

Does dna profiling
live up to its
expectations
criminology essay



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INTRODUCTION

DNA stands for Deoxyribonucleic acid and is molecule of life. It is a chemical code which specifies number of functions, appearance and pedigree and is unique for all individuals except identical twins. There is need to explain the formation of DNA, it is combination of half DNA from mother side and other half contributed by father side. This is the reason that it serve as an evidence of paternity of a child. DNA molecule is found in majority of cells of body including white blood cells, semen, hair roots and body tissue. Traces of DNA can be detected in body fluids such as saliva and perspiration.

Mitochondrial DNA, which follows the maternal line of an individual, can be extracted from hair and bone samples. This is the source used to investigate common relatedness and ancestry (Freckelton, 1989).

DNA Profiling is also known as DNA finger print. Basis for the individuality in each organism is in its DNA (deoxyribonucleic acid). There is a unique DNA sequence that identifies human or a specific species of a bird and animals etc. The DNA sequence differs with each individual within each group.

Research in molecular biology during 20th century enabled the scientists to identify the differences between any two DNA molecules. The pattern can be compared to a unique barcode or personal identifier, which in humans, and particularly in forensics, is referred to as a “ DNA profile” (also called a “ DNA fingerprint”). Forensic science uses the properties of DNA in several ways.

The fundamental information is that every contact leaves a trace which benefits the techniques of genetic material left during the commission of a crime. DNA profiling is used for investigation in various crimes which include robbery, murder and rape etc. The remnant of the hairs, saliva, semen, <https://assignbuster.com/does-dna-profiling-live-up-to-its-expectations-criminology-essay/>

blood, perspiration on clothing, traces of assailant's skin under a victim's fingernails can often be DNA profiled. It is not yet possible to test the whole of an individual's DNA. Forensic analysis involves the testing of regions of an individual's DNA.

Advantages of DNA profiling

Globally DNA profiling is being used comprehensively for paternity testing because of its capacity to determine to a high degree of certainty about the claims to be a child's parents or grandparents. The application DNA profiling is wide and varies from disputes within family to resolving the fatherhood of a child for rape victims to rights to social security benefits and for the issues related to inheritance. This will enable the investigating agencies to either include or exclude possible source of DNA found in relation to a criminal investigation. DNA profiling is also used in confirming the maternity or paternity of the children (Saasta, 2012). It is also true that DNA profiling can only be used if there is enough DNA in the samples. Crime samples can be compared to a sample from a known suspect or compared to a database of DNA profiling results from other scenes or from convicted offenders. If there is a 'match', the two samples may have originated from the same person. While making comparison, the profiles generated are matched with DNA samples derived from the same individual. The importance of DNA profiling could be seen as many countries made it compulsory to have DNA sampling of hardcore criminals. This could be seen in UK during 1995, it was mandatory to have sampling of DNA to form DNA sampling data base for the persons suspected, reported, charged, convicted, or cautioned for any recordable offence. Currently, the UK combined criminal and crime scene

databases contain over 4 million profiles. In South Africa, there is legal requirement of collection and retention of DNA profiles governed by the Criminal Procedures Act (CPA) of 1977 for criminal intelligence purposes. However, this act interpreted not to permit taking blood sample from the offender by insertion of a needle. In view of the above the existing data base with South Africa contains samples from crime scenes and DNA samples from suspected individuals collected from crime scene. Significance of DNA profiling has been considered an amendment to criminal Law is formulated which will provide an overall framework for DNA collection and storage. Since last three decades forensic scientists have shown keen interest in using genetic information to match crime scene evidence with suspects in criminal investigations. However, there were some difficulties due to lack of a suitable experimental approach which prevented them from achieving maximum benefit. However recent research studies in molecular genetics during the last decade have changed the situation. The findings of number of areas in DNA which does not hold genetic information has proved another boost for using the DNA profiling as one of the best tools for investigation. This area is extremely variable between the people. These areas consist of short sequences repeated many times with the number of repeats varying among individuals. Techniques to analyze this vast diversity in DNA have been developed and continue to improve (Easteal, 1990).

