

**DNA ON TRIAL: JUDICIAL USE OF SCIENCE AS A THREAT TO
HUMAN RIGHTS**

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ABSTRACT

A society without crimes is an ideal that all States like to reach. However, could it be done by any means? Modern technologies are helpful for identifying and pursuing suspects under criminal investigations. The Deoxoribonucleic Acid (DNA) molecule has the extraordinary property to be both specific to an individual and common to the species. Thus, DNA identification techniques are used for investigation purposes. The leading country which applies this method is the United Kingdom. However, genetic information is also private and sensitive. How could DNA fingerprinting be used in respect of fundamental rights? Is DNA as an evidence of guilt really reliable? The balance between State's interests and individual's rights is challenged from the collection to the retention of DNA samples. Furthermore, DNA could give other information not merely for identification purposes. Intelligence on familial relationships, ethnical origins, or health predispositions could be disclosed. Should the police have the power to conduct such speculative searches? The United Kingdom did not always act in proportion and necessity towards those concerned. Its legislation has been very lax and is now about to change following the decision of the European Court of Human Rights in the 2008 *S and Marper* case. However, the practices still remain unchanged on the field and the trend to extend DNA profiling from the suspects to the citizens has been raised on several occasions.

TABLE OF ACRONYMS

- AIM: Ancestry Informative Markers
- CCTV: Close-Circuit TeleVision
- CJ profile: Criminal Justice profile
- CJPA: Criminal Justice and Police Act 2001
- CJPOA: Criminal Justice and Public Order Act 1994
- CODIS: Combined DNA Index System
- DNA: Deoxyribonucleic Acid
- ECtHR: European Court of Human Right
- EU: European Union
- FSS: Forensic Science Service
- ILAC: International Laboratory Accreditation Cooperation
- INTERPOL: International Criminal Police Organization
- ISFG: International Society for Forensic Genetics
- MAOA: MonoAmine Oxidase A
- mtDNA: mitochondrial Deoxyribonucleic Acid
- NDNAD: National DNA Database
- NPJA: National Policing Improvement Agency
- PACE: Police and Criminal Evidence Act 1984
- RFPA: Right to Financial Privacy Act 1976
- SOC profile: Scene of Crime profile
- STADNAP: Standardization of DNA Profiling in the European Union
- STR: Short Tandem Repeat
- UNESCO: United Nations Educational Scientific and Cultural Organization
- UK: United-Kingdom
- US: United-States
- VNTR: Variable Number Tandem Repeat
- WMA: World Medical Association

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INTRODUCTION

The Deoxyribonucleic Acid (DNA) molecule distinguishes itself from others by the information it carries. It contains the genetic code defining the development and functioning of all living organisms. On the one hand, DNA is something that we all share, and on the other hand, it is specific and intimate for each living being, including humans.

The structure of DNA was discovered in 1953 by James D. Watson and Francis Crick¹ and launched the new era of molecular biology and genetics. What could DNA tell us about humans? Human genetic material contains various types of information that could be used.

First of all, each person has two copies of it, one from each parent. This inheritance characteristic enables the establishment of the relationship between individuals from the same families.

DNA also defines most of the physical traits of a person; together with environmental factors. The body shape, the colour of the eyes and the hair, the face and non-visible traits like the blood type are examples of genetic traits.

Finally, information on health predisposition could be revealed by DNA. Not all diseases have a genetic factor but some inherited mutations could have an impact on a person's health. We talk about "predisposition" because a genetic anomaly is not automatically expressed by the organism. It could depend on which chromosome carries the anomaly, whether or not this chromosome has been inherited, or if the gene's version² is dominant or recessive.

The discovery of DNA has been revolutionary in the field of medicine and pharmaceuticals. However, if it can be beneficial for medical research, are all other uses of genetic information for the right purpose? What control do we have on such a potential of information?

DNA could be used in many ways. One such way is to identify either victims or perpetrators in crime investigation. The forensic technique responsible for DNA identification is called either "DNA fingerprinting", "DNA profiling", "DNA typing" or "DNA testing"³. DNA typing is often considered as an effective method which has helped to solve many court cases in the past and will probably do so in the future.

To illustrate, *The Times* recently titled an article, "Hope for DNA breakthrough over holdall

¹ Watson & Crick, 1953.

² DNA sequence coding for a protein having a specific function in the organism.

³ In this study, all these terms could be used indifferently.

spy mystery”⁴ which was published on the 30th April 2012 in the United Kingdom (UK). Similarly in the United States (US), *The Washington Post* announced in an article published on the 24th June 2012 that “Suspect arrested in triple killing near Columbia in NYC; police say they have DNA evidence”⁵. Again in Israel, *The Jerusalem Post* published an article, on the 15th March 2012 titled, “DNA leads police to arrest rape suspect 7 years after attack”⁶. These very recent articles from three different countries show that the investigative and procedural uses of DNA are now part of the media scene and news items. It is not merely newspapers and police officers who have an interest in this molecule. The DNA became the centre of attention of science, fiction, politics and even artists like Adrian Salamunovi and his “DNA 11” project⁷.

Why is there such infatuation around a single molecule? Is it really the panacea of crime solving? Crimes and other offences are one of the main ills of all societies. Getting rid of them is one of the main objectives of all governing entities. If DNA fingerprinting could help identifying criminals, it will be beneficial for the security, safety and justice of society. However, could private genetic information be used to serve the State’s interest?

The legitimacy of the State’s authority over the individual is explained by the “social contract” of Jean-Jacques Rousseau previously theorised by Thomas Hobbes in *Leviathan*⁸. It underlies that individuals consented to assign some of their freedom to an authority, in exchange for their protection.

Here is the conflict of rights inherent to the very notion of a governing entity above a population. Indeed, this entity is responsible for protecting the individuals from any danger and to ensure the basic conditions for life, but it also has to respect their fundamental rights. These same rights could sometimes be refraining to ensure the two first legitimate aims.

In the use of DNA fingerprinting under criminal investigation, the balance of the State’s interest and the individual’s interest is challenging. On the one hand, the population will gain in having a safe and peaceful society. Everyone has a direct interest in catching criminals that constitute a threat to the global security. On the other hand, the use of genetic information could infringe many fundamental rights such as the right to freedom, the right to bodily

⁴ Schlesinger, 2012, available at <http://www.thetimes.co.uk/tto/public/sitesearch.do?querystring=dna&p=tto&pf=all&bl=on>, (Consulted on 20th June 2012).

⁵ Associated Press, 2012, at http://www.washingtonpost.com/national/suspect-arrested-in-triple-killing-near-columbia-in-nyc-police-say-they-have-dna-evidence/2012/06/23/gJQAIaSOyV_story.html (Consulted on 05 July 2012).

⁶ Lappin, 2012, at <http://www.jpost.com/NationalNews/Article.aspx?id=261920> (Consulted on 05 July 2012).

⁷ Adrian Salamunovi, “DNA 11”, at <http://www.dna11.com/about.asp> (Consulted on 05 July 2012).

⁸ Hobbes, 2009.

integrity, the right to informed consent, the presumption of innocence, the right to remain silent, the right to anonymity, the right to privacy, the right to data protection, the right to non-discrimination, the right to respect for a private and family life and even the right to not know about our genetic constitution.

These principles are fundamental but however not absolute. The authorities could be required to temporarily restrain some individual's rights and liberties for the sake of the society. This said, any reasonable restriction has to be *inter alia* proportionate and necessary to be legitimate.

Are police powers proportionate and necessary when DNA sampling suspects at the expense of their rights? To what extent could the State's authority touch the citizen's bodily integrity? How could the balance be settled? It depends on the philosophical approach which we will adopt.

Following the utilitarian philosophy, the best choice will be to favour the wellbeing and the security of the society overshadowing certain human rights of potential criminals. Indeed, according to this consequential approach, morality is judged regarding the consequences of an action and not by the ways and means of doing it. It follows the axiom "the *greatest happiness* of the *greatest number*"⁹ defined by Jeremy Bentham and then John Stuart Mill.

Thus, in this case, the greatest benefit for the greatest number would be to use DNA sampling as a routine technique. The consequence of prosecuting, and maybe convicting a suspect of a crime is more important than the means of restraining the suspect's liberties by DNA profiling. Besides, it could corroborate the (true or false) intuition that the more DNA samples that are taken, the more chance there is to control criminality and find matches. If this theory is proved right, then the utilitarian approach will estimate that the security of all ensured by a global DNA profiling is worth it at the expense of individual's rights.

Oppositely, the "duty-based" approach will lean on the other side of the balance. This deontological approach focuses on the duty, regardless of the consequence of an action. Morality is here based on a Kantian Universalist model and supports the strict respect of human rights. The action in itself has to respect the dignity and the rights of others. Catching criminals is secondary to the right to privacy and the freedom of the citizens.

Finally, a third possible approach to resolve this conflict of interests relies on the "principle of proportionality". This principle was first initiated by the German legal system and is now used in the European Union (EU) law, or in the international humanitarian law. In our case,

⁹ Bentham, 1995.

criminal law mainly concerns national law. Eric Engle defines this principle as a "... legal rule that states that action must be a rational means to a permissible end which does not unduly invade protected human rights."¹⁰

In other words, we have to balance between "means" and "end", by taking into account the respect of "protected human rights". In our study, the "end" is to control crime and ultimately prevent it. The "means" is DNA fingerprinting.

The principle of necessity is defined by the Nuffield Council on Bioethics as "...if a particular objective can be achieved by more than one means, the least harmful of those means should be adopted, that is, one that causes minimum harm to the individual or community."¹¹

Is DNA fingerprinting the only means in which to catch criminals? Is it the best means? Is it the least harmful for the individual or the community? Indeed, we will see that innocent persons and families could also be involved in criminal investigation through these DNA tests. Furthermore, is the retention of DNA samples a proportionate, necessary and efficient means to fight against crime?

Which one of the three approaches is applied in practice? It will depend on the period, the culture and the legal system of each country. In a country like the UK, we could say that it will favour the utilitarian vision. Indeed, the arrival of technologies of control such as DNA fingerprinting falls within a period of global surveillance that balances in the interest of the State' security.

It also belongs to the English culture and history. The English utilitarian Jeremy Bentham defined a model of welfare State and interventionism that characterises the United Kingdom. He also invented the "Panopticon" that Michel Foucault uses to describe our modern "disciplinary societies"¹². This circular structure was originally designed to enable the guardian placed in the centre of the structure to have a panoramic view of all inmates. The specificity of the Panopticon is that each inmate knows that he or she can be watched but he or she ignores when exactly. This invisible surveillance creates an inner stress that, in the theory, forces the people to behave. Bentham describes it as "...a new mode of obtaining power of mind over mind, in a quantity hitherto without example."¹³

Could we make a comparison with the forensic technologies? Indeed, collecting and storing

¹⁰ Engle, 2012, p. 1.

¹¹ Nuffield Council on Bioethics, 2007, at <http://www.nuffieldbioethics.org/sites/default/files/files/Bioinformation%20Chapter%203%20-%20Ethical%20values%20and%20human%20rights.pdf>, (Consulted on 26 June 2012).

¹² Foucault, 1991.

¹³ Bentham in Bozovic, 1995, p.29.

DNA samples by the authority could have a similar psychological effect on people: they are aware that they are under a constant possible surveillance without knowing when and where.

The United Kingdom is thus considered as a leading country in the use of surveillance technologies. One of the symbols of the English “panopticon” approach is the Closed-Circuit Television (CCTV) cameras which are situated in public places. The justification for constantly filming innocent citizens is, as always, to ensure their own security. This country is then a clear illustration of intensive crime control policy and a wide use of DNA identification technologies. Consequently, our study will mainly focus on the UK.

The reason for focusing on a specific country is also because our field of study touches on criminal law. This type of law is under the State sovereignty and there is not a clear harmonisation at the regional as well as the international level. However, some examples from the United States will be mentioned to support or contradict the English uses of the DNA fingerprinting method.

Other uses of DNA by the authorities could have been discussed around our topic. The use of the DNA’s inheritance characteristics to precede family reunification for immigrants is an example. We could also have talked about the imminent risk of using the DNA’s health predisposition characteristics by employment and insurance companies. Finally, DNA could, in the near future, be used as a biometric authentication. It would be included in identification cards, such as a passport, as it is already the case with fingerprint, facial and iris recognition. These topics are also of great interest regarding possible threats to human rights.

The United Kingdom did not have explicit protection of human rights in its legislation until the *Human Rights Act* of 1998 enforced the *European Convention on Human Rights* of 1950 in the English law.1998. Previously, the *Magna Carta* of 1215 and the *Bill of Right* of 1689 were the main common laws.

In our study, we will first discuss the admissibility of DNA as evidence in the court. Preceding the discussion, a technical highlight on the scientific techniques will be given. We will then see that the reliability of laboratory results is arguable and not always fully assessed. Should DNA evidence be systematically used as a prosecutorial tool in criminal trials? In this regard, it is important to consider that DNA identification could help in convicting but also in exonerating a suspect or a person who has been wrongly convicted (Part I.).

DNA is also used as an investigative tool when the police collect DNA samples. In this second part, we will highlight several concerns; mainly around the right to informed consent and the presumption of innocence. We will also discuss the different ways in which the police collect DNA samples (Part II.).

The right to privacy is also put at risk, especially when it comes to retaining the DNA samples and profiles. The English National DNA Database (NDNAD) was framed by a very lax legislation. Until now, convicted persons as well as innocent persons had their DNA profiles indefinitely retained in it. Nevertheless, the efficiency of the NDNAD has never really been demonstrated (Part III.).

Additionally, new techniques are used around these DNA samples to extract more information. The inheritance traits are used to conduct the so-called “familial searches”. This is problematic regarding the right to family privacy. Furthermore, DNA samples can be used to look at genes expressing physical traits for investigative purposes. These physical traits are classified *inter alia* regarding ethnical and race assumptions. Thus, there is a threat to the right to non-discrimination. Moreover, such practice could be alarming if correlated with determinist or eugenic theories.

Finally, the discrimination could be made at the level of the individual and not the group. Health predisposition could be precious information in criminal investigations. However, it raises questions of privacy and the right to not know (Part IV.).

Are all of these practices respecting the principles of proportionality and necessity in the United Kingdom? Is it a fair balance between the State’s duty to ensure public security and its duty to respect the rights and freedom of the citizens? For instance, is such a wide DNA databank the best means by which to catch criminals?

As Krimsky and Simoncelli said, we should always keep in mind that “(t)he pursuit of justice involves more than simply the resolution and reduction of crime. Fairness, equality, and protection of basic civil liberties are as much a part of justice as is conviction and the punishment of the guilty.”¹⁴

¹⁴ Krimsky, 2011, p. Xvii.

PART I. DNA IDENTIFICATION TECHNOLOGY IN CRIMINAL PROSECUTION

*“Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him [...] It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it, can diminish its value.”*¹⁵ Paul Kirk.

Nowadays, DNA tests are routinely used in forensic laboratories to assist investigations. DNA evidences are thus often presented at the court and have influenced many cases of conviction as well as exoneration of innocents. However, scientific experts and legal experts need a clear communication to avoid misleading the interpretation of DNA results. The reliability of DNA tests and the significance of probabilities around them have to be explained to lawyers. William Thompson and his colleagues warn to not ignore the “... case-to-case variations in the nature and quality of DNA evidence.”¹⁶

In this Part I., we will first give an overview of the apparition of DNA fingerprinting (A.). We will highlight some scientific technical aspects (1)), which are essential to keep in mind for the understanding of this study. Then we will illustrate these aspects by bringing attention to some successful cases (American and English) and the apparition of DNA evidences in the court (2)). The efficiency and reliability of DNA results will then be put into perspective (B.). The technical and scientific relevance of DNA evidences will first be explored (1)). Finally, the admissibility of DNA evidence at the court will be assessed (2)).

A. DNA Evidence: A Revolutionary Tool in Forensic Science

*“Lawyers must learn the historical context of DNA testing, the chronology of testing methods, and the implications of recent advances in DNA technology.”*¹⁷ Charles Strom.

To discuss the use of DNA as evidence in criminal prosecution, we previously have to introduce its apparition on the field of science as well as on the field of law. DNA fingerprinting is a highly technical science. We will provide basic terminology and an

¹⁵ Kirk, 1974, p. 2. This quote is based on the “Locard’s theory” (developed by Pr Edmond Locard) on the exchange principle which follows the idiom “Every contact leaves a trace”.

¹⁶ Thompson *et al.*, 1993, p. 22.

¹⁷ Strom, 1999, p. 18.

overview of the methods routinely used in laboratories (1)). We will then give some concrete examples of cases where DNA fingerprint has had an influence (2)). This will also be helpful to introduce some possible human rights conflicts that will be discussed in the following Parts of this study.

1. What is DNA Fingerprinting? A Technical Overview

Science as Evidence

The investigative and justice systems are constantly seeking for the “truth”. The constitution of evidences by investigative means is one of the ways to achieve this goal. Since humans are not able to go back in time like in the fiction book *The Minority Report*¹⁸, crime scene materials could help to reconstitute the event. There are various types of evidence, and their reliability is always influenced by subjective criteria.

The perception of what is a proof has evolved a lot in the history, from the trial by ordeal in medieval Europe to the modern techniques of forensic science. Terrence Kiely precises that “...in the extensive area of causation theory and forensic science and forensic evidence, the history question continues to be a major component in any analyses of proves of scientific fact.”¹⁹

There are “generations” of evidences where some were more popular than others. If nowadays, religious beliefs are not playing a role in evidence constitution, science seems to be the new path of truth. There is a clear tendency to foster forensic evidences, and especially DNA fingerprinting. What is DNA and how does it help inquiries to identify suspects or victims? The questions will be answered by pointing out some technical highlights.

DNA stands for “Deoxyribonucleic Acid” and is a macromolecule carrying all the genetic information of a living organism. It is normally localised within the nucleus of the cell and is divided into sequences called “genes”. These genes can code for proteins and ensure the daily functioning of cells but they are also specific to an individual, inherited from both parents. Each gene has different versions which are called “alleles”²⁰. The genes are constituted of four nucleobases: adenine (A), cytosine (C), thymine (T) and guanine (G). DNA molecule is a double-stranded helix and the two strands associate by the bases which go by pair: A-T and C-

¹⁸ Dick, 2000.

¹⁹ Kiely, 2001, p. 3.

²⁰ As we could say the gene “eye color” has various alleles such as “blue eye color”, “green eye color”...

G.

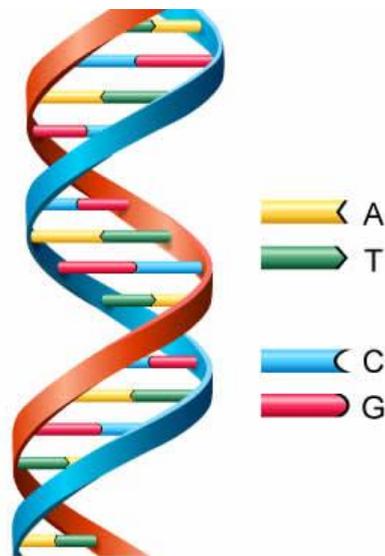


Figure 1: DNA Structure: Two strands forming a double helix: one blue and one red, which are bonded by their nucleobases A (adenine) with T (thymine), and C (cytosine) with G (guanine). Source of the schema is online at <http://www.biotechnologyhelp.com/What-does-DNA-look-like.html> (Consulted on 30 March 2012).

Most of the DNA is similar within all humans (around 99%), the rest is person specific. To perform DNA fingerprinting, we use short and repetitive DNA sequences which are unique for each individual. They are called “Variable Number Tandem Repeats” (VNTRs) or “Short Tandem Repeats” (STRs). The number of repetition and locus²¹ are variable between individuals and we know the frequency of these variants. As Mike Redmayne states; “(t)hese loci are not thought to contain information relevant to the development of an individual”²². Indeed, they are not coding for any proteins which permit forensic research to use them for identification purposes only, guaranteeing a certain respect of privacy.

For a better understanding of the use of DNA as evidence in criminal prosecution, we will concisely mention the main DNA profiling techniques.

What Can DNA Tell Us?

DNA can be found in blood, skin, semen, saliva, hair... Once a sample of DNA has been taken from there, the first step is the extraction of the DNA from other cellular materials. Then, the scientists have to quantify the amount of DNA extracted to ensure that they have enough to

²¹ A “locus” (or “loci” in the plural form) is the specific location of the gene or a sequence on the DNA strand.

²² Redmayne, 1995, p. 465.

conduct the research. Sometimes, there is not enough DNA material. Then we do an amplification of it by a technique called Polymerase Chain Reaction (PCR).

