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### The DNA technology

Human beings have the ambition to discover everything in this world so they are lured by curiosity to research the world. They want to research medical, biological, social sciences and also the human body. In ancient periods, people were curious to where we came from and what determined the appearance, characteristic, habit of human, animals and plants. At first, some people considered that God chose our appearance, height and personality. But in 1869, a swiss physician called Friedrich Miescher discovered through a substance the transmission of inherited traits from one generation to the next, and it is called Deoxyribonucleic acid(DNA). The first discovery of DNA marked the beginning of DNA technology. Later, in 1970s, scientists first began to clone and sequence DNA ((Clark,214) . People have already made use of DNA technology but they did not realize what it was. People tried to select efficient kinds of plants when they are planting. They usually select some plant which will grow a better quality of fruit. Then they use the seed of these plants and grow new fruits in the second year. They select high quality every years. Many years later, the farmer can harvest very high quality fruits for that year. This was a small use of DNA technology in ancient period even people did not know that it made use of the DNA technology. DNA technology sounds like is quite far away from human beings. But actually DNA technology is wildly used around everyone. The development of DNA technology has made a huge contribution to the medical ,biological and society fields.

# **Biological field**

When we consider the use of DNA in technology, It is most easily to be reminded as from a genetic point of view. In <u>Gene Cloning and DNA Analysis</u>,T.A.Brown writes", The idea that genes reside on chromosomes was proposed by W.Sutton in 1903"(3).When genetics get conveyed, we get our unique personalities, appearances ,body cells, etc. That is the reason why we usually have some similarity to our parents. Sometimes we inherit our mother's eye color, the shape of her nose and her figure. Also we inherit our father's character, height...etc. Even it can be easily recognized that you and your brother have blood relationship, which all of these owe to genetics. On the other side, DNA technology is widely used in medical field especially in transplantation and treatment. In fact, bone marrow transplantation began 20 years ago, and the operation to transplant a kidney is now fairly routine. The first step of transplantation is to carry on genetic comparisons. We can get DNA from patient's blood and bone marrow. In this way, we can minimize the probability of rejection reactions when transplanting an alien organ (Clark 95).

The representative accomplishment could be scientific researcher. The cloning technology has been a heated discussion after cloning sheep Dolly's birth. On Saturday,Feb.22,Dr Ian Wilmut of the Roslin Institute in Edinburgh precipitated a global media frenzy by announcing the results of an experiment in which DNA from the mammary cell of an adult sheep was successfully fused with an unfertilized egg from another sheep, leading to the production of genetically identical copy of the sheep providing the DNA(Wilmut I,1997). Cloning makes full use of DNA technology. "Cloned DNA sequences provide the tools by which many biological

processes can be studied, and our understanding of cell and molecular biology has expanded enormously by their use. Expression of cloned genes has allowed many different pharmaco acrive proteins. For example, insulin, growth hormone, and actor VIII to be produced on a scale and to a purity not seen before. Recombinant DNA technology will become more important pharmaceutic ally as new. Therapeutic protein and peptide molecules are made available.(Miles,1019)". Cloning techniques could provide a vastly improved method of animal husbandry, making it much easier to produce animals capable of generating pharmaceutical substances that can be used to ease human suffering. Cloning could play a role in hastening advancements in cross-species transplantation, or xenotransplantation(Jones,8).

Not only do cloning implementation on animals and human beings, but also on plants. "In 1964, Yuan Longping started his research of hybrid rice, which is based on cloning technology and be apart of DNA molecular hybridization technique"(Clark 95). Human has benefited a lot from hybrid rice because it increases 80% output of rice and famine. It solves out the foodstuff problem over 30 countries of the world. In another way, DNA technology can have effect on species hybridization. Genetic engineering followed by cloning to distribute many identical animals or plants is sometimes seen as a threat to the diversity of nature. The species hybridization can help the loss of biodiversity(David P,8).

#### Social field

There is no doubt that the significance of DNA technology involves in the legal evidence. DNA testing can be used to establish paternity or maternity. Since a child

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inherits information half its chromosomes from its mother and half from its father, its DNA profile should show contributions from both .DNA parental testing can easily prove that if the child is parents' own.