Medical technology helps in avoiding number of disorders due to genetics. This can be done by allowing genetic testing that allows individuals to submit a genetic sample and get it analysed for the genes for known anomalies or other problems. This idea allows awareness of the potential

health problems down the road. These problems may be avoided by rectification before they become a problem by changing behaviours, diet, and exercise regimen. This may work fine for some very well-defined health issues, like heart disease (although a recent government investigation into these companies' abilities to provide even this information reliably suggests some problems). But it doesn't work at all for any mental disorder (Grohol, 2012). Genetic engineering is a synthetic biology which is a giant leap forward, triggering a heated global debate. Genetic engineering attempts to refit and alter the DNA codes in the DNA, synthetic biology attempts to rewrite the entire sentence and paragraph in the DNA, it creates organisms vastly different from the original. There are positive and negative uses of DNA Profiling in our society. As against the use of DNA profiling for criminal investigation, the research has been used in the workplace to discriminate against employees whose profiles could pose a financial risk. Genetic technology is used to determine strength of a person contract certain diseases which may cause hesitation amongst some employers for hiring and training of such people. In some cases, these people are just carriers of diseases and such people are mistakenly thought to be afflicted with the genetically sensitive diseases. Most important is about the confidentiality which is often breached, and in some cases, carriers were discriminated against and denied health insurance. This is important to record that despite its huge benefits DNA profiling is extremely hazardous when results are inaccurate or used to discriminate. The frequency of inconclusive testing by the scientific community in many aspects of forensic identification has also increased. This has led to many problems within the legal profession.

Subsequently, there is need for lawyers to increase their scientific knowledge
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to enable themselves to competently question and understand scientific evidence put forth. However this is not the only possible downfalls of DNA profiling in criminology. Numbers of discussions that the use of a national DNA database infringes on the individuals constitutional rights to privacy but the law officials have claimed that the advantages this database presents for society are much higher as compared to the individual's rights. The disadvantages of DNA profiling are considered to be higher if the private institutions develop access to this database and use the information for discriminatory purposes. In near future use of DNA database can increase the risks of political and commercial abuse of such information, along with the danger this information falling into the hands of unfriendly parties, are unpredictable. Private institutions may influence their decision regarding decisions on loans, hiring practices, insurance rates, etc. Society, then, is faced with a conflict between an individual's right to privacy in one's genetic composition and the employer's or insurance company's interest in knowing about a person's health problems. There have been concerns about the disadvantages of DNA profiling relating to violation of genetic privacy revealing information like disease susceptibilities, behavioral traits, paternity that the person may not intend to re, veal others, such as relatives, employers, insurance companies. As the use of DNA profile for forensic purposes is specific and samples are destroyed after conviction, it does not reveal anything about individual's genetic makeup. Another social issue arises if there is no accuracy of the profiling and the chances of error resulting in wrongful conviction. DNA profiling is likely to have a very significant impact on the legal system if the bodies samples are taken

without subjects' consent. In the criminal arena, DNA profiling will have a more limited impact (Freckelton, 1989).

One of the important issues is privacy interests in the context of the collection and use of DNA for criminal justice. First, privacy concerns are on ethical grounds when DNA is collected and used to create a DNA profile that is stored in a database and searched repeatedly without the individual's knowledge or consent. Second, privacy concerns are raised by the government's retention of the biological sample from which the profile is derived, since it is a potent source of private information about both the suspect and the suspect's family members. Privacy concerns also arise in the context of so-called "familial searches." It is felt that due to very close familiarity between close relatives, this approach provides important leads for investigating crimes, while others feel it unfairly focuses police attention towards people because of their familial relationships, and may also result in police revealing a genetic link between individuals who were previously unaware of their relationship (DNA policy). There is another privacy concern relating to retention of database of DNA profiles which is controlled by the Government policy on the biological samples. DNA profile contains personal traits and also intensely personal information about genetic disorders and familial relationships. Majority of the studies propose to keep these samples for long as it is felt that with passage of time there is change in technology and improved technology may allow having further use of the existing database. This will also help in cases where there has been error in mislabeling the samples and it allows another test of the samples taken. Opponents of retention are, however, are of the view that profound privacy

interests are at stake. Possibility that the state (or an unauthorized third party) may access and then misuse this kind of information cannot be ignored. Misuse of data has been in discussion as the genetic information as many states allow access to their DNA forensic databases for non-law-enforcement purposes. The studies also indicate that the process may bring more racial inequalities in the criminal justice system as only those who come into contact with law enforcement are entered into databases, disparate arrest and conviction practices will result in a disproportionate number of minorities being included in the databases. Consequently, since only those profiles included in databases can be matched to DNA evidence from a crime scene, minorities will be more likely to be identified than other population. The use of DNA analysis to determine the probable race or ethnicity of a suspect from a DNA sample has also been debated. Number of companies have initiated to market genetic testing for ancestral background and physical appearance to law enforcement. There is another concern of the accurate testing of DNA Profiling. Any error in testing may lead to injustice and wrong persons can be identified as offender instead of real offender (Genetic Policy)...