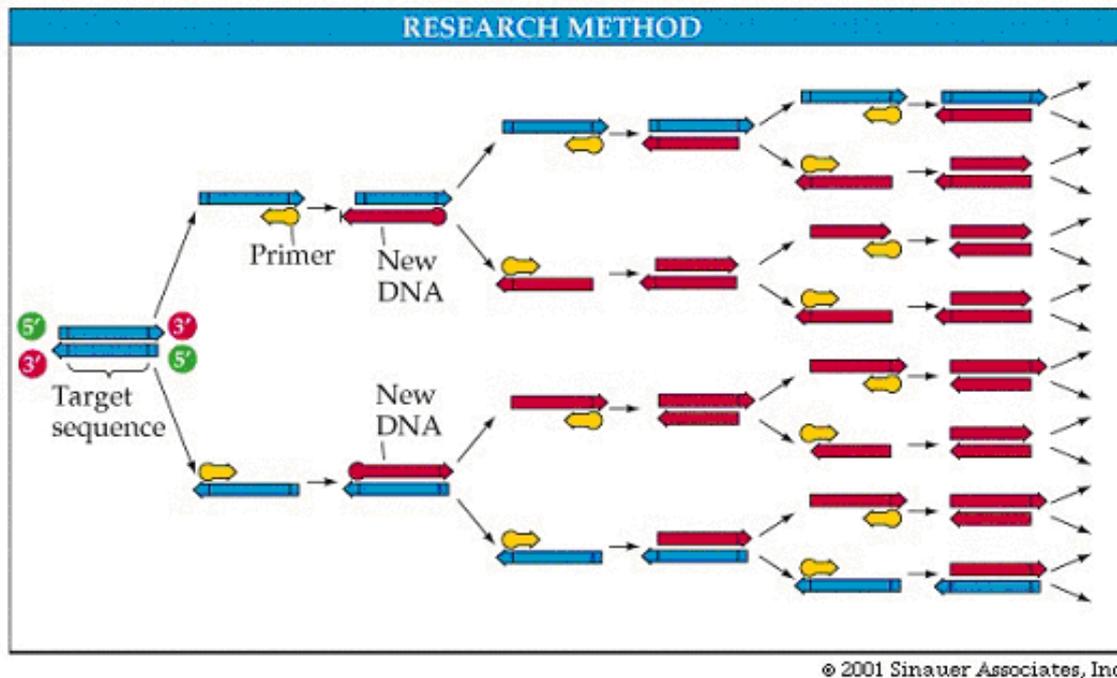


Figure 2: Polymerase Chain Reaction technique (PCR): from a DNA sequence, we separate the two strands by subjecting them to a hot temperature: it is the denaturation step. Then, we lower the temperature and hybridize each single strand with a “primer” in yellow (the beginning of the synthesized strand) according to the pair nucleobases rule: it is the annealing step. From this primer, a new DNA strand will be made with the help of a synthesizing enzyme called “Tap Polymerase”: it is the extension step. This technique will be repeated several times exponentially amplifying the number of DNA copies. Source of the schema: Purves, and al., 2001, p. 34.

This technique aims to reproduce copies of one DNA sequence. Without going into technical details, we can say that despite it not being possible to make an indefinite number of copies; it is a great way to run the test of DNA typing from a poor crime scene sample. This technique represents a major advance in forensic science and is nowadays widely used. PCR technique also permitted to reopen some cases which, at the time, did not have the technical level to proceed to DNA fingerprinting. Charles Strom expressed that “(t)he press is full of reports of innocent men being set free based on results of DNA testing, introducing the possibility of ‘second generation’ DNA testing. The smaller amount of DNA needed for PCR testing will undoubtedly encourage attorneys to seek to reopen cases where there was not enough DNA for interpretable results under RFLP testing.”²³

Then, the Restriction Fragment Length Polymorphism (RFLP) technique breaks the extracted DNA into pieces with the help of restriction enzymes. These enzymes are endonucleases

²³ Strom, 1997, p. 25

meaning that they cut the DNA at short and specific sequences. The number of cuts will be specific to the number of repetition of this short sequence, which (as we have said) is specific to each individual.

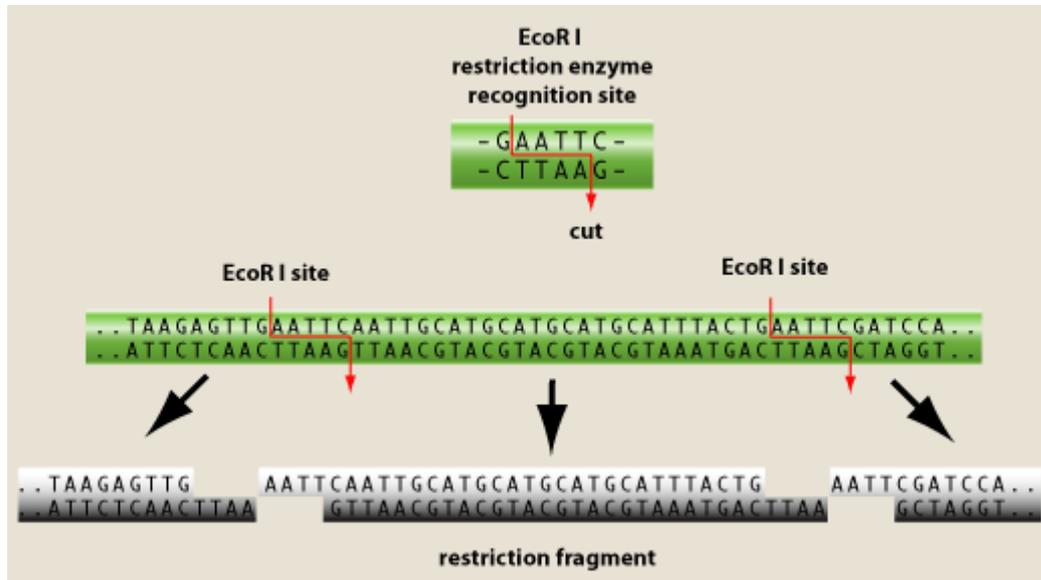


Figure 3: Restriction Fragment Length Polymorphism (RFLP) technique: The restriction enzyme EcoR 1 recognises the nucleic acid sequence GAATTC/CTTAAG. It cuts the DNA sequence between G and A. There will be as many restriction fragments as there are in this nucleic acid site. All these fragments will then be measured by electrophoresis. The source of the schema is <http://www.allanwilsoncentre.ac.nz/massey/research/centres-research/allan-wilson-centre-molecular-ecology-and-evolution/teachers--students/wheredidicamefrom/polymorphism.cfm> (Consulted on 30 March 2012).

The DNA fragments can then be characterized according to their size and net charge. The separation of DNA fragments digested by the restriction enzymes will be made by a technique called Electrophoresis, where DNA fragments are put into an agarose gel. DNA is negatively charged and thus, with power supply, these fragments will migrate to the positive electrode. However, larger DNA fragments will migrate more slowly because they find more resistance in the gel than the smaller ones.

The result of the electrophoresis is then analysed. To visualise the STRs of interest, we use the probing technique. This means that we hybridise a short single-stranded DNA sequence to a STR digested fragment. These DNA probes are tagged with (for instance) a radioactive isotope which can be visualized by X-ray. The visualization of the fragments is called “autoradiography”.

From the autoradiography, it is possible to compare the positioning of the different fragments between the DNA samples and estimate whether or not they come from the same person or if they are family related. These calculations always include a margin of error that we will

discuss later on.

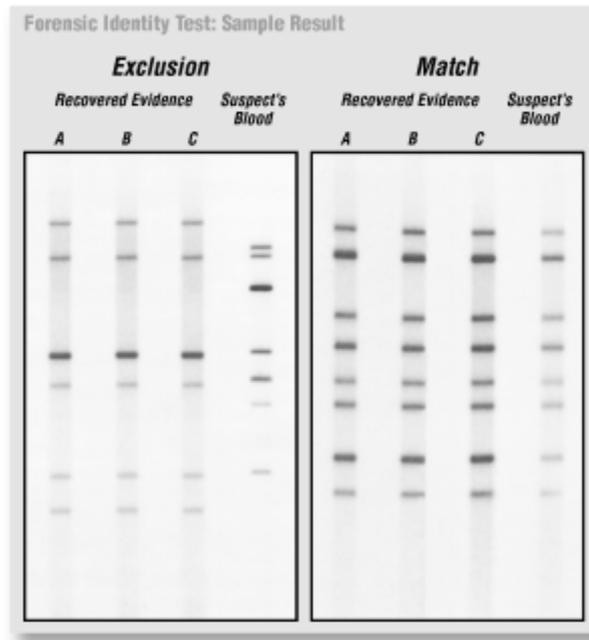


Figure 4: Autoradiography of an electrophoresis: this is an example of how the DNA fingerprinting works. The black bands show where the probes stick to the DNA fragments of interest. A, B and C are the samples found at the crime scene, extracted from a stain of blood, semen or other. The black bands under "Suspect's blood" come from the blood of the defendant or any other person suspected. We can clearly see here that when A, B and C present the same sized fragments as the "Suspect's blood", then the DNA matches that of the suspect. We can then conclude that it might come from the same person. The source of this photo is on the website <http://www.cellmark.co.uk/> (Consulted on 30 March 2012).

Finally, we will mention the mitochondrial DNA (mtDNA) which is the most recent DNA testing accepted as forensic evidence. A mitochondrion is an organelle found in eukaryotic cells, including human cells. It has many important roles like in the cell division or the production of energy through the Adenosine TriPhosphate (ATP) molecule. More importantly, it has its own DNA apart from the nuclear DNA. This mtDNA is only inherited from the mother and has good properties for forensic research: first, it has a lot of variation between individuals (polymorphism). Then, it is present in high quantity within the cell compared to the nuclear DNA. This is very helpful when samples are degraded or have only a small amount of nuclear DNA. For instance, the nuclear DNA is mostly concentrated in the bulb of the hair, so when the bulb is not found, the mtDNA will be used. It is the same with bone samples or teeth samples.

2. Genes Called to the Witness Box

The “CSI Effect”, From the TV to the Courtroom

DNA typing technique was first used in a trial in 1985 by Sir Alec Jeffreys. He elaborated a research on the identification of individuals based on their genetic fingerprints²⁴. This technique has then been rapidly accepted in the court.

Terrence Kiely explains that “(t)he judicial acceptance of various DNA technologies, up to and including mitochondrial DNA, has been even more rapid, to the point where judicial discussions are becoming centered on lengthy case citations rather than on actual DNA analyses.”²⁵ This popularity generally goes beyond laypersons and touches the whole population. It is called “CSI effect” from the 2000 TV show *CSI: Crime Scene Investigation*. It highlighted forensic sciences by simplifying the procedures and drastically exaggerating successes in results. As a consequence, people expect quick results from the court, and ignore the rate of potential error that every DNA analysis contains.

The courtroom is also welcoming towards DNA fingerprinting. This technique was originally used to solve severe crimes such as murders or rapes. However, it is now used for other minor offences such as theft property. The 2009 report from the National Policing Improvement Agency (NPIA) found that 15876 DNA profiles identified were for burglary, 3990 for car theft, 4934 for criminal damage, 1002 for violent crime and sexual offense and 1057 were for drug crime.²⁶

DNA is often said to be more efficient than other “traditional” evidences. The constitution of DNA Databases is directly part of this success. By collecting the DNA of suspects and victims and storing them in a national database, it is more likely that perpetrators will be caught in future crimes. We just need to consult the databank and look for a match with the sample found at the crime scene. This will be discussed in Part III.

From Prosecution to Exoneration, Success Stories

DNA evidences are used to solve “cold cases” left aside, to find perpetrators with the help of the DNA databases and, often, to prove the innocence of suspects.

²⁴ Jeffreys *et al.*, 1985.

²⁵ Kiely, 2001, p. 267.

²⁶ NPIA, *NDNAD Annual Report 2007-2009*, p. 30, at <http://www.npia.police.uk/en/docs/NDNAD07-09-LR.pdf> (Consulted on 26 June 2012)

This was what happened in the first case of 1985 using DNA evidence. Richard Buckland was accused of the rape and murder of two 15 years old girls, which took place three years apart. After being questioned, he admitted to one of the murders. Leicestershire police wanted to prove his guilt on the other murder and called Dr Sir Alec Jerreys to use the DNA typing technique with the semen found on the two girls and Buckland's blood. The result was that both girls were indeed raped by the same man but not by him. By running tests on all men matching with the prototype profile in surrounding villages, they finally found the perpetrator Colin Pitchfork. Thus, Buckland was exonerated from an accusation that he probably admitted by coercion or pressure.

To illustrate the efficiency of DNA database to solve a "cold case", we can mention the case of Canterbury. In 1988, two girls of 11 and 9 years old were raped and assaulted in their home, the police never found out who did it. However, 13 years later, in March 2001, John Wood was arrested for shoplifting. The police took his DNA and entered it into the National DNA Database of England and Wales (NDNAD). The match with the two 1988 rapes was unexpectedly found. The man was arrested and convicted. This dramatic story caught the attention of the media and the public, and contributed to the popularity of DNA evidences.

In terms of mediatic cases, we must mention the very famous case of the former football player O. J. Simpson in 1995, also called the "Trial of the Century". It dominated the news and introduced the population to DNA evidence and forensic sciences. In this case, the reliability of DNA evidence was questioned, but also the neutrality of experts who were accused of mishandling the blood sample. This case was also very political and raised racial polemic all across the United-States.

As we have said, DNA evidence is not only a tool to convict perpetrators but mostly to exonerate innocent people, including wrongly convicted inmates. In 1992, an American non-governmental organisation was born in the US under the name *Innocence Project*. Its mission is to review cases of convicted people and, with DNA evidence, prove their innocence. The PCR technique, for instance, gave the opportunity to reopen cases, when DNA samples were preserved. So far, "289 people in the United States have been exonerated by DNA testing, including 17 who served time on death row."²⁷

The first wrongfully convicted person exonerated from the death row with the help of DNA evidence was Kirk Bloodsworth in 1993. He spent 8 years in prison for the rape and murder of a nine year-old girl. He insisted to conduct DNA testing on him to compare it with the

²⁷ *Innocent Project* website, at <http://www.innocenceproject.org/about/Mission-Statement.php> (Consulted on 05 May 2012).

semen found in the underwear of the girl. Using the PCR technique, they concluded that both samples did not match. Bloodsworth's attorney said "Kirk, from the moment he was arrested to the time he was released, said he did not do it, he didn't know who did. Nobody believed him. Friday afternoon we got the results of the DNA tests. Monday morning he was out of prison and everybody believed him."²⁸

These spectacular cases restoring justice on people wrongfully convicted or catching the criminals raised hope and some talked about a "genetic justice"²⁹.

DNA as Circumstantial Evidence

Nevertheless, the fact that a single forensic evidence could invalidate a whole trial is disputed. States could refuse to drop charges if other evidences indicate that the defendant is guilty. Finding the real perpetrator stays the best way for exoneration.

Usually, DNA evidence is considered as a "circumstantial" evidence and not a "direct" evidence. It means that we cannot draw conclusions only from it but in combination with other factors.

DNA evidence did not only become ordinary, but it influenced the conception of evidence itself. Erin Murphy explained that the "(s)tudy of DNA typing reveals how second-generation evidence transforms the nature of proof within the criminal system."³⁰

Indeed, among other consequences, there is a tendency to favour cases with DNA evidences because they seem more reliable. John Roman and his colleagues denounced that "(p)roperty crime cases where DNA evidence is processed have and more than twice as many cases accepted for prosecution compared with traditional investigation"³¹. This becomes more a reality with scientific advances increasing the cost-efficiency and the rapidity of DNA analysis. In other terms, scientific evidences could overshadow other evidences such as testimony risking a "scientisation" of the courtroom.

²⁸ Chebium, 2000.

²⁹ Strom, 1997.

³⁰ Murphy, 2007, p. 730.

³¹ Roman *et al.*, 2008, p. 3.

B. DNA Fingerprinting: A Relative Success Story

*“...the varying practices of science and the law derive from differences in their underlying epistemic priorities [...] and the professional cultural and procedural norms that consequently follow as each searches to establish and maintain their autonomy and authority.”*³² Jim Frazer.

Science and the law differ in form and content but also regarding their objectives. Nevertheless, in the field of forensic sciences, they have to communicate around a common goal. DNA fingerprinting needs to be challenged and assessed on both fields. It implies, on the one hand, to check the reliability of the methods (experimental and statistical), according to scientific empirical and objective rules (1.). On the other hand, the law has to verify the compliance of DNA evidence with standards of proof, according to a normative and subjective different set of rules (2.). However, the “scientific truth” could differ from the “legal truth” and the judge has the final word on the interpretation of the evidence.

1. Scientific Admissibility of DNA Evidence

*“Some place their faith in forensic science to the degree that they are under the impression that it is absolute, infallible, and unassailable. In truth it is a manmade construct, dependent on manmade machinery, man-calibrated accuracy, man-led action under manmade protocols and analysed by man- an altogether human construct.”*³³ American Academy of Forensic Sciences.

A Risk of Contamination

As with all sciences, DNA fingerprinting contains a margin of error that is crucial to determine. How could we rely on one laboratory result to judge a defendant without being a hundred per cent sure of the certainty of this result? Is there any “hundred percent” when it comes to science, a “human construct”(as quoted above)? Sometimes, a suspect could be declared by mistake to match with the profile found at the crime scene, it is called a “false positive”. Conversely, when the two DNA samples are said to be different while they come

³² Fraser, 2009, p. 9.

³³ American Academy of Forensic Sciences (AAFS) in Pyrek, 2007, p. 2.

from the same person, it is called a “false negative”. Koehler suggested that “false positives occur in 1-4% of cases”³⁴.

Even though nothing prevented DNA in becoming routine evidence, the question of its reliability has caused a so called “DNA war” according to the expression of William C. Thompson³⁵. The case *People v. Castro*³⁶ of 1989 kicked off a long discussion on the admissibility of DNA evidence. Scientists were divided and some claimed to exclude DNA profiling from the court, as Farrington said playing with the acronym “DNA”: “Do Not Accept”³⁷.

As it is quoted above, forensic science is a “manmade construct” where mistakes could occur at every stage of the experimental process, from laboratory manipulations to interpretation of the results.

First of all, there is a constant risk of contamination of the DNA samples. “Contamination” is the word used for a transfer of external DNA into the crime scene sample or the suspect’s sample. It could occur at each stage of the analysis. When the external DNA was on the scene before the crime itself, it is called “adventitious transfer”. We reproduced below the schema made from the *Handbook of Forensic Science*³⁸ to illustrate the chain of possible transfers:

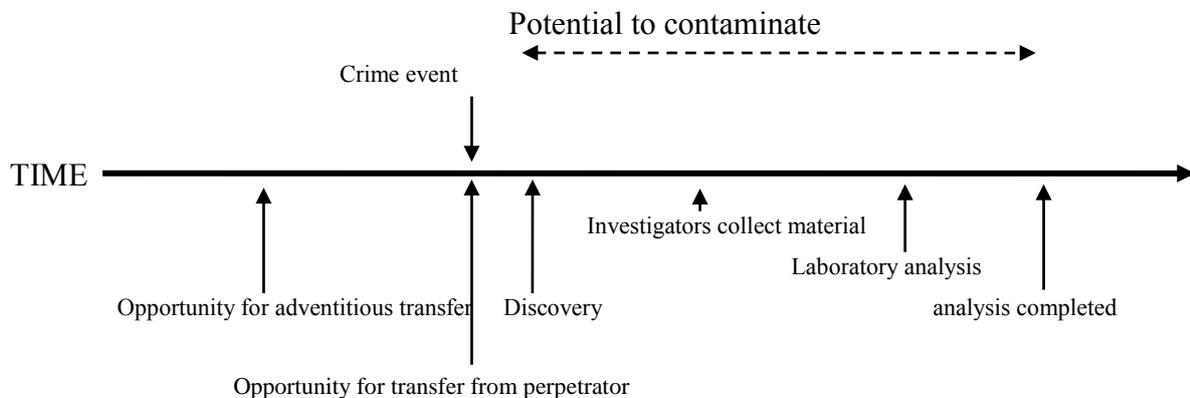


Figure 5: A timeline illustrating potential DNA transfers.

At any time, there are many risks of contamination when there is contact with “investigative officers/pathologists” or “laboratory staff”. It could also be when there is mislabeling of tubes, “cross-contamination [...] in the laboratory” or “plastic-ware contamination (may be

³⁴ Koehler, 1993, p. 26.

³⁵ Thompson, 1993.

³⁶ *People v. Castro*, 545, N.Y.S.2d 985 (1989).

³⁷ Farrington, 1993.

³⁸ Gill *et al.*, 2009, p. 46.

contaminated at the manufacturing source)” as explained by Peter Gill and his coworkers³⁹. This last example can be illustrated by the story of the “Phantom of Heilbronn”. From 1993 to 2009, the DNA of a mysterious woman was found on 40 crime scenes in Germany, France and Austria. She was wanted for six murders and other offenses and an important budget had been spent to investigate. A reward to help arrest her was offered in Germany, with the value of up to 300,000 Euros⁴⁰. Finally, this woman appeared to be a staff member of the industry making the cotton swabs used for DNA sampling on crime scenes. She was totally innocent but she involuntarily contaminated a lot of DNA samples.

Thus, the question remains why did the police persist so much to investigate on the basis of one form of evidence that presented so many contradictions? Indeed, some crimes occurred nearly at the same time but were geographically very far away from each other. This example shows the difficulty to question DNA fingerprint’s, even for professional investigators. It even overshadowed other kinds of evidences since many witnesses or other perpetrators of these crimes denied the presence of any woman in the crime. Carole McCartney warned that “(i)nsufficiently ‘forensically aware’ police officers may resort to DNA evidence in lieu of proper detective work, with literature on ‘case construction’ informing analysis of potential pitfalls of early reliance on DNA results, which may increase the risk of ‘tunnel vision’ in criminal investigations.”⁴¹

Thus, the relevance of DNA evidences has to be put into perspective. When someone’s DNA fingerprint is taken from the crime scene, it doesn’t mean that the person was there *during* the crime or that he or she is the perpetrator. Similarly, if the crime scene’s profile doesn’t match the suspect’s profile, then the sample could have been “adventitiously transferred” or “contaminated”. No match would not mean either that the suspect is not the perpetrator or that the sample belongs to the real perpetrator. This is one of the reasons why DNA evidence is considered as circumstantial and not as direct evidence.