"The paternity testing simulation that is described in this paper is a simple laboratory exercise which effectively illustrates the principles of immunoagglutination ,blood group genetics, DNA profiling and paternity determination. It also illustrates the use of a less expensive, but less definitive, prescreen as a way of keeping the cost of this type of analysis low in at least those cases where the prescreen does provide definitive results. The small extra cost associated with the use of a pre-screen that does not provide definitive results is generally perceived by the students to be worth the potential benefit of substantial savings. The procedure is adaptable to a broad range of skill levels and equipment availability Depending on equipment availability, student skill level, and time available for the exercise, student participation can range from observation of a demonstration to full participation, including preparation of their own solutions and their own goals. Any degree of participation between the two extremes can be accommodated(Rascati, 212-218)".

Also Genetics can help people do a paternity test especially in solving a case. In China, a lot of children are trafficked by crime. The children are sold to remote area even some small village without telephones. Once the police finish with this kinds of criminal cases, the children have already grow up to become adults. Some of the children might change their appearance and lose the memory of their baby period. DNA technique can help parents to distinguish and make sure of their own children. And also can help police to punish the criminals. What's more is that there was a famous event happened in China called " Pornographic Photos". Some famous stars doubt that whether their child is their own. After the paternity test, there is a child truly not his father's own. So his father divorce with his mother. This event is really famous in China.

### In history

DNA is used in periods of long historical work. But how could we use genetic evidence to prove history fact. Here is an example of DNA technology help clarify the mystery of history. Tsarist Russia the last princess Anna whereabouts mystery. The evening of July 17, 1918 the last czar Nicola II a Soviet government secretly shot. Rumours of the Czar youngest daughter, 17 year old Anastasia survived and escaped from the Soviet union. Then there are many people out claiming to be the princess Anna, the most famous is the Anna Anderson. In 1920 in Germany is claimed to be the princess Anna, died because of pneumonia in America. Until 1984, there has been a lot of people -- including the Tsar in foreign friends -" I believe she is Princess Anna". Some experts to believe firmly, for example there is a famous anthropologist in the comparison looks after, testified in court that Anna Anderson must be the princess Anna or his twin, handwriting experts believe that her handwriting and Anna the same. But there are a lot of people think that Anna Anderson is acting brillant cheater, more people survey from its true identity is Poland worker Franziska Ssandsjochska .The answer was found in 1994. Anna Anderson was in the hospital for operation, leaving a section of the intestines as pathological specimens, used it for the identification of DNA, shows that Anna Anderson is

extremely unlikely is princess Anna, and more likely to be Frankie Oscar, we export production(Andrei,2). The DNA technique helps compare two person's DNA to clarify this mystery of history.

In the discovery of species, DNA technology did a lot of contribution to the inventions. Dogs are said to be human's best friend, how long is the relationship between human to dog? After a series of genetics research, scientist use DNA technology to compare dog's mitochondrial DNA to wolf's. Swiss researchers finally proved that, as early as 15000 years ago, the dog's ancestors were living in the territory of eastern Asia. Five or six female wolves have been domesticated by human beings. From then on, people and dogs began to hunt together through the long river of time. As a result, the dog has been feed as pets and friends who accompany us in our daily life (Extraordinary Dogs March 29, 1997).

# In crime

DNA technology in identification of crimes can be another type of legal evidence —Forensic DNA Typing. In criminal cases, DNA typing is used to exclude the possibility that a given suspect left DNA—containing evidence at crime scene." For example, if blood is found at a crime scene, a DNA profile can be generated from the blood and compare with DNA profiles from any suspects"(Kreuzer 408). In using this technology, it is more convenient for involving the legal evidence. "In 1986, a British teenager named Richard Buckland admitted under police questioning that he had raped and murdered 15-year-old Dawn Ashworth in Leicestershire, England. He denied, however, any connection to a three-year-old murder that police were convinced had been committed by the same person. Had this happened just a year or two earlier, Buckland may have gone to prison for one or both murders. But a new technique, called DNA fingerprinting, conclusively demonstrated that semen found at both crime scenes did not belong to Buckland.

Leicestershire police and the United Kingdom's Forensic Science Service conducted a mass DNA screening of local men, looking for a match to the genetic profile of the murderer. They found nothing—until a man was overheard saying that he had given a DNA sample in place of his friend Colin Pitchfork. After Pitchfork was tracked down, he quickly became the first person convicted for murder on the basis of DNA evidence.Until the 1980s, such precise identification of a suspect was unheard of. If someone left a drop of blood at a crime scene, forensic scientists could analyze only the person's blood type plus a few proteins that exist in slightly different versions in different people. But neither of these tests were particularly specific because: many people share blood types and protein markers, making unique identification from a blood stain nearly impossible.