How DNA Profiling Works

DNA is a molecular chain storing genetic information on which precise linear order of stretches on nucleotides. Scientifically, genes encode specific protein products which are required for the cells of an organism for growth and function. For human beings the DNA in every cell is split between 23 pairs of chromosomes. For the purpose of using DNA profiling it needs to be understood that in any individual, one member of each paired chromosome

is inherited from an individual's mother and the other member from the father and in turn only one of each pair will be passed down to the following generation. This benefits in confirming the family relationships to be established, which forms the basis not only of paternity testing but also helps in identifying unknown corpses and skeletons by comparison with close blood relatives. DNA collection and storage of national database should be within law and not unlawful.

Techniques of DNA Profiling

There are two techniques used by forensic science laboratories for DNA Profiling globally. These two techniques are:

Restriction Fragment Length Polymorphism (RFLP) methodology involves cutting up the DNA in small fragments with molecular scissors known as restriction enzymes and determining their length. This is verified by passing through voltage when larger fragments travel a lesser distance than the smaller ones because the gel molecules obstruct the movements of fragments. The fragments are placed to appear in bands.

Polymerase Chain Reaction (PCR) involves copying small area of the DNA molecule. This has huge impact in the molecular biology field. This method has more advantages than RFLP method. It has more advantage over RFLP being more efficient and sensitive and used with smaller amounts of DNA.

In addition to the human beings genetic variations also occurs in other organisms and advantages of DNA profiling can be extended to animals, plants, viral and bacterial profiling. It will be useful for investigations

pertaining to conservation, poaching and animal smuggling, and <https://assignbuster.com/does-dna-profiling-live-up-to-its-expectations-criminology-essay/>

authenticating consumer products, in tracing pollution outbreaks, in forensic investigations and in infectious disease research. In South Africa varied research studies are still in progress for DNA profiling in animals especially in preventing poaching of species including abalone, rhino, elephant, parrots, blue crane and cycads. DNA profiling has also been used to authenticate the cultivars used in wine making and identifying different strains of sweet potato in bio-banks. Recent research studies pertain to DNA profiling of the organisms that cause HIV/AIDS to gain an understanding of the factors driving the spread of these deadly epidemics.

Future DNA Profiling

DNA analysis and profiling is based on well-established principles of the wide genetic variability among humans and the presumed uniqueness of an individual's genetic makeup. To get the huge benefits and advantages large number of techniques for isolating the DNA of human chromosomes will be used in non forensic scientific settings. Methodologies used for the techniques for use of the forensic application will involve comparing a known DNA sample obtained from a suspect with a DNA sample obtained from the crime scene. Such analyses typically are offered to support or refute the claim that a criminal suspect contributed a biological specimen (e. g., semen or blood) collected at a crime. With continuous research there is now development of portable DNA analyser which can be used at the scene of crime. The interrogation is conducted based on profiling of X and Y chromosome, DNA database will allow prediction of the surname of male suspects or victims of crime from DNA alone. Markers on mitochondrial DNA are helpful in tracing an individual's ancestry through the female line of

decent. However, there are few absolute tests for identifying features such as hair, eye or skin colour, because there are ethical concerns and these characters are also the result of variations in many different genes and environmental factors (SASSTA).

The future of DNA technology will provide great help to human beings and by the year 2050 there will be extensive use of materials like bacterial rope and DNA chips in the biotechnology sector. DNA chips will be used as part of predictive medicine which will enable monitoring and predicting the possibility of diseases and thereby instituting preventive measures or treatments. Predictive medicine in the form of DNA chips will revolutionize the healthcare scene by 2050. This will be helpful for plant kingdom too. Genetically engineered plants will show the way towards production of monoclonal antibodies (MABs) for diagnosis and therapy. MABs are single chemical species of antibodies produced in the laboratory by a special technique. Development in the DNA vaccines will gain acceptance globally as it will be much cheaper than protein antigen-based vaccines that are generally used as of now.

CONCLUSION

The database of DNA is now one of the mandatory requirements in majority of countries for legal issues for criminal cases. Such database is used by forensic agencies to help the police in support of current and future criminal investigations, requires legislative authorization, financial support and judicial endorsement. The real benefit of the database depends upon the range of its usage and the extent to which operational policing strategies respond to the intelligence opportunities it provides. In few countries like <https://assignbuster.com/does-dna-profiling-live-up-to-its-expectations-criminology-essay/>

United Kingdom, there is great demand for its inclusion, broadening of its scope of intelligence as contribution to detection and prosecution of offenders. Number of studies confirms that DNA evidence is rarely crucial at the trial. The main value of DNA profiling is in the earlier stages of an investigation, before the trial. It is a powerful investigative tool for excluding people falsely suspected of involvement in a crime. It can provide very strong evidence of involvement, and this is often enough to induce the defendant to plead guilty, or to fight the case on consent. It has become standard technique in criminal investigation as the results can be from any source of biological material provided it contains nucleated cells with genomic DNA. Future of DNA profile will be used in genetic engineering for cure of large number of hereditary diseases.