Experimental Interpretations

The other difficulty to assess DNA evidence concerns the interpretation of the results.

The autoradiograph shown in *Figure 4* is very clear but it is not always the case in laboratories. Experts have to interpret the bands in a way which could sometimes seem

³⁹ *Ibidem*, p. 47.

⁴⁰ Editors, *The Local*, 2009.

⁴¹ McCartney, 2005, p. 1.

approximate. As it was shown earlier, we compare two series of bands representing the two samples' loci. If they are similar, we conclude to a match. But how similar should they be?

It is not that easy to read electrophoresis results and some unexpected phenomena could happen. For example, during the migration of the fragments, two samples could meet in the gel. Then, there will be "band-shifts" in the picture that could lead to a false positive conclusion because the profiles would be similar.

Another difficulty, which leads to serious discussions, is when two samples present similar bands but one sample has one (or some) more bands. The expert could then either conclude to a match and declares these extra bands as "artefact bands" (like with the "band-shifts") or conclude to a non-match saying that these bands represent different alleles and thus another DNA profile.

It is here difficult to prevent any subjectivity in the interpretation. William Thompson⁴² tested some specialists by asking them to interpret same results but presented under different stories. According to the story, the experts made different conclusions based on the same autoradiograph. Some concluded that the extra band was an artefact, some that it was another allele. This experience also raises concerns on the role of forensic experts in investigation. How much should they know about the case? To what extent could it affect their neutrality?

Statistical Interpretations

When interpreting DNA profiling results, the use of probabilistic methods is very important. Discrepancies in the autoradiograph results have to be evaluated and well explained to legal experts. Mike Redmayne insists that these "...discrepancies between two profiles which are said to match can considerably decrease the strength of DNA evidence."⁴³

The DNA probabilistic estimations are mainly based on the Bayesian analysis. The Bayes' theorem is a formula to calculate conditional probabilities. In term of evidences, it calculates their weight called "likelihood ratio" (LR). This method is well explained by the International Society of Forensic Genetics (ISFG) DNA Commission⁴⁴. We must compare two probabilities: the probability of the evidence "given guilt" which is the prosecution hypothesis (H_p) and the probability of the evidence "given innocence" which is the hypothesis of the defence (H_d). (E) is the sample evidence:

⁴² Thompson, 1993, p. 26.

⁴³ Redmayne, 1995, p. 467.

⁴⁴ ISFG, at <http://www.isfg.org/Publications/DNA%20Commission> (Consulted on 12 May 2012).

$$LR = \Pr(EH_p) / \Pr(EH_d)$$

So, according to this formula, when the result is above 1, the prosecution hypothesis is superior and we could conclude that the defendant matches the crime scene sample. If it is less than 1, the defendant is more likely innocent following the defence theory.

There are also other probabilistic methods to assess DNA evidence than the Bayesian approach. We will only name the “frequentist” approach, the “probability of inclusion”, the “probability of exclusion” and the “Random Man Not Excluded” (RMNE).

Finally, to assess the relevance of a match, there are other important probabilities that the forensic expert needs to know. The “match probability” calculates the probability of the match having occurred by chance between all of the individuals presenting the same allele. For that, we must know the alleles which vary among individuals and the frequency of these alleles within the population. Databases could be a useful tool to estimate such frequency. This probability is calculated by the “product rule”⁴⁵.

Despite all of these sophisticated methods to interpret a DNA profiling result, its reliability is still not a “hundred percent”. LaMance reported that some estimates “...the odds of a *coincidental* match are 1 in 108 trillion. Other estimates are 1 in 113 billion, 1 in 10 billion, or 1 in 8192.”⁴⁶

From the Laboratory to the Courtroom

This last “product rule” technique was important to highlight because it is subject to another type of controversy than reliability. Indeed, the study of allele frequency between humans can be translated in “population genetics”. Concretely, it could define racial groups such as Asian, Caucasian, Afro-Caribbean, Hispanic and others. This discriminating analysis was criticised in the previously mentioned *People v. Castro* case and will be largely discussed in Part IV. However, constituting such groups might be relevant in criminal investigation. For instance, if a suspect has blond hair and blue eyes, it might not be useful information in Sweden but it could be in Mali.

The transition of results from the laboratory to the courtroom is another challenge. How to

⁴⁵ The “product rule” is “the probability of a particular multiple-locus genotype obtained by multiplication – by multiplying together the frequencies of the per-locus genotypes, which is to say, by multiplying together the frequencies of all the individual alleles and including in addition a factor of 2 for each heterozygous locus.” Definition from the Forensic Mathematics website, at <http://dna-view.com/profile.htm> (Consulted on 03 June 2012).

⁴⁶ LaMance, 2011.

translate scientific language in an understandable way for lawpersons? A probability could relativize the reliability of DNA evidence, and question a decision. It could have important consequences as Koehler demonstrated in an experiment reported in the article “The psychology of Numbers in the Courtroom.”⁴⁷ It shows that the jury could give different conclusions on the same number, depending on the way it was presented. This experiment is reminiscent of the one conducted by Thompson but on scientists, as mentioned above. The previous AAFS’s citation “...analysed by man” makes sense again here. Thus, there are different ways to read the same DNA result, despite its appearance as objective and purely scientific information.

The more a judge or a police officer ignores the probabilistic subtleties, the more they may have wrongful prejudices and interpretation. Thus, a common language is essential to discern between expressions such as “match”, “consistent with”, “association between”, “could have come from”, “provides strong evidence of a link between”, “supports an assertion that”...that constitute the laboratories reports.

2. Legal Admissibility of DNA Evidence

What is Good Science?

In the first place, it is necessary to discern the different relationships of science and the law when it comes to either civil or criminal cases in the UK. Civil cases would more deal with science when it causes injuries in terms of, for instance, product toxicity or for other business-related issues such as patents. Scientific actors could be directly part of the trial on the defendant or plaintiff's side.

Concerning criminal cases in general, there is a whole range of forensic experts which are helping the investigation by providing technical information, mainly on evidences. The main specialities are forensic anthropology, criminalistics, forensic odontology, forensic psychiatry, forensic toxicology, forensic serology and forensic DNA analysis.

DNA typing, as with all other forensic sciences, has the double challenge of having to always comply with scientific criteria but also having to fit in with current English legislation. Erin Murphy emphasises that “(t)o ensure the production of reliable forensic evidence, each side must guarantee that the technique used to interpret the evidence is generally reliable as a

⁴⁷ Koehler, 2001.

method, and that the technique was executed reliably in a particular case.”⁴⁸

Is it the court role to assess the very complex question of “what is good science”? We will here talk about two US important cases because they have been similarly inspiring for the UK legislation, sharing the same concerns.

Terrence Kiely explained the court criteria for admissibility evidences following the question: “Is this proffered expert opinion based upon a *generally accepted* and/or *reliable* scientific methodology?”⁴⁹

The expression “*generally accepted*” was first used in the case *Frye v. United States*⁵⁰ which, in 1923, ruled on the admissibility of the “systolic blood pressure deception test” as evidence: “Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone, the court continued, the evidential force of the principle must be recognised scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”⁵¹

This “Frye Standard” was a first step in requiring to the forensic evidences a minimum of reliability and credibility. As the court couldn't be an expert on scientific matters, it established that any methodology that was “generally accepted” by the “relevant scientific community”⁵² would also be accepted by the law.

Another case played a corner stone role in controlling the expert testimonies: *Daubert v. Merrell Dow Pharmaceuticals*⁵³ in 1993. In this case, an epidemiological methodology showed that the drug called Bendectin was provoking foetal malformations. The defendant questioned the reliability of this technique. The court concluded that the “Frye Standard” was not enough and established the “Daubert Standard” as the following. There are factors to help a judge's “gatekeeping determination” for the admissibility of forensic expert's testimony, and it depends on:

- “Whether a theory or technique can be (and has been) tested;
- Whether it has been subjected to peer review and publication;
- Whether, in respect to a particular technique, there is a highly known or potential rate of error and whether there are standards controlling the technique's operation;

⁴⁸ Murphy, 2007, p. 742.

⁴⁹ Kiely, 2001, p. 7.

⁵⁰ *Frye v. United States*, 54 App.D.C. 46 293 F. 1013 (1923).

⁵¹ *Ibidem*.

⁵² *Ibidem*.

⁵³ *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S 579, 113 S.Ct. 2786 (1993).

- Whether the theory or technique enjoys general acceptance within a relevant scientific community.”⁵⁴

The “Frye Standard” and the “Daubert Standard” have been inspiring both the American and English courts.

The law gave basic standards to validate the use of scientific techniques within criminal prosecutions. However, it doesn’t make the court understand these techniques neither does it make them able to adapt to their rapid evolution. For instance, DNA typing is more specialised and less understandable than its predecessor, the fingerprinting technique.

By this way, Erin Murphy makes a distinction between a “first generation” and a “second generation”⁵⁵ of forensic technologies. The first generation concerns forensic methods such as handwriting analysis, ballistic evidences, hair or fibre evidences or fingerprinting. The second generation techniques are location tracking with the Global Positioning System (GPS) or Radio-Frequency Identification (RFID), biometric scanning of the iris, facial recognition or DNA typing.

Compared to the previous ones, these techniques require a high level of technology and are also capable of extracting more information, which could raise issues of individual privacy and freedom as it will be discussed in Part III and IV.

Independence and Quality?

Finally, we will highlight a last point regarding the relationship between forensic laboratories, the courtroom and the authorities. Indeed, any collision could impede the neutrality of forensic experts, influence the laboratory results and might endanger the whole trial. The problem is that, in the UK, many laboratories are working jointly with law enforcement and have less contact with the defendant party. Pr. Duarte Nuno Pessoa Vieira clearly stated that “forensic laboratories should not work with the prosecution, or with the investigative police. As a start, they shouldn’t be in the same structure, to ensure that they are independent.”⁵⁶

Moreover, not only governmental interests, but also private interests could impede the good work of forensic experts. The fact that these technologies are becoming more and more sophisticated implies a need for specialised engineers and creates a risk of proprietary interests and patent issues. These business factors could create differences of quality between

⁵⁴ Kumho Tire v. Carmichael, 119 S.Ct. 1175 (1999).

⁵⁵ Murphy, 2007, p.722.

⁵⁶ See Duarte Nuno Pessoa Vieira, Interview 1, Annexes, p. 101.

private and governmental laboratories.

In this regards, quality controls are also absolutely necessary to limit the rate of mishandling in DNA profiling. The International Laboratory Accreditation Cooperation (ILAC) established, for instance, a *Guideline for Forensic Science Laboratories*⁵⁷. Some would say that such guidelines must be compulsory prior to the validation of DNA evidences in the court. Eric Lander denounces that the quality controls are lower in forensic laboratories than in others. It is a “...paradoxical result that clinical laboratories must meet higher standards to be allowed to diagnose strep throat than forensic labs must meet to put a defendant on death row.”⁵⁸

The laboratory procedures are very important, but it is not the first step to constitute DNA evidences. The police has to first collect DNA samples from both the crime scene and from the suspect. The DNA collection raises important concerns on the prior consent of the suspect. We will detail and discuss this in the following Part II.

⁵⁷ ILAC, 2002, at http://www.homeoffice.gov.uk/publications/police/operational-policing/Forensic_Practitioner_Stand1.pdf?view=Binary, (Consulted on 26 June 2012).

⁵⁸ Lander, 1989, p. 505.

PART II. DNA SAMPLING AND PRIOR INFORMED CONSENT

*“Consent by coercion, however subtle, is not voluntary consent.”*⁵⁹ Krinsky and Simoncelli.

Before reaching the courtroom, the constitution of DNA evidence could challenge human rights in every step; from the collection to the retention, including possible further uses of DNA samples. This chapter focuses on the collection of DNA samples from citizens suspected to be involved in a crime.

To use DNA as evidence, it first has to be taken from the crime scene. Then, it can be compared with either DNA taken from a suspected citizen or DNA profiles stored in the NDNAD. Not only could the suspects be asked to give their DNA, but the victims, witnesses or family members (although it could concern other cases rather than just criminal cases).

There are several ways to collect DNA from a suspect in the UK. Law enforcement officers can seek a court order which makes the DNA sampling compulsory. Without court orders, they can sample the person concerned with (or without) prior consent. DNA could also be located where the suspect left some traces on items or in pre-existing DNA “bio-banks” such as in medical records. Finally when there is no direct suspect, a large group of persons corresponding to the perpetrator’s profile could be DNA sampled. This last case is commonly called “DNA dragnet”.

To collect DNA, law enforcement must take into consideration both the medical consent to take a biological sample from the person, and the consent to use this sample for investigation purposes. In this Part II., we will first discuss the right to consent to take a DNA sample (A.) under medical law (1)) and then how this right is respected under the police authority (2)). Then we will see the right to refuse in accordance to the other arrestee’s rights (3)). Secondly, we will analyse the other ways to get DNA sample and the compliance with the person’s human rights (B.). Police officers might choose discretion by indirectly getting DNA (when they have a known suspect) (1.)). They could also decide to investigate publicly with “DNA dragnets” (without direct suspect) (2.)).

⁵⁹ Krinsky & Simoncelli, 2010, p. 51.

A. DNA Sampling as a Routine Procedure

*“One basic goal of critiques of the post-rape gathering of forensic evidence [...] is to keep rape victims conscious, active, consenting, and- no matter what the discomfort- in full possession of a coherent self. The declarations of consent are repetitive; the extent to which the rape victim is always hyperbolically aware of what is going on is extraordinary.”*⁶⁰

Ruth A. Miller.

Collecting DNA samples touches the physical integrity of the person, regardless of the statute of either patient or arrestee. The act of taking a biological sample is invasive and thus should be done by a healthcare professional. First, we will see the general legal framework to the right to prior informed consent (1)). Then we will see how English criminal law could overshadow medical law in the situation of criminal investigation (2)). Finally, we will see that requiring DNA samples from an arrestee hardly respects his or her rights to refuse and to not self-incriminate (3)).

1) Medical Prior Informed Consent

An International Recognition

Extracting DNA material from a human body is an invasive procedure, and has to be considered as a medical act. The investigative purpose of DNA sampling is secondary to the interest of the patient, under medical law. DNA sampling touches the physical integrity and thus needs a prior informed consent from the person concerned. Only doctors, nurses or other health care professionals should proceed, even in a judicial context or under custody. Numerous guidelines and conventions warn physicians about misuses of genetic material and the necessity to respect the patient’s rights when using their DNA. The *Universal Declaration on the Human Genome and Human Rights* of the United Nations Educational Scientific and Cultural Organization (UNESCO) adopted on the 11 November 1997 emphasises in article 5 paragraph a) that “(r)esearch, treatment or diagnosis affecting an individual’s genome shall be undertaken only after rigorous and prior assessment of the potential risks and benefits pertaining thereto and in accordance with any other requirement of national law.”⁶¹ The

⁶⁰ Miller, 2007, p. 117.

⁶¹ <http://www2.ohchr.org/english/law/genome.htm> (Consulted on 12 March 2012).

Nuremberg Code drafted ten principles. Out of the ten, it places the “consent” as first: “The voluntary consent of the human subject is absolutely essential.”⁶²

The European *Convention on Human Rights and Biomedicine* of 1997 reminds that “...(a)n intervention in the health field may only be carried out after the person concerned has given free and informed consent to it. This person shall beforehand be given appropriate information as to the purpose and nature of the intervention as well as on its consequences and risks. The person concerned may freely withdraw consent at any time.”⁶³

Informed consent often refers to a voluntary agreement of a patient before an intervention in medical context. The person needs to receive all information necessary and intelligibly in order for him or her to understand it and evaluate the possible consequences, when he or she has the intellectual capacity to do so. Indeed, the person concerned could be not able to consent. This will be the case with minors or with adults having “mental disabilities, a disease or for similar reasons”. In these cases, “the intervention may only be carried out with the authorization of his or her representative or an authority or a person or body provided for by law.”⁶⁴

The *Universal Declaration on the Human Genome and Human Rights* states in its article 5 paragraph b) that “(i)f the latter [person] is not in a position to consent, consent or authorization shall be obtained in the manner prescribed by law, guided by the person’s best interest.”⁶⁵ The *Additional Protocol to the Convention on Human Rights and Biomedicine, concerning Genetic Testing for Health Purposes* of 2008 also insisted on these rights.

Another situation could raise some issues: taking post-mortem samples on victims. How does one figure out whether or not DNA sampling would go against the victim’s consent? Should everyone write previous wishes in this regard? The *Convention on Human Rights and Biomedicine* says that the “[...] previously expressed wishes relating to a medical intervention by a patient who is not, at the time of the intervention, in a state to express his or her wishes shall be taken into account.”⁶⁶ Unfortunately, such wishes are barely taken into consideration in the context of investigation. It seems that the interest of the victim and the society to catch the perpetrator is above the interest to preserve the victim’s bodily integrity. Thus, considered DNA sampling as a medical act, law enforcement officers must ask a health

⁶² <http://ohsr.od.nih.gov/guidelines/nuremberg.html> (Consulted on 12 March 2012).

⁶³ *Ibidem*.

⁶⁴ *Ibidem*.

⁶⁵ http://portal.unesco.org/en/ev.php-URL_ID=13177&URL_DO=DO_TOPIC&URL_SECTION=201.html (Consulted on 12 March 2012).

⁶⁶ <http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=164&CL=ENG> (Consulted on 12 March 2012).

care professional, a nurse or a physician to proceed. However, it is not always the case in the UK.

Willful Default or Neglect?

All the considerations written in international legal texts were made in the context of medical or scientific research. They do not mention much regarding the judicial use of scientific methods such as DNA fingerprinting. It might be thought that it is because forensic techniques were not as developed at the time of the drafting of the texts. However, the 2003 *International Declaration on Human Genetic Data* precises that “[...] the provisions of this Declaration apply to the collection, processing, use and storage of human genetic data, human proteomic data and biological samples, except in the investigation, detection and prosecution of criminal offences and in parentage testing that are subject to domestic law that is consistent with the international law of human rights.”⁶⁷

Why would there be differences between medical, research and investigative fields when taking DNA samples? Even if the purposes are different, the act of taking a biological sample from someone’s body is exactly the same. Does a potential suspect deserve less individual protection than a patient?

Some would say that security matters are superior because they are dedicated to the good of the population, but is medical research not dedicated to the good of humanity? For both practices, any unreasonable restriction of the individual’s privacy and freedom should be equally considered as abusive.

The *WMA Declaration of Helsinki* explicates in its article 11 that it “...is the duty of physicians who participate in medical research to protect the life, health, dignity, integrity, right to self-determination, privacy, and confidentiality of personal information of research subjects.”⁶⁸ Similarly in the UK, the *Human Rights Act* of 1998 frames the police power in the respect of the constitutional rights of citizen.

However, some proponents of DNA sampling under criminal investigation question the definition of “medical act”. Elliott and Quinn stated that “DNA collection is not considered an intrusive surveillance technique similar to bugging, intercepting communication and covert

⁶⁷ http://portal.unesco.org/en/ev.php-URL_ID=17720&URL_DO=DO_TOPIC&URL_SECTION=201.html (Consulted on 12 March 2012).

⁶⁸ <http://www.wma.net/en/30publications/10policies/b3/index.html> (Consulted on 12 March 2012).

investigation.”⁶⁹ Rothstein and Carnahan mentioned that it can be “...suggested that the actual physical intrusion of a DNA test is minimal (and are therefore perhaps not even a search) and in the case of criminals they already have reduced privacy rights due to their status.”⁷⁰

2) The Right to Consent of Arrestees

Biology under Custody

Law enforcement officers are bound by the *Human Rights Act* of 1998 to respect the rights of citizens under their investigation. They should be obliged to respect individual’s bodily integrity and ask for the consent of any person under their custody before they take his or her biological samples. When the public security is threatened and the suspect is very likely to be the perpetrator, a special warrant might be delivered to make DNA sampling compulsory. Such warrants might help to increase the efficiency of investigations but overshadow the individual’s right to consent. Nevertheless, there is not always a need to act following court orders in the UK. Taking samples with respect to the prior informed consent could be enough. In England and Wales, the *Police and Criminal Evidence Act* 1984 (PACE) established the legislative framework of the police powers regarding DNA sampling. It differentiates between two types of samples: intimate (blood, semen, tissue, fluid, urine, saliva, pubic hair...) and non- intimate (hair other than pubic hair, nail, skin impression...) samples.

Intimate samples can be taken from anyone in custody if “a police officer of inspector rank or above has reasonable grounds to believe such an impression or sample will tend to confirm or disprove the suspect’s involvement in a recordable offence” and “with the suspect’s written consent”⁷¹. For instance, the PACE states that “(d)ental impressions may only be taken by a registered dentist.”⁷²

For a person not in police detention “but from whom two or more non-intimate samples have been taken in the course of an investigation of an offence and the samples, though suitable, have proved insufficient if”⁷³ the inspector authorises it and with a written consent from the person.

⁶⁹ Elliott & Quinn, 2007, p. 370.

⁷⁰ Rothstein & Carnahan, 2001, p. 159.

⁷¹ <http://www.homeoffice.gov.uk/publications/police/operational-policing/pace-codes/pace-code-d?view=Binary> (Consulted on 20 March 2012).

⁷² PACE, at <http://www.legislation.gov.uk/ukpga/1984/60/contents> (Consulted 10 May 2012).

⁷³ *Ididem*.