The course of molecular forensics changed in 1984, when geneticist Alec Jeffreys, of the University of Leicester in the United Kingdom, discovered a new type of marker in the human genome. The human genome is the complete set of genetic information for humans (Homo sapiens sapiens). This information is encoded as DNA sequences within the 23 chromosome pairs in cell nuclei and in a small DNA molecule found within individual mitochondria(Wikipedia,1). Jeffreys found that our

DNA contains many noncoding regions in which a sequence of 10 to 100 base pairs is repeated multiple times. Although the sequence is usually the same at each region in all people, the number of times that the sequence is repeated is highly variable among individuals.

Jeffreys immediately saw the potential for forensic use of these markers, which he called "minisatellites." In less than two years, forensic labs across the world could create DNA "fingerprints" of crime suspects by profiling their unique minisatellite makeup. For the first time, forensic scientists could create genetic profiles so specific that the only people who share them are identical twins.

DNA fingerprint techniques evolved subtly over the next several years, until the polymerase chain reaction (PCR), The polymerase chain reaction (PCR) is a biomedical technology in molecular biology used to amplify a single copy or a few copies of a piece of DNA across several orders of magnitude, generating thousands to millions of copies of a particular DNA sequence(Wikipedia,1). PCR developed by Kary Mullis, was introduced into forensic work. By allowing the selective amplification of any desired stretch of DNA, PCR ushered in unprecedented sensitivity in low-level DNA detection at crime scenes. All of today's forensic genetic methods are based on PCR.( Phillips,484)"

# **Medical Field**

HIV is an epidemic nowadays. It has a high mortality rate and difficult to cure. DNA tests are good way to measure if there is some potential virus in a human's body.

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"HIV Screening Test Is Developed Using Recombinant-DNA Technology . The test is appropriate when a quick screening result is required, and it was designed to be used by trained health professionals in settings where other types of AIDS antibody detection tests cannot be performed because of a lack of refrigeration or other sophisticated equipment(Public Health Reports ,313)".

FDA Commissioner Frank E. Young, MD, PhD, said that "the test is the first for HIV infection to be developed through the application of gene-splicing techniques. "This technical advance," Dr. Young said, "should help make testing available to all who want to be tested. It will also be particularly useful in remote areas of the world that lack the facilities for earlier approved tests and may also be very useful as a preliminary screening measure in emergency situations in this country. It is not, however, intended to replace the current tests used by blood banks for screening donated blood. Furthermore, any positive reactions using this screening test must be confirmed, because false-positive reactions can occur," he said. Called a latex agglutination test kit, the new test is a suspension of microscopic latex beads coated with a genetically engineered protein which contains portions of the outer surface, or envelope, of the AIDS virus. The engineered protein is produced by a process in which a part of the AIDS virus genetic material is inserted into Esche-richia coli bacteria.

There are other technology used in medical field called human insulin. It is produced by recombinant DNA technology and is the first commercial health care product derived from this technology. Word on this product was initiated before there were any federal guildlines for large-scale recombinant DNA work or commercial development of recombinant DNA products. The steps taken to facilitate acceptance of large-scale work and proof of the identity and safety of such a product are described. While basic studies in recombinant DNA technology will continue to have a profound impact on research in the life sciences, commercial applications may well be controlled by economic condition and the availability of investment capital (Johnson, 632).

In summary, DNA technology has played an enormous role in Biology, medical and society field. DNA helps us a lot in genetic point of view. DNA technology leads a guideline of cloning technology which made an invention about cloning sheep Dolly. And DNA technology works in plant which is hybridization rice. In social field, we make use of paternity testing to find back loosing children. Police also use DNA technology to do DNA typing and find out the murder. Therefore, DNA technology can provide evidence for historical question such as princess Russia's identify. Not only does it make sense of inheriting theory, but also be beneficial to transplantation and treating. We use DNA technology to do HIV testing. Since the invention of DNA technology, it has brought lots of scientific advancement in the recent 200 years. The DNA technology has global influenced all over the world.

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