plants, this is the time when he first discovered the mysterious particle as we know as DNA. Soon after this experiment occurred many other scientists started to research and discover the miraculous new substance of DNA. DNA was then recognised by a Swiss chemist, Johann Friedrich Miescher in the 1860's. Miescher started to research the important components of white blood cells. Johann carried out more and more experiments using salt solutions to further understand white blood cells and what they are made of. Johann once noticed that when he added acid to a mixture of the cells, one substance was divided from the rest of the solution. This same component dissolved once again when the substance alkali was added into it. When he started to investigate this certain substance, he soon realised that it had surprising properties which were different to the other types of proteins in which he was already familiar with. Johann Friedrich Miescher called this suspicious element ' Nuclein' since he had believed that

it had come from the nucleus cell. However, what Johann didn't know, was that he had discovered the molecular basis of all life... DNA! Soon enough, he started to configure ways remove it in its pure form.

People that have contributed to the discovery of DNA

Mendel – First discovered the actual substance of DNA and started the DNA topic and research for what the material actually was.

Johann Friedrich Miescher and Richard Altmann – In 1869 Miescher revealed a material he named " Nuclein". Later on, he isolated an unpolluted and pure sample of the substance currently known as DNA. He found this from the sperm of salmon and in 1889 his apprentice, Richard Altmann, called it " nucleic acid".

Frederick Griffith – In 1928, Frederick was working on a project that produced the base that " DNA was the molecule of inheritance".

Oswald Avery – Oswald continued with Frederick's experiment roughly a decade later to see what " The Inheritance Molecule" was. In the experiment he conducted, he demolished the lipids, ribonucleic acids, carbohydrates, and proteins of the virulent pneumonia.

Phoebus Levene – In 1929, Levene displayed that the components of DNA were linked together in the order phosphate-sugar-base. He proposed that these formed a " back bone" of the particle.

Erwin Chargaff and Chargaff's rule – Around the 1940's, Erwin discovered the pattern in the measurements/amounts of the previous four bases which were

discovered. These were guanine, thymine, cytosine and adenine. He took testers of DNA of various cells that differed, and shortly determined the pattern! This pattern is known today as Chargaff's rule.

Rosalind Franklin and Maurice Wilkins – Later on, Franklin and Wilkins attempted to create a crystal made up of DNA. To understand how DNA worked, both scientists wanted to take pictures using an x-ray to get a further understanding of what DNA was. Both Franklin and Wilkin were successful and discovered an x-ray pattern in the DNA. They found out that the molecule, DNA, had a " helix shape".

James Watson and Francis Crick – Watson and Crick, in 1953, started to attempt to put a model together which was DNA. To make this model they had to use the previous scientists (Rosalind Franklin and Maurice Wilkins) x-ray discovery to help guide them to make their own model. The model that these two created has not been changed since 1953.

Alec Jeffreys – A few years later in 1984, DNA profiling was created by Jefferys. It was first used in 1988 in a murder case, in England, which then started the further research of DNA.

Accuracy of DNA

Accurate definition in relation to testing DNA: " The process being described is free from mistakes: this exemption arising from carefulness; exact conformity to truth, or to a rule or model; exactness; nicety; correctness".

According to the Australian Government, the accuracy of DNA testing depends on a number of factors, " including the quantity and quality of the

sample analysed and the laboratory equipment or technique in analysing the sample". Quality refers to measures to help make sure that each and every DNA examination result/s meets a compulsory customary quality. Quality refers to observing, confirming and recording. Lawyers and juries normally believe that DNA evidence is very reliable, however, a poll that was put up in 2005 found out that 58 percent of people in the world consider DNA to be " extremely reliable." But truthfully, DNA evidence is greatly less reliable than what most people around the world believe.

The importance of DNA to forensic science

The effect of the discovery of DNA in scientific discoveries has definitely influenced science today, it has 100% helped scientists and forensic scientists to discover many new things to help solve cases, find genes, identification and much more. The discovery of the mysterious and amazing DNA has made many impacts in the forensic science field has meant that the innocence or guilt of a suspect or person who is being examined and explored for a crime, can be determined using this discovery. Not only suspects, but also victims. For example; a person has just been kidnapped and there was only one witness. This witness saw the person being taken in a truck and reported it to the police immediately. The police came to the scene and saw that a beanie in which the victim was wearing fell off and there were finger prints all over it. Using this beanie and DNA, the forensic scientists and detectives and determine who the victim is, where they live, who they are, who the culprit is and lots of information that you would never guess someone would know about you using your DNA. DNA has been important in transforming the whole, entire field of forensic science.