Non-intimate samples require a written consent of the person concerned but under certain circumstances; otherwise they could be taken without his or her appropriate consent. This would be the case if “the person is in police detention as a consequence of his arrest for a recordable offence and he has not had a non-intimate sample of the same type and from the same part of the body taken in the course of the investigation of the offence by the police or he has had such a sample taken but it proved insufficient.” Or “where he is being held in custody by the police on the authority of a court and an officer, of at least the rank of inspector, authorises it to be taken.”⁷⁴

A Custom-Made Consent?

Surprisingly, the next paragraph 6.7 even points out that “(r)easonable force may be used, if necessary, to take a non-intimate sample from a person without their consent”⁷⁵. The inspector may do this if “there are reasonable grounds for believing the sample will confirm or disprove the involvement in a serious arrest able offence.”⁷⁶ Thus, there are some cases where a DNA sample could be taken without the consent of the person, even using “reasonable force”.

“Non-intimate” samples could be found either on or around the suspect (such as hair) and do not require invasive procedures and medical intervention.

This measure goes against the *International Declaration on Human Genetic Data* of 2003 in its article 8: “Prior, free, informed and express consent, [...] should be obtained for the collection of human genetic data, human proteomic data or biological samples, whether through *invasive or non-invasive procedures...*” However, the Declaration opens this article to eventual restriction by domestic law (in accordance with human rights), including criminal law.

In 1994, the *Criminal Justice and Public Order Act (CJPOA)*⁷⁷ enlarged the discretionary power of police officers. The expression “serious arrest able offence” was changed to “recordable offence” enlarging the scope of suspects susceptible to be asked to give biological samples, with or without consent.

Mouth samples changed their statute from “intimate” to “non-intimate” samples and thus could be taken without proper consent. Indeed, the “buccal swabs” were considered as less

⁷⁴ *Ibidem*.

⁷⁵ *Idibem*.

⁷⁶ Liberty, *Fingerprints, Photographs and Samples*, 2008, at <http://www.yourrights.org.uk/yourrights/the-rights-of-suspects/the-rights-of-suspects-in-the-police-station/fingerprints-photographs-and-samples.html> (Consulted on 15 May 2012).

⁷⁷ <http://www.legislation.gov.uk/ukpga/1994/33/part/IV/crossheading/powers-of-police-to-take-body-samples>

invasive and less painful than blood samples. According to the organisation GeneWatch UK, “(t)his meant the police could now take samples without assistance from a doctor and could collect mouth scrapes and hair roots by force if necessary.”⁷⁸

Going into the mouth of arrested citizens might still be a matter of bodily integrity. During a demonstration, an arrested student testified in this practice: “Each swab was like being coerced into giving up part of my being. The government had already taken my possessions and clothing, now they were taking the building blocks of my own body. It seems like some ownership of myself has been lost and my privacy violated.”⁷⁹

Thus, the prior consent doesn’t seem to be considered as undertake able right that suspects enjoy, in the UK. When there is no direct need to ask consent to take DNA samples, as is the case under court orders or with “non-intimate” samples, there could be a risk to overshadow suspects’ constitutional rights and to undermine their body integrity.

Should DNA fingerprinting be only considered as “scientific research” in order to be under medical law and not under a more lax criminal law? Indeed, this technique is not only used by forensic laboratories but also by regular scientific laboratories. This proposal is interesting to protect the right to prior consent under criminal investigation but it is not realistic concerning the different uses of the DNA samples. The DNA samples collected by the police must be used for identification purposes only. Using them for scientific research interests would be a serious breach of confidence as we will see in Part IV.

Concerning the consent of the person to use his or her DNA for investigation purposes, police officers have the duty to explain why they need a DNA sample and it has to be recorded. According to PACE, “(b)efore any intimate sample is taken with consent or non-intimate sample is taken with, or without, consent, the person must be informed:

- (a) Of the reason for taking the sample;
- (b) Of the grounds on which the relevant authority has been given;
- (c) That the sample or information derived from the sample may be retained and be the subject of a speculative search (...) unless their destruction is required (...).”⁸⁰

The information has to be given in a language that the person concerned can understand. It must also be understood that this sample could be used against the person in the trial and that

⁷⁸ GeneWatch, *A Brief Legal History of the NDNAD*, at <http://www.genewatch.org/sub-537968> (Consulted on 23 May 2012).

⁷⁹ Aakash Desai in *Haskell v. Brown*, 677 F. Supp. 2d 1187 (N.D. Cal. 2009).

⁸⁰ <http://www.legislation.gov.uk/ukpga/1984/60/contents> (Consulted on 20 March 2012).

it is possible to withdraw before giving it. Finally, the choice can be made in the presence of a lawyer.

3) What if I Say “No”?

The Illusion of Choice

Regarding medical consent, the *WMA Declaration of Helsinki* says that some “...research populations are particularly vulnerable and need special protection. These include those who cannot give or refuse consent for themselves and those who may be vulnerable to coercion or undue influence.”⁸¹ What exactly is a vulnerable person? Could we say that anyone arrested and held in custody is “vulnerable to coercion or undue influence”? Does he or she really have the choice to “say no”? How could the professional health care taking blood from this person be sure of his or her full consent in such a situation?

By consenting to give a biological sample, even an innocent suspect takes a minimum risk to be wrongly inculpated. As seen in Part I., false positive matches could occur with, for instance, an adventitious transfer. Thus, it is important to recognise the right to refuse as part of the right to remain silent under investigation and the right against self-incrimination.

The right to remain silent is not explicitly written in the *European Convention on Human Rights* but in the case *Murray v. UK* it is said that “(a)lthough not specifically mentioned in Article 6 of the Convention, there can be no doubt that the right to remain silent under police questioning and the privilege against self-incrimination are generally recognised international standards which lie at the heart of the notion of a fair procedure under Article 6 [...]”⁸².

In England and Wales, it is not compulsory to help the police to investigate. To be a fair choice, the suspect must be protected from adverse inferences when deciding to remain silent and to not self-incriminate. However, the CJPOA mentions that such inferences will be if the accused “fails to mention any fact which he later relies upon and which in the circumstances at the time the accused could reasonably be expected to mention; fails to give evidence at trial or answer any question; fails to account on arrest for objects, substances or marks on his person, clothing or footwear, in his possession, or in the place where he is arrested; or fails to account on arrest for his presence at a place.”⁸³

⁸¹ <http://www.wma.net/en/30publications/10policies/b3/index.html> (Consulted on 20 March 2012).

⁸² *John Murray v. the United Kingdom* - 18731/91 ECHR (8th February 1996).

⁸³ <http://www.legislation.gov.uk/ukpga/1994/33/section/38> (Consulted on 28 March 2012).

When suspects refuse to give DNA samples, the police can declare this refusal dubious and call for a court order. In fact it seems like there is no real choice for the suspect to use his or her right to remain silent in this situation.

Innocent until proved guilty?

The use of DNA fingerprints might also threaten the principle of presumption of innocence. The presumption of innocence is considered as a fundamental right within international, regional and even national laws. According to article 11.(1) of *The Universal Declaration of Human Rights*: “Everyone charged with a penal offence has the right to be presumed innocent until proved guilty according to law in a public trial at which he has had all the guarantees necessary for his defence.”⁸⁴ The *European Convention on Human Rights* follows suit in its article 6 of the right to a fair trial: “Everyone charged with a criminal offence shall be presumed innocent until proved guilty according to law.”⁸⁵ The *Charter of Fundamental Rights of the European Union*⁸⁶ also has the presumption of innocence recognized in its article 48.

In the United Kingdom, this principle seems to be less respected. According to the *Regulation of Investigatory Powers Act* of 2000, a suspect under custody cannot be forced to cooperate, but not answering could be prejudicial at trial⁸⁷. The PACE says that before “...a suspect is asked to provide an intimate sample, they must be warned that if they refuse without good cause, their refusal may harm their case if it comes to trial...”⁸⁸ This article could be seen as a threat to the presumption of innocence, to the right to remain silent as well as to the right against self-incrimination.

The English organisation Liberty informs, regarding DNA sampling, that when someone “...refuses to consent without reasonable cause the court or jury may - in committal proceedings or at a trial - draw such inferences from the refusal as appear proper, and the refusal may be treated as corroboration of any evidence against you to which the refusal is material. Suspects must be warned of this before being asked to provide such a sample.”⁸⁹ This kind of warning might result in pressuring (or even blackmailing) someone to give a

⁸⁴ <http://www.un.org/en/documents/udhr/index.shtml#a11> (Consulted on 28 March 2012).

⁸⁵ <http://www.echr.coe.int/nr/rdonlyres/d5cc24a7-dc13-4318-b457-5c9014916d7a/0/englishanglais.pdf> (Consulted on 28 March 2012).

⁸⁶ http://www.europarl.europa.eu/charter/pdf/text_en.pdf (Consulted on 28 March 2012).

⁸⁷ <http://www.legislation.gov.uk/ukpga/2000/23/contents> (Consulted on 03 May 2012).

⁸⁸ <http://www.legislation.gov.uk/ukpga/1984/60/contents> (Consulted on 03 May 2012).

⁸⁹ Liberty, 2008.

DNA sample. Besides, becoming the main suspect of an investigation by simply refusing to give a biological sample could have consequences on the reputation or even on mental well-being. Such situations will finally contribute “transferring the burden of proof from the police onto the citizen.”⁹⁰

On the other hand, a refusal from a direct suspect could seriously obstruct the investigation. Thus, in practice, law enforcement officers might be tempted to use more coercive methods to convince the suspect to cooperate. Measures to prevent such drift should be set up instead of the ambiguous article in PACE, which was previously referred to: “(r)easonable force may be used, if necessary, to take a non-intimate sample from a person without their consent”⁹¹.

B. Consent as an Optional Right

*“Nothing to hide, nothing to fear?”*⁹² Human Genetics Commission.

The medical prior informed consent is a first “obstacle” for investigators to get biological samples from suspects. Concerning the possible uses of DNA samples in England and Wales, Elazar Zadok and his colleagues say that there are two types of “prior informed consent”: “the limited scope of consent and the unlimited consent.”⁹³ The first one allows only a restrictive use of the DNA sample, for the specific case the police is investigating in. The second one allows storing the DNA profile within the national database for possible further uses.

Obtaining the direct consent of suspects to sample their DNA is not the only way to collect DNA evidence. Law enforcement officers might pick up DNA traces left on items or use pre-existing databases made for another purpose such as medical records (1)). When they have no direct suspects, they can finally ask large groups of “voluntaries” to give their DNA during the so-called “DNA dragnets” (2)).

⁹⁰ Zadok *et al.*, 2010, p. 45.

⁹¹ <http://www.legislation.gov.uk/ukpga/1984/60/contents> (Consulted on 03 May 2012).

⁹² Human Genetics Commission, 2009.

⁹³ Zadok *et al.*, 2010, p. 45.

1) Other Sources of Genetic Data

A Trick on Track

DNA traces are left everywhere, by hairs on clothes or saliva on cigarette butts or on drinks. Could police officers look for such samples behind people's backs, the same way they take it from crime scenes? Will such DNA evidence be legally acceptable in the court?

The 2001 case of Robert William Bradford Jr. illustrates this point. The police officer Susana Hanna suspected the man to be the perpetrator of two rapes. She invited him to have lunch and used his straw from the drink to take his DNA. It matched with the DNA found for the two rapes and Bradford pleaded guilty. We are here far from seeking for the suspect's consent or trying to get court orders.

About the admissibility of such evidence, the own attorney of Bradford, Donald T. Barkemeyer, said: "We had every reason to believe the evidence would be allowed at trial. [Police] did not unreasonably seize or delay Mr. Bradford. He voluntarily had the soda with the cops. They were tricky. But they weren't illegal."⁹⁴ Indeed, Dean Robert Dinerstein explains that "(t)he state's argument would have been that the straw was abandoned or taken with his consent."⁹⁵ Steve Thompson also explains that "(m)any people consider this a violation [...] but since the object was (wilfully) discarded by the owner, he or she has no say in the matter."⁹⁶

The good faith of this reflexion could be discussed. The suspect did voluntarily abandon his straw after he finished drinking, but with the probable expectation of discarding it in the trash can. There was no contract between the customer (the suspect) and the employee (an actual detective) but there is a tacit agreement based on reasonable trust from any customer when giving private items to staff of any companies. In the same way, it will not be acceptable that a staff member look into a customer purse left at the cloakroom. Tricking suspects on basic trust within the customer-employee relationship could have negative consequences in society. This is even truer when it comes to DNA since it is nearly impossible to control where each of us leaves traces on a daily basis. Thus, under the scope of constitutional rights, the question remains whether or not to consider this evidence as lawful within the trial.

⁹⁴ Hanley, 2001.

⁹⁵ Dinerstein *et al.*, 2002, p. 410.

⁹⁶ Thompson, 2006.

Efficiency Versus Medical Secrecy?

There is another way to get DNA samples by looking into the so-called “biobanks” originally constituted for medical or research purposes. In the UK, there are several biobanks and they all contain genetic information on the patients. The government projected to gather them under a national “UK Biobank”. In 2009, the Joint Committee on Human Rights proposed to make “information-sharing orders”⁹⁷. This measure would have allowed DNA collected in the National Health Service and others to be shared with commercial companies without consent. The English population strongly reacted against this proposal which was temporary rejected. There are concerns over who can gain access to these biobanks and for what reasons. The *Equality Act* of 2010 restricts access to employers and insurers in order to avoid discriminating uses of genetic information. The *Human Tissue Act* of 2004 and the *Data Protection Act* of 1998 also regulate the “removal, storage and use of human tissues”. The *Human Tissue Act* settled the notion of “DNA theft” saying that “It is unlawful to have human tissue with the intention of its DNA being analysed, without the consent of the person from whom the tissue came from.”⁹⁸ Nevertheless, these Acts do not prevent the police from using medical records for investigative purposes. Investigators only need a court order to access medical records. The question remains; is a DNA sample still the possession of the patient once stored into databanks? Is the patient aware that his DNA could be one day used for other purposes than medicine?

Any medical act should be first in the interest of the person concerned as mentioned in the *WMA Declaration of Helsinki*: “In medical research involving human subjects, the well-being of the individual research subject must take precedence over all other interests”⁹⁹, as similarly expressed in the *WMA Declaration of Geneva*¹⁰⁰ or in the *WMA International Code of Medical Ethics*¹⁰¹.

Then, it is already questionable to take a sample from someone for non-medical but investigative reasons. But the function creep of medical data to identify criminals clearly does not consider the person’s direct interest. When a person gives a sample for medical purpose, his or her consent is only for an exclusive medical use as it is specified in the 1997 *Convention on Human Rights and Biomedicine* (not ratified by the UK). A warrant allowing

⁹⁷ Joint Committee on Human Rights, 2009, p. 19.

⁹⁸ <http://www.hta.gov.uk/legislationpoliciesandcodesofpractice/legislation/humantissueact.cfm> (Consulted on 10 May 2012).

⁹⁹ <http://www.wma.net/en/30publications/10policies/b3/> (Consulted on 10 May 2012).

¹⁰⁰ <http://www.wma.net/en/30publications/10policies/g1/> (Consulted on 10 May 2012).

¹⁰¹ <http://www.wma.net/en/30publications/10policies/c8/> (Consulted on 10 May 2012).

the police to use such medical data infringes automatically the privacy and the consent previously given by the patient.

According to article 15 of the 1966 *International Covenant on Economic, Social and Cultural Rights*, everyone should be able to “...enjoy the benefits of scientific progress and its applications”¹⁰². DNA data stored in biobanks and used for criminal investigation purposes could then be seen as a progress serving the State’s security. Nevertheless, the “benefits of scientific progress” should not be at the expense of constitutional rights of the people.

2) DNA Dragnets

A Participative Investigation

Taking DNA from a “direct” suspect challenges some constitutional rights. But what happens when there is no “direct” suspect? When the suspect’s profile is not precise enough to arrest someone? In this case, English law enforcement officers also found some interests in DNA evidence. They conduct the so-called “DNA dragnets” which consist in casting a wide net of persons corresponding to the perpetrator's profile and asking them to voluntarily give their DNA samples. In the United Kingdom, “DNA dragnet” is preferably called “Intelligence-led DNA screening” or “mass screening”. It is used for “elimination purposes” meaning to exonerate the wrongly suspected persons.

Leigh Harlan critically defines DNA dragnets as “essentially warrantless searches administered en masse to large numbers of persons whose only know connection with a given crime is that authorities suspect that a particular class of individuals may have had the opportunity to commit it.”¹⁰³

It is true that DNA dragnets differs from usual “police dragnets” which are defined as “A system of coordinated procedures for apprehending criminal suspects or other wanted persons.”¹⁰⁴ Here, the situation is reversed since police officers do not use all means to track down one suspect. Instead, they use one “mean” (DNA) to track down many suspects.

The 1987 *Colin Pitchfork* case (already mentioned in Part I) was the first case of “DNA dragnet”. So far, the most important dragnet has been conducted in Cloppenburg in Germany

¹⁰² <http://www2.ohchr.org/english/law/cescr.htm#art15> (Consulted on 10 May 2012).

¹⁰³ Harlan, 2004, p. 187.

¹⁰⁴ <http://www.thefreedictionary.com/dragnet> (consulted on 28 May, 2004).

in 1998 where 16,400 men between the ages of 18 and 30 voluntarily gave their saliva¹⁰⁵.

Each individual corresponding to the description of the suspect (which could be as vague as the age, the color of the skin or the gender) will give a sample on a voluntary basis. The notion of “consent” discussed above is found here under the expression “voluntary”.

It must include both the medical consent to take a biological sample from the person, and the consent to use this sample for investigation. Both of these consents require duly informing the persons concerned and permitting them to make an autonomous choice.

This “voluntary” principle has been largely criticised and questioned. Krinsky and Simoncelli say that dragnets “...are conducted without a warrant, probable cause, or individual suspicion. Should there be protections against coercion to obtain DNA samples?”¹⁰⁶

The people sampled give their consent to have their DNA used for the investigation. They can also give a written consent to add their DNA profile into the NDNAD, discussed in Part III.

Unlike, for instance, in Scotland, a volunteer giving one of the consents described above cannot withdraw. This illustrates the feature of wide police power allocated in England and Wales.

The destruction of DNA samples of volunteers eliminated from the investigation has also been largely discussed. The possibility to sample and store DNA of simple arrestees and volunteers was enlarged by the *Criminal Justice and Police Act 2001* and the *Criminal Justice Act 2003*. However, the recent *Protection of Freedoms Bill* adopted on the 1st May 2012 will allow the volunteers to withdraw their consent at anytime. All innocents should have their DNA samples automatically deleted after a certain deadline from when they are cleared. Nevertheless, a court warrant allowing the police to conduct DNA dragnets, under reasonable suspicion or probable cause, is still not required by law.

Is Voluntary DNA Sampling “Voluntary”?

The voluntary aspect of the procedure has to be put into perspective. When police officers in investigation ask a citizen for his or her DNA, it may be hard to decline the offer. Despite the possibility that the person could be perfectly innocent, it is always disconcerting or intimidating to be suspected as a potential “public enemy”.

Dean Robert Dinerstein describes the “(p)olice [...] going to citizens and suggesting, ‘Well, if

¹⁰⁵ Drobner, 2000, p. 481.

¹⁰⁶ Krinsky & Simoncelli, 2010, p. 49. (with italics in the original text)

you were innocent you would give us your DNA’.”¹⁰⁷ This statement would undermine “if you refuse to give us your DNA, then you are not innocent”.

To illustrate similarly in the US, the editors of the Journal *The New Atlantis* denounced that “in 2001, for example, police in Oklahoma returned to the homes of people who had refused to participate in a DNA dragnet with search warrants. These people were targeted as suspects—and subjected to a great deal of public embarrassment—because of their refusal to cooperate with the “voluntary” dragnet.”¹⁰⁸

Despite the possibility that some people might refuse to give their DNA to protect their privacy, it might be seen as a fear to give incriminating information. However, refusals do not mean admission of guilt. To be cleared from suspicion, the person has no choice but to give his or her biological identification without any chance to protect his or her privacy rights.

Another possible side-effect of DNA dragnets, besides breach of privacy and threat to presumption of innocence, is a feeling of discrimination. Targeting people on a large-scale based on physical criteria such as color of skin might create some tensions between the police and the groups concerned. Besides, there is a real risk of “racial profiling” that will be discussed in Part IV. Mark Rothstein supports that “(t)he sample population frequently consists of members of a single – often minority – racial or ethnic group.”¹⁰⁹

Thus, to avoid any excessive pressure on innocent people, the form of the request seems very delicate and important. Instead of physically asking the individuals, the police could, for instance, appoint by mails, or make a call through the media in order to ensure a truly “voluntary” participation.

Is DNA Dragnet efficient?

Are all these efforts worth it? Despite DNA dragnet costs in terms of civil liberties, it might finally benefit the society since the aim is to catch criminals. However, is it that efficient?

The *Colin Pitchfork* case was in fact nearly a failure since Pitchfork escaped from the actual DNA Dragnet. Indeed, he was warned of the general sample collection, and sent someone instead of himself. Years later, a woman overheard a conversation where he explained his trick and she reported it to the police.

DNA dragnet is indeed not a “discrete” means of inquiry and could give the perpetrator an

¹⁰⁷ Dinerstein, 2002, p. 418.

¹⁰⁸ Editors of *The New Atlantis*, 2005, p. 105.

¹⁰⁹ Rothstein *et al.*, 2006, p. 156.

opportunity to run away or to trick the police. Frederick Bieber and David Lazer ironically said that traditional "...DNA dragnets have had little success, as true perpetrators usually don't rush forward to volunteer a blood or cheek swab sample for comparison to crime scene evidence."¹¹⁰

Indeed, contrary to the statement of law enforcement officers, DNA dragnets do not always have an impressive success rate in catching criminals¹¹¹. Additionally, DNA dragnets could impede the effectiveness of the investigation by slowing it. Despite DNA analysis technologies having been improved, having thousands of people to sample would take time (giving the perpetrator, aware of the dragnet, an opportunity to flee away).

DNA dragnets could also have adverse effects on investigations. By regularly suspecting groups of the population, they could become very unpopular and "compromise community willingness to cooperate."¹¹² Nevertheless, a trustful relationship between police power and local citizens is essential for an effective investigation.

Thus, in terms of cost-efficiency, DNA dragnets should be based on the precision of the suspect's profile and the size of the geographical area in which to investigate. Elazar Zadok and his coworkers advised that DNA dragnets should never be conducted as "...a "stand-alone" operation" [...] but used in conjunction with other investigative means and relevant information sources, based not only on geographical or ethnic considerations."¹¹³

DNA collection is subject to the conflict of rights in balance between the State security interests and the individual interests. Tentative to incite or legally compel people to give private biological information has been done in many ways: by court order, by direct consent, by taking traces left on items, by using other databases or by conducting "voluntary" mass screenings. Given the fact that DNA contains potential inculpatory information, it is in the interest of criminal investigations to collect it and store it. However, in each case, the prior informed consent on medical invasive procedures and the informed consent on the investigative uses of the DNA samples have often been denigrated. The presumption of innocence, the right to not self-incriminate and the right to remain silent are rights belonging to all defendants and arrestees. They are also challenged by DNA sampling.

Whether DNA is voluntarily or compulsorily taken from someone, it is a physical intrusion. Despite buccal swabs being considered as "non-intimate" by the CJPOA, the notion of bodily

¹¹⁰ Bieber & Lazer, 2005.

¹¹¹ *Ibidem*.

¹¹² Zadok *et al.*, 2010, p. 44.

¹¹³ *Ibidem*, p. 43.

privacy is also a matter of an individual's perception. Genetic privacy in criminal investigation concerns DNA collection but also DNA storing in databanks, as we will discuss in the next part, Part III.

PART III. DNA DATA BANK AND RIGHT TO PRIVACY

*“The existence of a national DNA database in England & Wales is neither the inevitable outcome of either developments of the technology of DNA profiling nor its successful application to criminal case work by the police. Rather, the NDNAD is the purposeful creation of successive policy makers and legislators who have sought to harness the capacities of molecular biology to support important governmental ambitions in relation to the detection and reduction of crime.”*¹¹⁴ Williams *et al.*

Modern western societies tend to adopt individualistic values as well as an ideal of transparency towards information. This could lead to some contradictions. Indeed, if the need for privacy is more strongly claimed than before, it is at the same time undermined by new technologies. The notion of privacy is very complex and combines philosophical, sociological, historical, and legal aspects. It has been defined by Alan Westin as the following: “Each individual is continually engaged in a personal adjustment process in which he balances the desire for privacy with the desire for disclosure and communication of himself to others, in light of the environmental conditions and social norms set by the society in which he lives.”¹¹⁵

Privacy as a right, proposed by Samuel Warren and Louis Brandeis in 1890¹¹⁶, has often been discussed. In international law, the right to privacy has precedent in the *Universal Declaration of Human Rights* of the 10 December 1948, article 12: “No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks”¹¹⁷. The *International Covenant on Civil and Political Rights* which came into force on the 3rd of January 1976 directly mentions the right to privacy in its article 17.

As regional texts, for instance, the *European Convention on Human Rights* expresses this right in article 8, stating in paragraph (2) that “(t)here shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and it is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection

¹¹⁴ Williams *et al.*, 2004, p.28.

¹¹⁵ Westin, 1968, p. 7.

¹¹⁶ Warren *et al.*, 1890.

¹¹⁷ <http://www.un.org/en/documents/udhr/> (Consulted on 16 May 2012).

of health or morals, or for the protection of the rights and freedoms of others.”¹¹⁸ The Council of Europe also wrote the *Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data* on the 28th January 1981 to ensure the respect of privacy, especially with computerised personal data flowing across borders.

In 1995, the European Union established the *Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data*. The 2000 *Charter of Fundamental Rights of the European Union* expresses in the article 8 the “Protection of personal data”.

National laws also mention this right. In the United Kingdom there exists a set of laws concerning privacy, despite them not being explicitly mentioned in a constitution. This includes the *Data Protection Act* of 1998, the *Freedom of Information Act* of 2000, the *Privacy and Electronic Communications Regulations* of 2003 and the *Environmental Information Regulations* of 2004. To compare, the right to privacy has been more easily pleaded in the United States by invoking the Fourth or the Fifth Amendments of the Constitution, in DNA database matters.

The notion of privacy has evolved with the apparition of new technologies such as the printing press, CCTV, new means of communication, the internet, and also forensic techniques. Protecting private information became a prime concern with these new possibilities of intrusion and control of individual’s personal data. Privacy laws aim to limit governments having access to citizen’s privacy through these modern technologies.

Genetic privacy fits in line with contemporary privacy concerns. As genetics is a recent science which rapidly progressed during the twentieth century, the privacy issues around it are also contemporary and maybe not fully assessed yet. As already explained, DNA is something very intimate that could give a wide range of information about someone. Not only can it be used for identification, but it also contains the information on physical, family relationship and health characteristics.

For this reason, attempts to assimilate DNA typing with fingerprints (only giving information on identification) fail regarding human rights.

Nevertheless, these two techniques have in common to inform on the location of an individual, infringing another type of “spatial” privacy linked to the freedom of movement of the person.

Privacy challenges in genetics are found at different levels, not necessarily linked to forensic

¹¹⁸ <http://conventions.coe.int/Treaty/en/Treaties/Html/005.htm> (Consulted on 16 May 2012).

uses. From patenting human genome to misusing genetic information by health insurance or employment; all of these current debates underline the importance of genetic privacy.

We have seen in Part II. that in the UK, collecting DNA samples under criminal investigation requires the intervention of professional health care for intimate samples. Taking an intimate sample is thus a medical act and should be regulated under medical law. In this regard, the *Declaration of Helsinki* says in its article 23: “Every precaution must be taken to protect the privacy of research subjects and the confidentiality of their personal information and to minimize the impact of the study on their physical, mental and social integrity.”¹¹⁹

Similarly in Europe, the *Convention on Human Rights and Biomedicine* of 1997 emphasises the primacy of the “interests and welfare of the human being” regarding the right to information and a private life in its article 10¹²⁰.

Interestingly, genetic privacy in the context of criminal justice and law enforcement does not seem as protected as in a medical context in the UK. Krimsky and Simoncelli say in this regard that if “...we are moving toward a double standard of privacy, one for medicine and another for forensics, we should know why, whether, and under what circumstances it is justifiable.”¹²¹

The constitution of national DNA databases somewhat insets privacy concerns towards the different possible forensic uses of DNA. Databases add a temporal dimension which leaves a question mark over exactly how much control people or authorities will have in the future on their biological information. In this chapter, we will discuss the apparition of the national DNA database and its constitution in the UK (A.). We will then discuss what is exactly in a DNA database and to which extent that is necessary (B.).

¹¹⁹ <http://www.wma.net/fr/30publications/10policies/b3/> (Consulted on 16 May 2012).

¹²⁰ <http://conventions.coe.int/Treaty/en/Treaties/html/164.htm> (Consulted on 16 May 2012).

¹²¹ Krimsky & Simoncelli, 2011, p. 227.

A. DNA database, the Perfect Blend between Science and Justice?

*“Subtler and more far reaching means of invading privacy have become available to the government. Discovery and invention have made it possible for the government, by means far more effective than stretching upon the rack, to obtain disclosure in court of what is whispered in the closet.”*¹²² Louis Brandeis.

The frenetic search for DNA has progressively modified law enforcement methods in the UK. As seen in Part II., methods to collect DNA can go beyond minimum compliance with constitutional rights such as the right to consent. However, having crime scene DNA evidence will be relevant only if it could be compared with the suspect’s DNA. Progressively, DNA profiles of convicted people (and others as we will see) have been kept and stored. The constitution of the English National DNA database quickly expended with the risk to infringe certain human rights. In this chapter, we will discuss the right to privacy of individuals under the processes of the constitution of DNA databanks. We will first explain the ideological ground where DNA databanks germinated (1)) and we will then detail the legal basis of its apparition in the UK (2)).

1) DNA Databank, Antidote against Crime?

An Attempt to Prevent Recidivism

The first idea behind the constitution of DNA databases is that perpetrators are likely to reoffend at anytime. Having their DNA stored will clearly help to solve new cases if it was found at crime scenes. It is a gain of money, a gain of time (so precious in investigations) and it raises victim’s expectation to pursue their true perpetrators. DNA databases could also be a good alternative to repetitive DNA dragnets which solicit innocent citizens.

Constituting DNA databases is keeping DNA profiles of perpetrators of crimes, in case there is a need to use it again. In other words, it assumes that convicted persons might or will reoffend. Presuming recidivism this way would more institute general presumption of guilt than respecting the principle of presumption of innocence. A convicted person who has

¹²² Louis Brandeis in *Olmstead v. United States*, 1928, at http://www.law.cornell.edu/supct/html/historics/USSC_CR_0277_0438_ZS.html (Consulted on 12 March 2012).

performed his or her sentence will always stay a suspect, a potential perpetrator within this database. In daily life, every trace of DNA left on items could “adventitiously” be sampled.

However, the sole evidence of DNA found on crime scenes is not sufficient to inculcate, even someone who has already been convicted before for the same crime. DNA evidence is only circumstantial. As seen in Part I., wrongful inculcation could always occur. For instance, in the case of a semen sample found on the victim, a DNA match with a person already convicted for rape shouldn’t be inculcating in itself, since the question of the consent of both sexual partners should still be examined *even* for someone who has previously been inculpated for a similar crime.

It could be said that it will be very unlikely to be an innocent ex-perpetrator leaving DNA traces in the wrong place, at the wrong time. Regardless, the smallest probability should never be put aside when it comes to law or justice; the exception keeps being a possibility that cannot be ignored.

If DNA databases were originally made for convicted persons as potentially recidivists, then they have been quickly expanded to include any felons, arrested persons or “volunteers” from DNA dragnets. Thus, with so many entries of persons who were not found guilty of crime, the probability to have DNA left “in the wrong place at the wrong time” which matches with the database increased.

Another justification for enlarging DNA databases is based on the well-known theory that severe perpetrators of crime often start with minor offences. Chester L. Britt advances that “offenders who have gained a certain level of expertise in one type of crime (or cluster of similar types of crime) may be more willing to commit a more serious and presumably more complicated type of crime, because they have acquired the requisite skills for less serious and less complicated forms of crime. Thus, it is possible for escalation to take a number of different forms.”¹²³ Inversely, we could say that “different forms” of minor offences could escalate to violent crimes. In doubt and as a preventive measure, those who are found guilty of simple misdemeanours should be treated in the same way as those more dangerous criminals.

¹²³ Britt, 2000, p.1.

A Modern “Panopticon” System?

Storing criminals or misdemeanours’ DNA is often said to have a psychological deterrent effect on them to reoffend. This argument in favour of DNA databases is however difficult to assess as attempted by Jennifer Doleac through the “placebo test”. For instance, she found that “(b)ack-of-the envelope estimates suggest that the addition of individuals arrested (but not convicted) for serious felony offenses — a common policy proposal— would result in a 12% increase in the size of an average database per year. Assuming a linear effect on crime, such an expansion would result in a 3.2% decrease in murders, a 6.6% decrease in rapes, a 2.9% decrease in aggravated assaults, and a 5.4% decrease in vehicle thefts.”¹²⁴

The idea is inspired from the “Panopticon” of Bentham as an offender who knows that his or her DNA is constantly under the watch of the authority might restrain his or her intention to reoffend. Serial killers or terrorists will have a greater fear of being caught, since it is nearly impossible to hide or change biological identity, especially if DNA databases are shared between countries.

We understand that DNA databases can help catching recidivists quite. However, it might be more difficult to significantly “prevent” crimes with such a tool. Would DNA storing really lower the rate of recidivism by simple psychological pressure? The idea seems slightly naïve, especially since many crimes are impulsive and thus not premeditated. Will a criminal think about his or her DNA profile at the moment of the crime? Or even in the case of premeditated crimes, would the perpetrator not try to avoid the trap by not leaving DNA traces or by using someone else’s DNA traces? In this regard, the 2006 American TV show *Dexter* is almost a guideline for illustrating how serial killers should clean up their DNA indications. Despite it being a work of fiction, it makes the prevention policy by DNA collection seem obsolete.

What is then the idea behind investing in DNA databases? Martin Innes objected that “...in the process of targeting these individuals the organisation is more likely to generate further intelligence on them, thus justifying their selection as targets both retrospectively and prospectively.”¹²⁵ Helen Wallace advanced that “(t)he ‘added value’ of putting individuals on a database is only to introduce new suspects into an investigation, not to exonerate innocent individuals who are already suspects for a crime (from whom DNA can always be taken in relation to that crime, without entering their details on a database).”¹²⁶

¹²⁴ Doleac, 2011, p. 23.

¹²⁵ Innes, 2003a, p. 74.

¹²⁶ Wallace, 2008, p.5.

2) Permissive Law for Extensible Memory

The UK National DNA Database

England and Wales are world pioneers in the DNA database constitution. They stand out by their leadership in terms of the amount of DNA profiles *per capita* and their very permissive law toward police empowerment.

The English National DNA Database (NDNAD) was created on the 10th April 1995, and was first ruled by the Forensic Science Service under the Home Office department. In April 2007, the NDNAD was placed under the control of the National Policing Improvement Agency (NPIA) and governed by the NDNAD Strategy Board. The NDNAD Ethics Group is providing independent opinion on ethical issues concerning the use of the DNA database. However, this body is only advisory and doesn't have any statutory powers.

The NDNAD counts for, as of the 4th of January 2012, 6,889,385 subject profiles¹²⁷. Knowing that the national population is around 62 million¹²⁸, means that more than 10 per cent of the people in the United Kingdom have their DNA under watch. This impressive number illustrates the general English policy using modern technologies at the cutting edge to fight against criminality and terrorism (e.g. CCTV).

The English database is divided into two main indexes: one contains the Criminal Justice (CJ) profiles (including innocent or convicted people) and the other one, the Scene of Crime (SOC) profiles. It also contains DNA from volunteers collected during DNA dragnets. The last category is the Police Elimination Database (PED) which stores DNA profiles of the police and scientific staff.

This could raise questions about the impartiality of investigations toward investigators themselves. Couldn't they be potential criminals as well as all of the other citizens, in a society of general suspicion? Or is the PED essential regarding the possible contamination of DNA samples? How often does such contamination occur, and how often might a police officer or forensic scientist commit a crime? This comparison is unfortunately nearly impossible to make.

¹²⁷ including police forces from England and Wales, Scotland and Northern Ireland, at <http://www.npia.police.uk/en/13338.htm> (Consulted on 20 May 2012).

¹²⁸ http://www.statistics.gov.uk/hub/release-calendar/index.html?newquery=*%&uday=0&umonth=0&uyear=0&title=Population+Estimates+for+UK%2C+England+and+Wales%2C+Scotland+and+Northern+Ireland&pagetype=calendar-entry&lday=&lmonth=&lyear= (Consulted on 20 May 2012).

Unlike in other countries, the NDNAD did not encounter much legal resistance in its constitution. Indeed, the right to privacy for instance is not explicitly mentioned in the common law. The *Human Rights Act* of 1998 introduced this right through the incorporation of article 8 of the *European Convention on Human Rights* in the English law.

Nevertheless, the national DNA database has been legally framed by successive Acts. In a way, we could say that the law has been adapted to the NDNAD rather the NDNAD being adapted to the law. Indeed, criteria to allow uploading DNA profiles within the database keeps enlarging and empowering law enforcement officers.

A “Headlong Rushed” Legislation

The power to take DNA samples was first included in the *Police and Criminal Evidence* of 1984 (PACE) as well as fingerprints and photographs. Robin Williams and his colleagues explain that the DNA database legally expanded in three steps from PACE: “first, changes in measures which allow the police to take CJ [Criminal Justice] samples from individuals; second, changes in the provisions which allow the police to retain CJ samples and profiles; and third, changes in the powers granted to the police to speculatively search all retained profiles.”¹²⁹

In 1994 the *Criminal Justice and Public Order Act* (CJPOA) enabled the constitution of NDNAD by allowing the police to take DNA samples from the people charged with “recordable offense”. By that time, the notion of “recordable offense” was enlarged to include minor offenses, begging, drunkenness, or even “football offences”¹³⁰. This Act also made provisions to allow speculative searching of profiles. DNA found on crime scenes can henceforth systematically be compared against the profiles stored in the database, in order to solve “cold hits”.

The DNA databank now contains a wide range of people: perpetrators of crime but also of minor offences, arrestees, volunteers, and even children from as young as 10 years old. The *Criminal Evidence Act* of 1997 also included, in the NDNAD, inmates from serious offences. This was aimed to sample criminals inculcated from before the 1994 Act and ensure that they are registered in the DNA database.

The 2001 *Criminal Justice and Police Act* (CJPA) allowed DNA samples to be indefinitely stored regardless of the court verdict. It goes beyond the 1994 Act allowing the storing and

¹²⁹ Williams *et al.*, 2004, p. 30.

¹³⁰ <http://www.legislation.gov.uk/ukxi/2000/1139/signature/made> (Consulted on 22 May 2012).

conducting of speculative searches against DNA samples and profiles of persons “not convicted” of recordable offence. We could say that the law has been adapted to legalise a situation where the police were already unlawfully keeping DNA profiles of non-convicted persons.

This legal adjustment was necessary because when such DNA profiles matched with new crime scene profiles, the admissibility of the evidence could then be problematic. In the 2000 *Regina v. B*¹³¹ is a good illustration of it. On the 23rd January 1997, an elderly woman (66 years old) was raped at her house. Semen found on her was sampled and the DNA profile was stored in the NDNAD as a SOC profile. A year later, a man was suspected for burglary and thus arrested and DNA profiled. He then was exonerated for it. According to the CJPOA applied at the time, this sample should then have been destroyed and certainly not loaded in the NDNAD. However, it clearly was, since a match was found with the SOC profile of the 1997 rape. The defendant was acquitted because the court declared the sample unlawfully retained.

The 2003 *Criminal Justice Act* empowered the police to sample, profile and store DNA without the consent of “the one-time suspect who may never have been charged with recordable offence and has no criminal record.”¹³² The following *Serious Organized Crime and Police Act* of 2005 and *Counter-Terrorism Act* of 2008 keep extending the police powers. In general, these laws do not consider the relevance or utility of the NDNAD in crime investigations but seem determined to maximise the quantity of DNA profiles. The liberal democrat, Nick Clegg emphasised that the “...Government's onward march towards a surveillance state has now become a headlong rush. They seem determined to Hoover up the DNA details of as many people as they can, regardless of guilt or innocence. We already have by far the largest DNA database in the world, and these figures make it clear just how fast it's growing.”¹³³

There is a challenging balance to make between favouring the general interests to fight against crime and respecting the constitutional rights of citizens. However, governments keep being tempted by the former point, influencing the legislation to empower the police.

The inherent contradiction of this tendency is that governments call for “special needs” to justify intrusive measures, but these measures will quickly become a norm through law-

¹³¹ *Regina v. B* ((*Attorney-General's Reference No 3 of 1999*), UKHL 34, Court of Appeal, Criminal Division UK, 26th May 2000, at <http://www.publications.parliament.uk/pa/ld200001/ldjudgmt/jd001214/agref-1.htm> (Consulted on 13 May 2012).

¹³² Williams *et al.*, 2004, p. 40.

¹³³ Editors at *The Metro*, 2009.

making. Then, there will be a risk to institutionalise discredit for constitutional rights. Consequently, one of the first criticisms toward the quick changes of legislation in forensic policies was the “lack of transparency and democratic public debates.”¹³⁴

UK; Always Against the Tide?

This opinion might have been shared by the Council of Europe. Indeed, in 2008 the European Court of Human Rights (ECtHR) condemned the UK in the case *S and Marper v. the United Kingdom* regarding the collection and retention of DNA samples, as discussed below. As a response to this judgement, the *Crime and Security Act* of 2010 was written. As explained by the GeneWatch UK organisation, this Act “...allows the retention of innocent people's DNA records and fingerprints for 6 years after arrest. Innocent people's Police National Computer records will continue to be kept indefinitely. DNA samples taken on arrest, which are currently stored in commercial laboratories, will be destroyed once the computerised DNA profiles have been obtained from them, not later than 6 months after the sample is taken.”¹³⁵

Despite this 2010 Act never came into force with the change of government, it shows that the UK government stepped back in its lax legislation toward criminal investigation powers.

The Act was replaced by the *Protection of Freedom Act* of 2012 which is even stricter on the retention of innocent people's DNA profiles and should be applied in the near future.

The NDNAD is ruled by England and Wales but data is exchanged and loaded across the UK (like with Northern Ireland). In this regard, it is interesting to mention that Scotland differentiated itself from the global governance of the forensic investigation policy. The Scottish government has been more careful toward human rights, especially in the case of indefinite retention of DNA profiles for non-convicted people. It considered that this wasn't justified regarding the respect of their privacy. Johnson and Williams explained that “(t)he Scottish national DNA Database remains a distinct entity but exports ‘copies’ of its profiles to the NDNAD. [...] Along with their submissions to the FSS, the request the removal of 2,500 CJ profiles from the database each month. This amount represents the number of individuals from whom samples were taken and who, subsequent to police investigation, have not been subject to judicial proceeding, or against whom there have been no judicial findings of

¹³⁴ Staley, 2005, p. 26.

¹³⁵ GeneWatch, *A Brief Legal History of the NDNAD*, at <http://www.genewatch.org/sub-537968> (Consulted on 23 May 2012).

guilt.”¹³⁶ Scottish DNA samples retention policy was thus in contradiction with the 2001 CIPA, complicating the data sharing system.

Regarding regional legal framework, the European Union wrote the 2005 European *Prüm Convention* organising data sharing (DNA, fingerprints or vehicle registration) to fight against terrorism and cross-border crime.

Interestingly, the UK has been first sceptical and hasn't ratified it yet despite "...the Government now pushing ahead with adopting the proposals and intends to begin sharing details by 2015"¹³⁷. Indeed, on the 18th September 2007, the House of Lords' European Union Committee wrote *Prüm: Effective Weapon Against Terrorism and Crime?*¹³⁸ It explains that the two main concerns against the *Prüm Convention* are: first, foreign police officers could enter their State without their prior consent. The Convention was then changed on this point and the State remained in power to decide the degree of intervention of other States in its territory.

Secondly, it is said that the DNA exchange cannot be fair and proportionate. The reason is that the UK NDNAD is far more important and inclusive than other national databases. As it will be discussed in Part IV., not only does the NDNAD store DNA profiles of innocent people, but it also allows the use of these profiles to look for relatives as potential suspects. This "familial search" renders possible access an important part of the English population. The British politician David Davis wondered "(h)ow exactly will our European counterparts ensure that the personal details of British citizens remain safe?"¹³⁹

Thus, on the one hand, the national DNA samples collection and retention policy is little cautious regarding of the citizen's rights to privacy and freedom. On the other hand, the government becomes very protective when it comes to sharing this same data with the EU member States. This interesting contrast is explained by Ian Traynor, who says that the UK is "...traditionally a jealous guardian of its sovereignty on police and judicial policy areas in the EU..."¹⁴⁰

¹³⁶ Johnson & Williams, 2004, p. 74-75.

¹³⁷ Whitehead, 2012.

¹³⁸ European Union Committee, 2007.

¹³⁹ Traynor, 2007.

¹⁴⁰ *Ibidem*.

B. Scope and Limits of the NDNAD

*“Yet, increasingly common portrayals of DNA as being able to solve crimes almost instantaneously, beyond any doubt, even from ‘beyond the grave’, may overstate the degree to which DNA currently assists in criminal investigations.”*¹⁴¹Carole McCartney.

The information that DNA contains is clearly private and even intimate. It can define our physical and organic features and to a certain extent, our health condition. Genetic information is thus part of data protection matters. As discussed above, the first uses of DNA as evidence aimed to target highly suspected profiles for serious crimes only. The DNA sampling was enlarged to include innocent persons and the amount of profiles stored into the NDNAD constantly increased. In this chapter, we will first highlight what the NDNAD is really made of (1)). Then, we will discuss its real efficiency (2)).

1) What and who is in the Database?

DNA Profiles vs DNA Samples

To understand how DNA databanks can affect the privacy of someone whose DNA has been sampled and profiled, we need to explain which DNA material is exactly stored. A DNA profile stored in the NDNAD contains around 10 loci. As explained in Part.I, these loci are not coded by the cells, and thus are not able to give information on any physical characteristics, disease predispositions or ancestry origins. They are used for identification purposes because they have the particularity to be specific to individuals, nevertheless, they also can inform on familial relationships as we will see in Part II.

These DNA segments are often called “junk DNA” because their function is unknown thus far. As science evolves rapidly, there is no guarantee that we won’t find any indirect role for these genes in the near future. There will then be a need to delete all DNA profiles containing the coding information. The *Prüm Convention* provides such measures but has not been ratified yet by the UK.

However, DNA profiling today does not look for any coding genes. So what type of privacy is threatened by legitimately searching for identification under criminal investigation?

¹⁴¹ McCartney, 2005, p.1.

Pr. Duarte Nuno Pessoa Vieira says: “I think that, with DNA databases, there are many fears that have no reason to exist. For instance, in many countries we have a national database of fingerprints. A national database of DNA doesn’t give more information than the fingerprint database. [...] So the problem is not a threat of privacy but it is a problem of misinformation because people are afraid about the potential of DNA.”¹⁴²

David H. Kaye has also his own interpretation: “...we could have a system for identifying individuals from their DNA that respects individual privacy, but it won’t respect the desire to mask our identities. The privacy we’re talking about involves only the claim of a right to anonymity, to be able to leave DNA and not have it be known that you were the one who left it. The fundamental issue is not whether society should respect privacy in the abstract or in all of its possible forms. Rather, it is whether we should privilege the demand for anonymity.”¹⁴³

There is an important distinction to make between DNA samples and DNA profiles. A DNA profile is less dangerous in terms of privacy since the information is fixed, like a photography mapping some non-coding genes.

However, DNA samples keep threatening the person’s genetic privacy since it contains an infinite amount of genetic information. To ensure that DNA samples will never be used for other purposes than identification under criminal investigation; a clear and restrictive legislation should be needed in the UK. Indeed, the risk to disclose any private information from these samples will remain as long as they are preserved. A third party having other interests than identifying a criminal in a trial could take advantage of any lax legislation to seize this biological data.

Can the *Data Protection Act* of 1998 or the *Human Tissue Act* of 2004 protect against such misuses? Regarding possible research from DNA databases, there is a surprising exemption in both Acts for “purposes related to the prevention or detection of crime”¹⁴⁴ Thus, researchers can use these DNA samples or profiles stored in the NDNAD without the person’s consent, as long as their research concerns criminology, as we well see in Part IV.

Moreover, the UK distinguishes itself by including all kinds of information around the DNA profiles loaded up in the NDNAD and builds statistics around it. The names, date of birth, gender, ethnic appearance or localisation are not only accessible but are used to make percentages on the sampled population. Statistics based on gender, ethnicity or ages are then

¹⁴² See Duarte Nuno Pessoa Vieira, Interview 1, Annexes, p. 103.

¹⁴³ David H. Kaye in Dinerstein, 2002, p. 28.

¹⁴⁴ *Human Tissue Act*, 2004, at <http://www.legislation.gov.uk/ukpga/2004/30/schedule/4/part/2/crossheading/purposes-of-general-application?view=plain> (Consulted on 12 Jun 2012).

filling the official reports and rendered public. To compare, the American database “...does not store criminal history information, case-related information, Social Security numbers, or dates of birth...”¹⁴⁵ as a matter of respect of privacy.

Innocent People Together with Criminals

The information extracted from DNA samples and the possible uses we could make out of them are not the only concerns toward the respect of genetic privacy. The presence of innocent citizens in the databanks also raises questions. If DNA databanks were originally made to profile criminals and to prevent them from reoffending, what is the utility of profiling innocent people? As seen in Part II., a lot of citizens are sampled even if not convicted; from simple arrestees to persons “voluntarily” cooperating during DNA dragnets. Is it fair to treat these persons as direct suspects? Their DNA profiles stored in databanks are daily checked against crime scene profiles. These peoples are thus constantly under the suspicion of the police.

Could an innocent person ask for the removal of his or her DNA from the NDNAD? Yes, but the procedure is not easy and requires a proactive approach from the person concerned to solicit several intermediate actors. The 2012 *Protection of Freedom Act* offers to substitute this procedure by automatically destroying DNA samples and profiles of innocent and exonerated persons. Until then, the citizen has the burden to ensure that his or her genetic privacy is respected by law enforcement administration.

This situation will improve following the already mentioned ECtHR judgment. The case of *S. and Marper v. The United Kingdom*¹⁴⁶ concerned S., a juvenile arrested and charged for attempted robbery, and Michal Marper charged with harassment. In both cases, the persons were DNA profiled and transferred into the NDNAD during the investigation. Finally, they were both acquitted but the DNA profiles remained in the databank. The Court’s final verdict was a violation of the article 8 of the European Convention on Human Rights, on the right to privacy.

The Court concluded that the “...blanket and indiscriminate nature of the powers of retention of the fingerprints, cellular samples and DNA profiles of persons suspected but not convicted of offences, as applied in the case of the present applicants, fails to strike a fair balance

¹⁴⁵ Krinsky & Simoncelli, 2011, p. 31.

¹⁴⁶ <http://www.coe.int/t/dghl/standardsetting/dataprotection/Judgments/S.%20AND%20MARPER%20v.%20THE%20UNITED%20KINGDOM%20EN.pdf> (Consulted on 12 June 2012).

between the competing public and private interests and that the respondent State has overstepped any acceptable margin of appreciation in this regard. Accordingly, the retention at issue constitutes a disproportionate interference with the applicants' right to respect for private life and cannot be regarded as necessary in a democratic society.”¹⁴⁷

It is interesting to note that the Court did not question the use of DNA as evidence in itself, as Sarah Lipscombe remarked: “...the ECtHR agrees with the Government that retention of fingerprint and DNA data ‘pursues the legitimate purpose of the detection, and therefore, prevention of crime’.”¹⁴⁸

In response to the ECtHR judgement, the Home office set out a proposal in May 2009: *Keeping the Right People on the DNA Database: Science and Public Protection*¹⁴⁹. It offers to change the “blanket” retention policy to a “...retention framework which, in the words of the judgment, will ‘discriminate between different kinds of case and for the application of strictly defined storage periods for data’.”

A shift of English policies and legislation has been encouraged but has struggled to be implemented. As previously mentioned, the UK government wrote the *Protection of Freedom Act* recently adopted by the Parliament (on the 1st May 2012) but it has not been implemented yet (this is expected to be adopted at the end of July 2012). This last Act considers that the retention of innocent people’s DNA and fingerprints is unlawful and that they have to be destroyed.

The United Kingdom thus recognised the verdict of the Court and showed some intention to slow down the wide DNA gathering policy but is this change of posture also a change in the intention? Did the general English policy of aggressive investigation methods take softer direction? In the first instance, we should analyse the reasons why this government keeps investing resources to enlarge the NDNAD. It may be that, despite the noncompliance with article 8 of the European Convention of Human Rights, this project is really beneficial for society. Thus, assessing the cost-efficiency of the NDNAD will eventually help justifying the restriction of the freedom and right to privacy of certain citizens that occurred in the UK.

¹⁴⁷ *S. and Marper v. the UK*, 2008, p.35, at <http://www.coe.int/t/dghl/standardsetting/dataprotection/Judgments/S.%20AND%20MARPER%20v.%20THE%20UNITED%20KINGDOM%20EN.pdf> (Consulted on 24 May 2012).

¹⁴⁸ Lipscombe, 2009, p. 24.

¹⁴⁹ Home Office, 2009.

2) Efficiency and Weaknesses

Solving Crimes with a Universal DNA Database?

Surveillance tools often appear in modern societies as a key to reduce the average violence. However, crimes never stopped and might even be a part of all societies. For instance, the video surveillance system meets a great success in many governments, including the UK. As a promise to catch perpetrators, these videos have been established in a number of towns within a very few years. However, studies on their efficiency are far from being convincing. One of the main issues according to 20 reports from several countries is “(t)he expectation that CCTV systems should be deployed to reduce crime rather than solve”¹⁵⁰ them. Video surveillance is thus wrongly advertising on its preventive capacity to avoid crimes by exposing perpetrators.

Similarly, is the national DNA database the best way to prevent crimes? With a budget of around £70 million per year¹⁵¹, is the cost-efficiency of such a measure worth it? Some will answer positively since the project of a universal DNA databank has been repetitively expressed. Following the reasoning of “the more people in the database, the more crime will be solved”; if everybody was in the NDNAD, then all crime scene samples would logically find a match. It seems natural that, to efficiently prevent crimes, DNA should be widely collected. The former mayor of New-York City, Rudolph Giuliani, gave blanket approval to invest in a population-wide DNA database for medical as well as forensic purposes¹⁵². The former prime minister in the United Kingdom, Tony Blair, made a similar announcement in 2006¹⁵³.

DNA Database is an effective tool to collect evidences and to identify or relate offenders to crime scenes. Besides moral concerns around the protection of privacy and other civil rights, there should be pragmatic interests in DNA profiling.

The official statistics of the NPIA say that, between April 2001 and December 2011, 403,131 matches were found between SOC samples and CJ samples in England and Wales¹⁵⁴. They also say that “(b)etween 01 April 2011 and 31 December 2011 the National DNA Database

¹⁵⁰ Honovich, 2008.

¹⁵¹ National Policing Improvement Agency, 2009, p.12.

¹⁵² Simoncelli & Steinhardt, 2005, p. 283.

¹⁵³ Jones, 2006.

¹⁵⁴ <http://www.npia.police.uk/en/13338.htm> (Consulted on 12 June 2012).

produced 89 matches to murder, 412 to rapes”¹⁵⁵. These numbers, however, have a limited interest since a simple match does not say anything about the guilt of the suspect or a final positive conviction.

A Relative Efficiency

Indeed, identifying doesn't mean inculcating someone. As explained in Part I., DNA evidence is only “circumstantial” and is a spatial but not a temporal indication. Unless the perpetrator and the victim were the only humans ever to have been physically present at the place of the crime, the DNA evidence is relatively efficient in itself. The relevance of the DNA evidence will finally be assessed by the judge and weighted with the other evidences.

DNA identification is not the only factor to take into consideration in crime solving. In the case of a rape, for instance, the problem is often that the victim will not report the crime to the police, especially as rape is often committed by someone the victim already knows. In this situation, identifying the perpetrator by looking for a match in the NDNAD would not be relevant. As a result, Helen Wallace commented that “Although Britain has by far the largest DNA database in Europe; it also has the lowest conviction rate for rape.”¹⁵⁶ Secondly, the sole DNA identification of the potential rapist is not enough for conviction since the question of the victim's consent has to also be taken into consideration. In other words, not all DNA matches within the database will result in conviction.

Detecting DNA on a crime scene is a first step to constitute the DNA database, but how often is that possible? The so-called “CSI effect” gives the impression that all crimes leave DNA traces and that investigators just need to pick it up. The official 2003-2004 report from the Forensic Science Service reported that the crime detection rate¹⁵⁷ was around 23% but “where DNA was successfully recovered from a crime scene and loaded into The National DNA Database the detection rate rose to 43%.”¹⁵⁸ They then put this number into perspective explaining that the constitution of SOC DNA samples concerned in reality a small amount of cases: “DNA is successfully loaded following only 5% of examined crime scenes. As scene examination follows only 17% of all recorded crime, this represents 0.8% of all crime.”¹⁵⁹

¹⁵⁵ <http://www.npia.police.uk/en/8934.htm> (Consulted on 12 June 2012).

¹⁵⁶ Wallace, 2008, p. 6.

¹⁵⁷ The crime detection rate is the percentage of crimes detected and brought to court.

¹⁵⁸ Forensic Science Service, 2004, p. 24.

¹⁵⁹ *Ibidem*.

0.8% is indeed a very low statistic to rely on assessing DNA database utility. If only a few cases can detect DNA on the crime scenes, then the SOC samples index will slowly increase. This is clearly not the case of the CJ samples index which exponentially increases by extending DNA collection to a wide range of people. Will this disproportion between the indexes improve the efficiency of the NDNAD?

It will depend on the so-called “match rate” representing the percentage of SOC profiles which match with the CJ profiles. When both indexes are in proportion, the match rate increases. As only the CJ index increases and the SOC index stagnates, the match rate only tends to the SOC maximum matching possibilities and stagnates too.

It even already decreased as reported in the 2007-09 report: “During 2007/08, one or more subject profiles were matched with 40,406 crime scene profiles. The total represents a decrease of 8.6% of the total number of crime scenes for which one or more suspects were nominated in the previous year. The fall is due to fewer new crime scene profiles being loaded within the period.”¹⁶⁰ Thus, the efficiency of the NDNAD would depend more on the amount of crime scene profiles than suspect profiles. This factor is also up to the evolution of forensic techniques to allow better DNA analysis with small amounts of DNA (like with PCR).

The Adverse Effect of Wide DNA Sampling

Inversely, to keep increasing the CJ index might lower the statistic of the “match rate” and “conviction rate” (when, for instance, comparing the amount of CJ profiles with the number of total matches or convictions), which negatively advertise on the real efficiency of the NDNAD.

On the other hand, increasing the “match rate” by increasing the SOC index is not a guarantee that the DNA databases efficacy will be increased. As said earlier, a match does not automatically lead to a conviction.

To assess the efficacy of DNA databases, we should elaborate a serious study based on statistics and probabilities. We will simply summarise it with the formula made by Krimsky and Simoncelli. According to them, the factors of relevance to assess the NDNAD efficacy are:

- the percentage of crime scenes analysed for DNA evidence;
- the percentage of analysed crime-scene DNA uploaded to the national DNA database;

¹⁶⁰ *Ibidem*, p. 28.

- the percentage of matches from DNA uploaded to the national DNA database (cold hits)
- the percentage of detections from DNA profile matches and
- the percentage of convictions from DNA profile detections.¹⁶¹

In consideration of all these factors, Krimsky and Simoncelli established the “DNA Crime-Solving Efficacy” (CSE) indicator which results in a very low percentage of 0.1% of all convictions. “This tells us that the role DNA plays in convictions of all crimes is minuscule” and “[...] when all the factors of the index remain constant [...] while the size of the database grows the efficacy of the DNA data bank decreases.”¹⁶²

Thus, if the cost-efficiency of an increase of CJ samples is negative, why keep increasing them? Additionally to the efficacy and budgetary cost, the price for privacy and freedom is also high. Guarantying security, safety and justice could justify a reasonable restriction of these rights. In these regards, the assessment of the NDNAD’s efficacy is not convincing and the State’s obstinacy to sample more people remains unexplained.

However, if the identification function of the NDNAD has shown some limits, there are other ways to use DNA profiles and DNA samples that attracted the police’s attention. We will see in Part IV. that DNA has a lot more to potentially reveal about the suspect. Nevertheless, these investigative practices might infringe not only the individuals’ privacy, but also the principle of non-discrimination.

¹⁶¹ Krimsky & Simoncelli, 2011, p. 312.

¹⁶² *Ibidem*, pp. 313-315.

PART IV. DNA'S FUNCTION CREEP AND DISCRIMINATION

“While it is impossible to foresee every potential risk of these new technologies, it is prudent to address the known risks such as inaccurate (false positive) test results, individual and family privacy, and inflammation of racial profiling practices.”¹⁶³ Susanne B. Haga.

The *International Convention on the Elimination of All Forms of Racial Discrimination* of 1969 defines, in its article 1 paragraph 1, “racial discrimination” as “...any distinction, exclusion, restriction or preference based on race, colour, descent, or national or ethnic origin which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise, on an equal footing, of human rights and fundamental freedoms in the political, economic, social, cultural or any other field of public life.”¹⁶⁴

The categories of possible racial discrimination, cited by the UN definition, “race, colour, descent, [...] or ethnic origin” have one common denominator that is that they can all be linked to genetics. Other types of discrimination are based on physical or relational aspects like sex, physical anomaly or some handicaps, which could also be grounds for genetic discrimination. Genetic information is thus something that is to be protected from any possible political or social misuses. It should also be considered as a new category of “genetic discrimination”.

The United-Kingdom ratified the *Charter of the United-Nations* of 1945 which mentions in its first article, paragraph 3: “...promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion...”¹⁶⁵

Regarding binding instruments, the UK is also part of the *International Covenant on Civil and Political Rights* and the *International Covenant on Economic, Social and Cultural Rights* referring to non-discrimination under several articles. More explicitly, the United-Kingdom ratified the *International Covenant on the Elimination of All Forms of Racial Discrimination* of 1969. At regional level, the United-Kingdom ratified the *European Convention on Human Rights* of 1950 referring to the prohibition of discrimination in the article 14, and the *European Social Charter* of 1961 mentioning it in its Preamble. The European Union also established a *Racial Equality Directive* 2000/43/EC that came into force in 1999.

However, the UK has not yet ratified the *Revised European Social Charter* of 1996 where the

¹⁶³ Haga, 2006, p. 69.

¹⁶⁴ <http://www2.ohchr.org/english/law/cerd.htm> (Consulted on 16 June 2012).

¹⁶⁵ <http://treaties.un.org/doc/Publication/CTC/uncharter.pdf> (Consulted on 16 June 2012).

principle of non-discrimination was incorporated in the article E. It also did not sign and ratify the *Protocol No. 12 to the Convention for the Protection of Human Rights and Fundamental Freedoms* reaffirming the principle of non-discrimination. Finally, the UK did not ratify the Council of Europe's, *Convention on Human Rights and Biomedicine* of 1999. This Convention explicitly refers to discrimination based on human genome in its article 11: "Any form of discrimination against a person on the grounds of his or her genetic heritage is prohibited."¹⁶⁶

The *Charter of Fundamental Rights of the European Union* of 2000 also explicitly mentions in its article 21 the prohibition of discrimination based on "genetic features"¹⁶⁷. However, the UK "opted out" of this Charter. Despite this decision was based on the economic and social rights of the Title IV of the Charter, it remains unclear how binding the Charter will be.

At a national level, the UK prohibits discrimination in many different Acts, to name a few, the *Race Relations Act* of 1976, the *Sex Discrimination Act* of 1975, the *Disability Discrimination Act* of 1976, the *Anti-Discrimination Act* of 1977. More recently the *Equality Act* of 2010 restricts the use of genetic tests results by employers and insurance companies.

DNA profiling and the constitution of national DNA databases have been a fast and expanding phenomena in several countries across the world. Whether or not such practices could be discriminating will depend on the uses of them.

Philip Bereano says that, "(t)he dominant ideology in Western society proclaims that science and technology are value-neutral, and the only problems caused by technologies are either "externalities" (unintended side effects) or abuses. However, because technologies are the result of human interventions, [...] they are themselves actually imbued with human intentions and purposes."¹⁶⁸ For this reason, it is important to constantly "...interrogate the mutual interaction of technologies and the social networks within which they are realised."¹⁶⁹

DNA wide collection by English law enforcement is contemporary to the "zero tolerance" policies on transparency and crime control. The modern "surveillance society"¹⁷⁰, defined by David Lyon, tends to consider citizens as permanent potential suspects. Thus, forensic technologies could be used as "bio-surveillance apparatus", for political purposes.

Function creeps of DNA databases could favour discriminatory policies. Indeed, DNA can provide different types of information, for example, revealing family relatives, ethnic origins,

¹⁶⁶ <http://conventions.coe.int/Treaty/en/Treaties/Html/164.htm> (Consulted on 16 June 2012).

¹⁶⁷ http://www.europarl.europa.eu/charter/pdf/text_en.pdf (Consulted on 16 June 2012).

¹⁶⁸ Bereano, 2000.

¹⁶⁹ Williams *et al.*, 2008, p.8.

¹⁷⁰ Lyon, 2001.

physical appearance or potential diseases. Could such information be used by the police? Could it be prohibited on the principle of privacy? If one day, a gene is found to be responsible for criminal behaviours, should the police factor this in their cases or not? Is the law adapted to the inevitable evolution of technologies and scientific knowledge?

In this chapter, we will explore the possible function creeps of DNA samples in crime investigation purposes. We will observe how it might involve the entourage of the person sampled without their consent (A.). It will first concern the family relatives (1)) and then the persons sharing the same “ethnic” origin (2)) with the risk of creating discrimination. Secondly, we will analyse function creeps directly threatening the individual (B.). Genetic medical information could be a source of useful details for criminal investigation (1)). However, genetic specificities might support determinist theories that could be dangerous when applied in society (2)).

A. Extensive Uses of DNA Database

« - *Si ce n'est toi, c'est donc ton frère.*

- *Je n'en ai point.*

- *C'est donc quelqu'un des tiens* »¹⁷¹ Jean de la Fontaine.

The DNA is person' specific, but it is also inherited and particular to a species. These two other characteristics might help profiling a suspect. Being able to link relatives or to discern the “ethnic” aspect are precious clues that, combined with others, might be crucial to catch the perpetrator of a crime. When using the NDNAD, the police only look at DNA profiles issue from non-coding DNA sequences. The breach of privacy seems thus limited. We will see that “Familial search” is a technique helping to suspect the relatives of someone through his or her DNA, by also using the “non-coding” genetic information (1)). The other studied characteristic needs to use the DNA samples and thus, the “coding” information. Looking at “ethnic” traits coded by genes is a very controversial investigative method that we will discuss (2)).

¹⁷¹ De la Fontaine, 2002, in English: "*If it wasn't you, then it was your brother.
I haven't any brother.
Then it's one of yours.*"

1) Families in Inquiries

From identification to relationship analysis

The Forensic Science Service (FSS) introduced a new method called “familial searching” which “...aimed at providing DNA intelligence to investigations in which a full DNA profile has been obtained from a crime scene sample of a serious offence, but there are no matches when this profile is checked loaded to the NDNAD.”¹⁷²

One of the characteristics of DNA is that it is hereditary and thus can identify a person’s relatives. DNA testing can relate two persons, regarding the degree of their relationship. Despite “familial searching” appearing to be a great use of DNA databases in crime solving; it threatens the right to privacy of the relatives of the person who is sampled.

Henry Greely estimated the similarities of DNA profiles between relatives and said that it is not simple to determine when a family member of the real perpetrator partially matches the crime scene sample. “It depends both on the nature of the postulated relationship and on the rarity of the genotype (set of alleles) involved.”¹⁷³ He explained that first degree relatives (parents, siblings and children) share around fifty per cent of DNA, decreasing to around one quarter for second degree relatives (uncles/aunts, nephews/nieces, grandparents, half-brothers/half-sisters). However, estimations are always approximate. Greely concedes that it “...is possible for two siblings to share anywhere from zero to all twenty-six markers...”¹⁷⁴ even though this would be rare. Inversely, two unrelated people could match closely.

A famous case in the UK illustrates the success of familial searching. On the 21st of March, 2003, a motorcyclist succumbed after being clouted with a brick which came from a bridge above the road. The police found some blood on the brick but no perfect match was found by comparing it with CJ samples on the national DNA database. They decided to enlarge the field of research by looking at “partial matches” matching at least eleven out of the twenty markers used. The best profile selected was investigated, identifying that this person had a brother, one Craig Harman, living where the crime occurred. After sampling Craig Harman, the police found a complete match with the SOC sample. He was convicted of manslaughter and was sentenced for six years¹⁷⁵.

Familial search can also look for sexual chromosomes. This DNA analysis can be based either

¹⁷² Forensic Science Service, 2005, p. 1.

¹⁷³ Greely *et al.*, 2006, p. 252.

¹⁷⁴ *Ibidem*, p. 253.

¹⁷⁵ Clough, 2004.

on mtDNA (only inherited from the mother by the mitochondrion) or Y chromosome (to identify male relatives by Y-STR typing)¹⁷⁶. The DNA sequences used there are also not coding. Nevertheless, these techniques are used for another purpose rather than solely for the identification of an individual; they also look for information on inheritance.

The mtDNA or Y-STR analysis could reveal private information on families that they might have ignored themselves, or wanted to keep private. Do forensic laboratories go beyond the respect for private and family life by using the inheritance characteristic of DNA?

As for the inclusion of arrestees and volunteers, familial searches will also affect the relatives of innocent persons. DNA profiles from simple arrestees could be used to investigate their relatives and considerably enlarge the scope of people under constant “genetic surveillance”, depending on the precision of the technology. If, in the present day, analysis can only reach as far as third degree relatives, there is always the possibility that it goes further in the future.

A Threat to Family Rights?

Anyone registered in the NDNAD becomes a permanent potential informer against their families, and thus it could be a threat to family harmony. An inculpation or an arrest does not only create a conception that the person is guilty but could also expose the person to rejection within the family or the community. As Erica Haimés argued, “issues about *identification* in forensic work have the potential to have a profound impact on matters of *identity* for individuals and families.”¹⁷⁷ Due to the “CSI effect” and blind faith in DNA technologies, a simple suspicion could already cause damages.

Besides, affiliations should be allowed to remain a private matter that shouldn’t be controlled by official authorities this way. By looking at the inheritance property of the human genome, information concerning adoption, paternity affiliation, adultery or incest...could be disclosed. Some could say that destroying a family equilibrium to catch a public enemy would be worth it. It will depend whether the utilitarian or Kantian approach is favoured, and whether the balance tips toward the State or the individual (familial)’s interests.

With this in mind, similar questions which were raised in Part II should be asked. What about a need to obtain the person’s consent to give information on his or her relatives? What about the relative’s consent to give his or her DNA, especially when there is no reasonable suspicion? Could the police ask for a court order in familial searches? What happens with the

¹⁷⁶ Beiber, 2004.

¹⁷⁷ Haimés, 2006, p. 269.

sample of the relative once collected?

Finally, familial searches could support racial and discriminatory theories. The proponent Frederick Bieber affirms that we can talk about “crime cluster in families”¹⁷⁸. Jeffrey Rosen wonders whether familial search “...echoes the discredited eugenic family studies of the early 20th century, with their discriminatory emphasis on ‘genetic criminality’.”¹⁷⁹ Could it, in practice, enhance racial bias in criminal investigations?

While familial searching only focuses on non-coding loci as specified for DNA fingerprinting, other techniques would explicitly aim to translate the genotype into phenotype. These techniques are used to elaborate a physical profile of the suspect and raise direct concern about the respect of the non-discrimination principle.

2) New Ground for Racial Discrimination

A World Wide Enterprise

The Human Genome Project is an international research project which aims to sequence all human genome and to identify the function of each gene. Similarly, the Human Genome Diversity Project studies the “population-specific alleles” that define the human population according to ancestral genotypes. Europeans, Africans, Asians and native Americans are linked by common “Ancestry Informative Markers” (AIM) shaped by years of local reproduction.

Nowadays, in a globalised world, people tend to have mixed origins. Consequently, Koops & Schellekens explain that a genetic analysis might result in an approximate “percentage of origins”¹⁸⁰ open to odd interpretation. What will, for instance, signify to have a 30% Asian and a 70% Northern Caucasian profile? Which percentage will come out the most in the phenotype?

Many other similar projects are born to understand and classify the human population (“admixture mapping”) like the International HapMap Project, the 1000 Genomes Project, the Human Variome Project, the Personal Genome Project or the Genographic Project.

Studying human genome to define ancestry and “race” could help, for instance, to understand common genetic diseases or other medical purposes. It would also help to translate the

¹⁷⁸ Bieber *et al.*, 2006, p. 1315.

¹⁷⁹ Rosen, 2011.

¹⁸⁰ Koops & Schellekens, 2008.

genotype into phenotype and enable investigators to profile a criminal. These techniques are called “DNA phenotyping”, “DNA reserve engineering” or “molecular photo fitting of DNA”. Is DNA phenotyping a reliable science? Translating genetic into phenotype is more complex than a causal link of a gene for a trait. A gene might influence a trait among other genes and environmental factors. Some are unequivocal like gender directly observable by the chromosomes. This iris colour is also mainly dependant on the gene OCA2, according to the research of Frudakis and his colleagues¹⁸¹. But some other characteristics, like skin colour, are defined as “polygenic traits”. To evaluate the skin colour, the searches could use the percentage on ancestry phenotyping, as explained above.

When the police unsuccessfully check a SOC profile against the DNA database, the criminal’s identity remains unknown. However, the SOC sample could reveal a lot more precious information regarding the colour of the eyes, the skin, the hair, the body size or the sex of the suspect. These details are routinely investigated with eye-witness evidence. Thus, we look for the same information but by different means, which shouldn’t make such difference in term of privacy. Moreover, proponents say that science is more reliable than human interpretation or memory.

However if, for instance, an eye-witness reports that the suspect was red haired but a DNA sample shows a gene coding for a “blond” person, which account is the truth? Could the account of simple hair coloration discredit the, otherwise valuable, DNA expertise?

There is no legislation regulating forensic “DNA phenotyping” in the UK. Koops and Schellekens explained that, “... it is a technique that is simply being used in practice, apparently permissible by the general legislative framework.”¹⁸²

Moreover, these practises are not exclusive to forensic laboratories but are also being utilised by private companies like “DNAPrint Genomics” (which was shut down in 2009). The “DNA Witness” project was designed for law enforcement customers and aimed to determine the “race” of the SOC samples’ owners.

Is Science a Guarantee of Objectivity?

Regarding human rights, DNA phenotyping raises numerous concerns. In terms of stigmatisation, it might seem risky to look into people’s DNA, highlight common features and eventually categorise them into “races”. We can discuss the scientific relevance of human

¹⁸¹ Frudakis, *et al.*, 2007.

¹⁸² Koops & Schellekens, 2008, p. 172.

taxonomy. The terms genetic “origin/race/ethnicity/ancestry” are indifferently used, but are they all exact? Are they human races? And if there is no scientific “race”, how could there be “racial” discrimination? Many scientists denounce a misnomer like Omi and Winant saying that “...race is a concept which signifies and symbolizes social conflicts and interests by referring to different types of human bodies.”¹⁸³ Levi Strauss demonstrated how the scientific racial theory is biased in his famous book *Race and History*¹⁸⁴. Many other authors like Imani Perry¹⁸⁵ bring out links between social definition of race and its reflection in the justice system, notably in the prison population disparities.

Then, the first question to ask prior to using DNA phenotyping in criminal justice is whether it will be used in a context where there already is racial stigmatisation. If a group of people are frequently targeted by the police, they will be arrested more often. Then, the successive extension of DNA profiling to simple arrestees might open the door to transpose racial disparities from society to the NDNAD. Consequently, with a DNA database over representing a particular group, the investigation might be biased and worsen previous stigmatisation creating a vicious circle.

Some argue the opposite, stating that science brings objectivity and neutrality. DNA profile matching will restore justice by clearing the names of people improperly and systematically arrested. Lindsay A. Elkins explains that “...DNA analysis could serve as an antidote to racial profiling in that reliance on genetic information in crime scene samples could correct tendencies to pursue one group disproportionately”¹⁸⁶. Unlike eyewitnesses, the results cannot be driven by any racial prejudices. Nevertheless, people could be victims of indirect discrimination by the interpretation of the results.

This would counter the idea mentioned in Part.I that DNA fingerprinting is a “...manmade construct, dependent on manmade machinery, man-calibrated accuracy and man-led action under manmade protocols analysed by man- an altogether human construct.”¹⁸⁷ But how could we ensure that the uses of this technique, or even the results, are not “manmade” interpreted according to the usual human racial disparities?

¹⁸³ Omi & Winant, 1994, p.55.

¹⁸⁴ Strauss, 1952, at UNESCO website

http://www.archive.org/stream/racehistory00levi/racehistory00levi_djvu.txt (Consulted on 10 July 2012).

¹⁸⁵ Perry, 2011.

¹⁸⁶ Elkins, 2003, p. 282.

¹⁸⁷ American Academy of Forensic Sciences (AAFS) in Pyrek, 2007, p. 2.

DNA Database, a Mirror of Social Disparities?

As Helen Wallace explains, "... the extent to which retained DNA profiles may lead to stigmatization or prejudicial treatment also depends on the extent to which other information (including names, addresses, ethnic appearance and suspected crime) are retained alongside the DNA profile, or in linked computer databases, and how this information may be accessed and used."¹⁸⁸

There, the UK NDNAD is very informative and transparent. It includes personal details with DNA profiles and makes statistics out of it; "by gender", "by age" or again "by ethnic appearance". According to the latest statistics of 4th January 2012, the NDNAD contains 77.40% of "White North European"; 8,05% of "Black"; 6,10% of "Asian"; 4,58% of "Unknown"; 2,17% of "White South European"; 0,93% of "Middle Eastern" and 0,76% of "Chinese, Japanese or SE Asian"¹⁸⁹. Nevertheless, taking in to consideration the average UK population, there is a disproportion of certain categories, such as with the "Black" group. Jason Bennetto remarks that "...in excess of 30% of all black males are on the NDNAD, compared with about 10% of white males, and 10% of Asian males. Estimates suggest that black men are about four times more likely, than white men, to have their DNA profiles stored on the police NDNAD."¹⁹⁰ Similarly, the English Human Genetics Commission reported that "...the profiles of over three quarters of young black men between the ages of 18 and 35 are recorded"¹⁹¹ in the NDNAD. A great number of authors find similar statistics.

The English Committee on Home Affairs itself explained that "(t)he fact that Black young people are overrepresented within the youth justice system does not simply indicate a higher level of offending in general. The relationship is complex including the potential areas of discrimination..."¹⁹²

If there are more black people arrested, they will be more represented in the DNA database, regardless of their guilt. Inversely, if white people are less likely to be arrested, then white perpetrators can more easily flee away. This would be another consequence of indirect discrimination through the NDNAD system.

"Familial searching" will exacerbate stigmatisation because for one black person profiled, the

¹⁸⁸ Wallace, 2008, p. 2.

¹⁸⁹ <http://www.npia.police.uk/en/13852.htm> (Consulted on 16 June 2012).

¹⁹⁰ Bennetto, 2009, pp. 28-29.

¹⁹¹ Human Genetics Commission, 2009, p. 25.

¹⁹² Committee on Home Affairs, 2007, p. 34.

surrounding family will automatically join the circle of “permanent suspects”. This would lead to harass the black community in disproportion.

Finally, police officers might be psychologically influenced by getting used to having more black DNA profiles in the database. This would seriously infringe the presumption of innocence of the persons with African origins.

Some, like Kaye and Smith, would say the opposite: “Racial skewing of the DNA databases will be reduced somewhat if the legal authority to sample and type offenders’ DNA continues to expand and comes to include the multitudes convicted of lesser, but more numerous, felonies and misdemeanours.”¹⁹³ According to them, black people are generally more convicted than white people. In other words, the main racial prejudice would not be during arrests but at the final judgement, questioning the neutrality of the Court.

Universal against Differential, a Solution?

An egalitarian solution against ethnic disproportionality within the NDNAD will be to collect DNA from the whole population without preferences according to the social class, the origin or the sex... This solution also has the advantage to solve issues of who should or should not be in this database (convicted or non-convicted persons). Kaye and Smith said that a “...universal (population-wide) DNA database would ‘be more efficient and more fair’ than any system based on conviction or arrest.”¹⁹⁴ They explained that “(w)hen a person is arrested and incriminating crime scene DNA evidence points to the guilt of another person whose DNA profile is in the database, prompt exoneration and release of the innocent is likely to follow -- regardless of the initial suspect's race or status.”¹⁹⁵ Not only will the collection of DNA be partial but also wrongful arrests based on racial skewing will be easily disclaimed.

Similarly, controversial practices like DNA dragnets and familial searching will become unnecessary. This could help to restore a good relationship between the local population and the police and also save time and money in investigations.

However, a universal database will not prevent stigmatisation on arrests and police prejudices. It could also be argued that the first version of the NDNAD, collecting DNA only from convicted persons of serious offences, would be a better way to avoid reproducing discriminative schemes. Indeed, it would avoid soliciting the whole population and infringing

¹⁹³ Kaye & Smith, 2003, p. 454.

¹⁹⁴ *Ibidem*, p. 415.

¹⁹⁵ *Ibidem*, p. 457.

their constitutional rights. A world-wide collection might thus worsen these last concerns. Therefore, why incur these costs of creating a population-wide DNA database if it is unlikely to be utilised. Instead would it not be more cost effective to reassume the previous model?

B. From the Genotype to the Phenotype

“*Do we inherit our behaviour?*”¹⁹⁶ Nuffield Council on Bioethics.

“Racial” discrimination is not the only way to physically stigmatise a group of people. Disabilities or other anomalies genetically determined could also be targeted. Nevertheless, such information might help investigator to get very specific features of the suspect. Indeed, the precision of medical information is greater and rarer than ethnical features. We will see that research and investigation might share interest in using genetic private data of criminals (1)). However, linking these two fields could lead to research on “criminal prototype” based on genetic assumptions. We will see that the use of DNA in criminal justice might indirectly promote determinist theories (2)).

1) Abnormalities under Investigation

Looking into Medical Records

It is possible to go deeper into the individual’s genetic privacy in order to serve the interest of criminal investigation. We already saw that physical and supposedly racial characteristics might help to draw a picture of the suspect but these are general traits. It could be even more relevant to use the person’s specificities such as their genetic abnormalities and diseases.

Besides, it could help to narrow the hunt and avoid large DNA dragnets. According to the Human Genome Project data, there are now nearly 2000 gene tests available to detect diseases¹⁹⁷.

Could investigators run such tests coding DNA sequences? There is no explicit restriction on the possible uses of DNA profiles or samples which concern "purposes related to the prevention or detection of crime" under the *Data Protection Act* 1998. Besides, forensic

¹⁹⁶ Nuffield Council on Bioethics, 2002, p. 1.

¹⁹⁷ http://www.ornl.gov/sci/techresources/Human_Genome/medicine/genetest.shtml#testsavailable (Consulted on 12 June 2012).

laboratories might not proceed with these researches themselves. Private laboratories, like the company “23andMe”, offer online service to any customer, including investigators. 299 Euros is the price to read someone’s DNA under the commercial spot “Your DNA, Endless Possibilities”¹⁹⁸ Ancestry, family research and health features are decrypted as far as their knowledge can go.

Once investigators know that the SOC sample belongs to someone with a rare and physical abnormality; it will be natural to use this clue to catch the perpetrator. In the first place, analysing genetic abnormalities and using it in a procedural context might not respect the right of the suspect to not know about his or her health predisposition.

For medical characteristics, using such information for investigative purposes would depend on access to medical or pharmaceutical records. We have already discussed, in Part II, the issue of access by police officers to medical records with or without the informed consent of the patient. Krimsky and Simoncelli wonder, “(s)hould this be considered a normal part of police investigation, or is this an intrusion on medical privacy that must be accompanied by a court warrant? Is this a type of ‘medical dragnet’ without informed consent?”¹⁹⁹

The organisation GeneWatch UK informs that “research on most collections of DNA - known as biobanks - is governed by the Human Tissue Act but the Act does not cover the collection or use of DNA for ‘purposes related to the prevention or detection of crime’”²⁰⁰.

The opposite situation should also be considered. What happens if medical or scientific researchers want to DNA samples stored in the forensic laboratories? Or study the DNA profiles from the NDNAD?

The *Data Protection Act* allows researchers to use “both the DNA profiles on the National DNA Database and the linked DNA samples for genetic research”²⁰¹ without the need to ask for prior consent to the persons in the databank, when the research concerns “detection of crime”.

¹⁹⁸ <https://www.23andme.com/> (Consulted on 12 June 2012).

¹⁹⁹ Krimsky & Simoncelli, 2011, p. 100.

²⁰⁰ GeneWatch UK, *Genetic Research and DNA Sample Storage*, at <http://www.genewatch.org/sub-539491> (Consulted on 30 June 2012).

²⁰¹ *Ibidem*.

Research on Criminals

Incarcerated people have always been easy targets to medical or scientific research. They are a vulnerable population and often discredited as citizens. The necessity to protect convicted persons has been expressed in, for instance, the 1948 *Nuremberg Code* or the 1964 *Declaration of Helsinki*.

Regulating human experimentations must consider rights such as the right to informed consent, the protection of privacy, the right to integrity (and bodily integrity) or the non-discrimination principle. Research on DNA could be considered as a human experimentation that has to be regulated according to these rights.

The question is whether a person giving a DNA sample, to be stored in the DNA database, still “owns” this sample as a biological property. We will not explore the issue of the right to property in this study. Nevertheless, do they still have the right to informed consent of their DNA sample or profile to be used for other purposes than that of the investigation? Similarly, regarding the data obtained during medical interventions the *Explanatory Report* of the *Convention on Human Rights and Biomedecine* says on article 14 that “if there is an intention to utilise biological materials or personal data obtained during a medical intervention for research purposes after the medical intervention, it is good practice for specific consent to be obtained for such research uses not related to the medical intervention.”²⁰²

Research on DNA database and inmate population could be based on “behavioural genetics”. These researches are based on the idea that violent behaviour is abnormal and thus might be genetically determined. The NDNAD would gather all profiles likely to carry such “genetic defect”. This is far more convenient for researchers than asking paedophiles or murderers to voluntarily participate in experimentation.

Troy Duster made a wise observation saying that studying DNA from databases will result in biased experiments²⁰³. Indeed, the sampled used are not randomised and, as we said earlier, some ethnicity, gender or age groups might be overrepresented. If people sharing common African ancestry are more represented in behaviouristic study; recurring Ancestry Informative Markers (AIMs) might be wrongly interpreted to be responsible for abnormal behaviour. Such a situation could be very dangerous if the study were in the hands of persons with bad intention and could have dramatic consequences for societies.

²⁰² <http://conventions.coe.int/Treaty/EN/Reports/Html/203.htm> (Consulted on 22 June 2012).

²⁰³ Duster, 2008, p. 4.

2) Psychology of DNA

When Science Defines Humans

As previously discussed, “behavioural genetics” supports the idea that if DNA is able to determine physical traits and many potential physical diseases, why can it not partially determine our behaviour or psyche too? The classic Cartesian vision of humans with body and spirit entirely separated could be questioned. Maybe the personality is also partially influenced by some genetic factors? We know that some gene codes for proteins, hormones and enzymes playing neurological roles. We also know that some behaviours and emotions depend inter alia on some of these molecules (to not mention all of them: adrenalin, serotonin, dopamine, insulin, oxytocin, prolactin, testosterone, progesterone...). Thus, behavioural genetics could help explain many cases of abnormal behaviours, especially some psychosis or violent behaviour leading to crimes.

Finding the “gene of crime” will drastically simplify and nearly automatize crime-solving. But such assumption gives a very restricted definition of what is a criminal. For instance, the question of criminal liability is often asked at the court, since some crimes occur by manslaughter. Will these “unintentional” criminals also carry the “gene of crime”?

Understanding humans through the exclusive scope of genetics risks giving an impression that the persons with genetic anomalies are “irreparable”. Indeed, if there is a “gene of paedophilia” or a “gene for murderous drive”, the authorities should detect the gene’s carriers initially only as a preventive measure. Carrying the gene will signify being a potential criminal and a permanent suspect. This irrevocable determinist approach ignores the presumption of innocence.

Nevertheless, the question remains, what to do if such genes were discovered? Will the perpetrators carrying the genes be criminally liable? Should they be judged as criminals or treated as the mentally ill people? Should the State take safety or preventive measures against these persons? The authorities could finance researches to inhibit the gene, but could they force the gene’s carriers to live under medication?

Another possibility to protect society away from these “potential dangers” would be “quarantine”. This is not a fantasy speech since, nowadays, genetic researches for social deviance are still running under the watch and support of law enforcement which already proposed such solutions.

During the seventies in the US, a chromosomal abnormality provoked preventive measures against the gene carriers, whom were supposedly dangerous. The so-called “Y Killer” profile consists of an extra Y chromosome in males resulting in XYY profiles. The idea is simple: Y chromosome is the chromosome of masculinity. Having 2 of them will increase, in fact double, the level of testosterone and aggressiveness²⁰⁴. From this statement, the Nixon Administration planned to organise a detection campaign to identify children carrying this additional chromosome and to stock those young XYY carriers in preventive “therapeutic camps”. These measures are reminiscent of some traumatising events during World War II based on similar naturalist theories, where “misfires” or defective persons were considered as noxious for society and were treated differently than “normal” citizens.

Similarly, Lawrence Razavi used forensic techniques to explain mental disorders. The Law Enforcement Assistance financed her study. The theory was that fingerprints could reveal genetic abnormalities which generate criminal behaviours. The reasoning is that skin (fingerprints) and brain (behaviour) have the same embryonic origin and thus, if one goes wrong, the other one will too²⁰⁵.

Recently, the Brunner syndrome (mental retardation and violent behaviour) was suspected to be driven by a gene coding for the enzyme monoamine oxidase A (MAOA) localised on the X chromosome²⁰⁶.

Inevitably, there have been tentative measures to justify social violence by claiming that this genetic abnormality was responsible for the crime. For instance, the MAOA gene has been defined as being responsible for doubling the chances of gang enrolment. Beaver and his colleagues explained that “...males with the low MAOA genotype, compared with males with the high MAOA genotype, were 1.94 times more likely to be gang members and they were also 1.82 times more likely to have used a weapon in a fight.”²⁰⁷

However, using behavioural genetics to explain criminality and social violence might be a reductive explanation of complex social, historical and political issues. It underlies the debate on the question of “nature versus nurture” that should always be carefully balanced. In our “DNA Era”²⁰⁸ as called by Richard C. Lewontin, we tend to focus more on the innate qualities at the expense of personal experiences and free will of individuals. Nevertheless, the State’s duty to ensure social inclusion and social peace couldn’t be substituted by clinical

²⁰⁴ Jacobs *et al.*, 1965.

²⁰⁵ Moran, 1992, p. 226.

²⁰⁶ Caspi *et al.*, 2002.

²⁰⁷ Beaver *et al.*, 2010, p. 133.

²⁰⁸ Lewontin, 2009.

justification.

The New Spectre of Eugenism

Richard Moran defined such States as “parental and therapeutic” and made a comparison with the *Clockwork Orange* film of 1971. In this movie, criminals are under treatment to take their “bad” away with behaviourist techniques. Moran fairly wonders, “(d)oes God want goodness or the choice of goodness? Is a man who chooses the bad perhaps in some way better than man who has the good imposed upon him?”²⁰⁹ In other words, what seems at first for the good of the “abnormal” persons and for society might appear to institutionalise questionable methods of treatment. Detecting, isolating and maybe curing people with “genetically determined social deviance” might be for the sake of the “greatest number” from a utilitarian point of view, but not for the individual.

Behaviourist genetic theories are dangerous since they flirt with eugenic ideology. Giving scientific credibility to discriminative prejudices will target and marginalise groups whom are already stigmatised. Yet, it seems hard to control the evolution of behaviourist theories since genetic knowledge progresses rapidly. The more we find biological factors potentially responsible for human tempers, the more criminal justice might show interest in this determinist approach, and the more individual rights and liberties will be put at risk.

In this regard, crime scene samples finding no match with DNA databases shouldn't be used either to determine physical or behavioural traits. After all, we have to keep in mind that, as the *Universal Declaration on the Human Genome and Human Rights* of 2000 states in its article 6, “(n)o one shall be subjected to discrimination based on genetic characteristics that is intended to infringe or has the effect of infringing human rights, fundamental freedoms and human dignity.”²¹⁰

Ultimately, the main risk of using DNA in criminal investigation would be to constantly push the limits of the respect of privacy, of informed consent, of the presumption of innocence, of non-discrimination or the right to know or not know about our genetic abnormalities. We have seen in Part.III that the constitution of DNA databases, using only non-coding genes, could already threaten all of these constitutional rights. Using the human genome to detect the phenotype of criminals is a step ahead towards a “biocontrol” society, and a risk narrow the

²⁰⁹ Moran, 1992, p. 216.

²¹⁰ <http://unesdoc.unesco.org/images/0012/001229/122990eo.pdf> (Consulted on 22 June 2012).

definition of human to “innate” characteristics.

Some would say that a list of traits could be allowed, since they are not that intimate. The sex, for instance, could be observed simply by looking at the chromosomes, without DNA profiling. However, this assumption supposes that the gender is exclusively genetically defined. Transsexuals or androgens would automatically be excluded, which might distort the investigation. In the end, basing criminal investigation (and thus criminal justice) on such reductive definitions risks to worsen social stigmatisation.

Establishing a list of traits would not be a long term solution, rather an open door to indefinitely extend this list, according to the scientific discoveries. Unfortunately, the longer the list will be, the greater the risk to reduce humans to their genomes.

CONCLUSION

“...the impact of social networks has moved DNA profiling and databasing in the UK from the ‘local uncertainties’ of their initial deployment within a small number of serious crime investigations to the ‘global certainties’ of their routine use for the investigation of volume crime.”²¹¹ Williams *et al.*, 2008, p. 8.

The routine use of DNA profiling as a procedural and investigative tool is now admitted in the United Kingdom and elsewhere. English practices differed from other countries by assuming a pioneering role and having the most aggressive policy in the use of forensic technologies. As a result, there has been a lack of minimal safeguard to protect the rights and liberties of citizens. This posture reflects an English culture of global surveillance as illustrated by the controversial *Regulation of Investigatory Powers Act* of 2000.

There are many critics, from all over the world, who pass judgement on the UK criminal investigation policies and DNA fingerprinting methods. Academicians, non-governmental organisations, advisory bodies and even parliamentary committees expressed their concerns. To name only a few, the Nuffield Council on Bioethics reported in 2007 *The Forensic Use of Bioinformation: Ethical Issues*²¹² and the Human Genetics Commission wrote in 2009 *Nothing to Hide, Nothing to Fear?*²¹³ In 2010, the Home Affairs Committee gave its opinion in the report *The National DNA Database*²¹⁴.

The *S. and Marper* case of the European Court of Human Rights underpinned the opinions expressed in these reports. The current English legislation regarding the collection and retention of DNA information is too lax and does not consider the fundamental rights of English citizens enough. The UK Government responded to the Court judgment in the document *Keeping the Right People on The DNA Database: Science and Public Protection*²¹⁵ and wrote two Acts. The first one, the *Crime and Security Act* of 2010 was abandoned for the second one the *Protection and Freedom Act* which was adopted on the 1st May 2012.

The rapid evolution of forensic technologies might create new challenges in the near future. Thus, the English legislative framework needs to be precise enough to avoid any further situation of ambiguity.

²¹¹ Williams *et al.*, 2008, p.8.

²¹² Nuffield Council on Bioethics, 2007.

²¹³ Human Genetics Commission, 2009.

²¹⁴ Home Affairs Committee, 2010.

²¹⁵ Home Office, 2009.

Did the UK respect the principle of proportionality and necessity mentioned in the introduction? Was the balance between the police powers and the rights of the individuals equilibrated? According to our study and the reports cited above, the answer is no. There are fundamental improvements that the UK should make to ensure that both police and citizens' expectations are fulfilled, and the main ones could be mentioned.

First, to avoid any further misunderstanding on the uses of DNA typing techniques, the establishment of legislative framework should be more open to public and democratic debates.

To help with understanding and assessing the reliability of DNA evidences, dialogues between forensic experts and laypersons should be more regular.

The methods for collecting DNA samples should also be more regulated. It is essential to prevent any use of coercive methods. To ensure that all of the necessary information is delivered and understood, including the possibility to refuse or to withdraw, a written consent should be compulsory for all situations.

Any biological sample taken from an individual should be done by a professional health care worker, despite the English differentiation of "intimate" and "non-intimate" samples.

To ensure that DNA sampling is requested with reasonable suspicion or probable cause, English police officers should be allowed to collect DNA only under court orders. Consequently, delivering warrants on a case-by-case basis would prevent DNA dragnet practices.

Concerning the disclosure of other DNA databases like the "biobanks", a warrant should also be compulsory to ensure a proportionate and necessary use.

Any other ways to get DNA from someone without his or her explicit consent should be forbidden by law. A biological sample left in a public area is the property of nobody. However, a difference should be made between crime scene sample taken from an unknown person, and tracking someone's DNA traces to avoid asking for his or her prior consent.

The more recurrent concern that has been condemned by the *S. and Marper* case is the retention of DNA samples from non-convicted persons. First of all, to prevent any function creeps of DNA samples, they should all be automatically destroyed after making the DNA profile, as it is for instance the case in Portugal²¹⁶. Then, the retention of DNA profiles should only concern convicted persons and for a limited time. In this respect, the *Protection of Freedom Act* of 2012 has new provisions.

²¹⁶ See Interviews Annexes.

Furthermore, each DNA profile loaded into the NDNAD should be non-nominal and with a code. It shouldn't have other information on the person like the name, sex, age, ethnicity, or any previous police record. The identification could be disclosed only when necessary, like in the case of a match with the crime scene profile. Statistics from the NDNAD should be based on anonymous and not nominative information.

In these regards, the *Prüm* Treaty says in its article 2 that “(r)eference data shall only include DNA profiles established from the non-coding part of DNA and a reference. Reference data must not contain any data from which the data subject can be directly identified.”²¹⁷

Possible function creeps of the NDNAD like “familial searches” on partial matches should also be regulated. It has to be proportionate and necessary to the extent that it must comply with the respect for private and family life.

Similarly, further analysis on crime scene DNA samples concerning coding genes should be regulated under the law. Decrypting the genotype to bring out physical traits, ethnic appearances or genetic anomalies for investigative purposes should be open to a public debate.

Further recommendations could be made, but the main axis keeps being a greater acknowledgement to the *European Convention of Human Rights* entered into force in the UK by the *Human Rights Act* of 1998, in the context of criminal investigation procedures and the uses of DNA fingerprinting.

This permissive attitude from the English government towards the uses of forensic technologies also reveals political issues.

In terms of governance, it is necessary to have a transparent, accountable and independent governing body supervising the NDNAD. The Nuffield Council on Bioethics 2007 report denounced a “lack of an independent relationship from the Home Office”²¹⁸ and the NDNAD Strategic Board. The NDNAD Ethics Group should play an important role here to ensure a transparent and independent oversight. It should regularly report on the cost-efficiency of the NDNAD in crime solving and its impacts on human rights. In other words, the Ethics Group is the body ensuring that the principles of proportionality and necessity are respected; but it is only advisory.

Moreover, forensic technologies have never been in the exclusive hands of the public sector in the UK. As already mentioned, private companies offer services to supply DNA analysis for the police. The GeneWatch UK organisation listed the organisations that can conduct DNA

²¹⁷ <http://register.consilium.europa.eu/pdf/en/05/st10/st10900.en05.pdf> (Consulted on 30 June 2012).

²¹⁸ Nuffield Council on Bioethics, 2007, p. 91.

profiling (and thus have access to DNA samples). First, the Forensic Science Service changed its status in 2005 "...from a trading fund to a Government owned company (GovCo), with a view to possible partial privatisation in the future."²¹⁹. Other private or public laboratories also operate, like LGC Limited, Orchid Cellmark, Tayside Police Forensic Science Laboratory and Forensic Science Northern Ireland. Strathclyde Police Forensic Science Laboratory and Lothian and Borders Police Forensic Science Laboratory only have access to crime scene samples.

All of these laboratories must be independent from the government or must avoid any private interests to ensure the neutrality of the DNA results brought to the court. Michael Saks denounced the fact that the "forensic science grew up in the criminal law" and suffers now of an "arrested development of scientific research."²²⁰ Indeed, internal demands of police investigators and government attorneys still lead the forensic business agenda as they are the main customers. This situation could open the door to a conflict of interests. A private market around DNA fingerprinting might challenge the accountability and transparency of the procedures further.

Furthermore, the laboratories' quality and the qualifications of forensic experts should be regularly controlled by an independent organism of experts. Pr. Duarte Nuno Vieira insists on the fact that "all laboratories must get an accreditation and a certification as well as conduct quality controls"²²¹.

Regarding the UK and other European countries, States' cooperation became necessary to catch criminals, especially within the Schengen space where criminals can move freely. Counter-terrorism and the fight against crime policies need thus a European harmonisation like with the European Law Enforcement Agency (EUROPOL). However, as already discussed in Part III., the UK is reluctant to share NDNAD data with other countries. Cooperation between countries can also be challenging since their standards differ in terms of criminal legislation, of investigative methods and of political situation.

Indeed, the creation of DNA databases met a prime difficulty. In the UK but also in other countries, databases were often constituted before any legislation was settled to frame them. As a result, despite the spread of national DNA databases around the world, the standards and legislations for the collection and retention of DNA samples are very different.

In any case, a global management of forensic identification techniques would also need to

²¹⁹ GeneWatch UK, *Governance*, at <http://www.genewatch.org/sub-539485> (Consulted on 04 July, 2012).

²²⁰ Saks, 1998, pp. 1091-1092.

²²¹ See Duarte Nuno Pessoa Vieira, Interview 1, Annexes, p. 101.

impose transparency and accountability mechanisms. International or regional guidelines would help to create such harmonisation.

Standardisation of DNA Profiling in the European Union (STADNAP) was created by the European DNA Profiling Group (EDNAP) in 1998 to promote co-operation across the European Union in the criteria for DNA profiling. The European Network of Forensic Science Institutes has similar ambitions to harmonize forensic sciences across the European Union. Other European instruments sharing other types of data have been created in the same spirit as the European Criminal Records Information System (ECRIS).

The 2005 *Prüm Convention* aims to share DNA databases as well as data on fingerprints and vehicle registrations between European countries for investigation purposes. The *Decision 2008/615/JHA I* “on the stepping up of cross-border cooperation, particularly in combating terrorism and cross-border crime”²²² has been included in the European Union Law.

At the international level, some tentative moves to share DNA profiling data and to establish international guidelines have been made, like with the International Society for Forensic Genetics (ISFG). According to the International Criminal Police Organization (INTERPOL), “120 countries use DNA profiling in criminal investigations; 54 countries have national DNA databases and 26 countries plan to introduce a national DNA database.”²²³

International cooperation for a common DNA database is just a premise because of technical difficulties. For instance, a previous international homogenisation to select the loci of interest would be necessary to allow comparisons. INTERPOL tried to impose international norms with the *INTERPOL Standard Set of Loci*. Its international DNA database called “DNA Gateway” was initiated in 2002 and “...by the end of 2011, it contained more than 117,000 DNA profiles contributed by 61 member countries.”²²⁴

The idea of a worldwide DNA database is however controversial. First it is not realistic in terms of resources, and then we saw that it has not been proven that the cost-efficiency of such a database will be worth it. Pr. Francisco Corte-Real says about universal DNA database that “DNA sampling from birth is not possible and it is non-sense.”²²⁵ Indeed, it also brings ethical concerns on a global scale.

As a “global” questioning of the use of DNA as evidence; we could wonder if it generates more benefits than harm. Before rushing in to improve DNA databases, did the UK and other

²²² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:210:0012:0072:EN:PDF> (Consulted on 03 July 2012).

²²³ INTERPOL, 2008, p. 1.

²²⁴ <http://www.interpol.int/layout/set/print/INTERPOL-expertise/Databases> (Consulted on 03 July 2012).

²²⁵ See Francisco Corte-Real, Interview 2, Annexes, p. 106.

States consider a precautionary approach? Genetic information could be like a “Pandora’s box” and could potentially cause harm. Once disclosed, the temptation to learn more from it is inevitable. However, its uses could be dedicated for other goals than for the good of humanity. Genetics science differs from other sciences in the fact that it touches something sacred: the essence of life. Being in God’s shoes seems tempting but it also means having the potential capacity to infringe some peoples’ fundamental rights, as it was illustrated with DNA fingerprinting.

Although this technique was originally aimed to catch criminals, it should always be in accordance with their human rights. A (suspected) criminal is still a citizen, and must be treated as such. Any unreasonable restriction of his or her rights in investigation procedures should be prevented, and certainly not extended to other innocent citizens. Besides, the use of genetics to pursue criminals also contains the risk of being used to “predict” criminal profiles. Applying determinist and eugenic theories in criminal justice is a dangerous way to categorise humans in society, as history showed with Nazism ideology.

Even if we are far from the 1997 *Gattaca* film directed by Andrew Niccol, surreptitious surveillance of citizens from States is not fiction anymore. The disturbing fact is that science serves this ambition and even helps to advance it further. Despite DNA profiling is a great tool to exonerate innocent and wrongfully inculpated persons, Hindmarsh expresses the general fear saying that “(t)here is no doubt that this is a worrisome technology. I worry about it.”²²⁶

Misuses of science for political or war purposes have already occurred in the past and created the most devastating and traumatising weapons. Similarly, identification methods have also been used to purchase a category of the population, in the worst cases, for genocide purposes. The DNA database system has longevity, and political stability is unpredictable in the future. We, today, need to be cautious and realistic on all of the potentialities that DNA identification technologies have.

Scientific advances are faster than the law, and it is challenging to have a clear overview on their possible impacts in society. The essence of our concerns should then always follow Rabelais’s thought saying that, “Science sans conscience n’est que ruine de l’âme”.²²⁷

²²⁶ Hindmarsh , 2010, p. 334.

²²⁷ Rabelais, 1999, p. 131. In English “Science without conscience is only the ruin of the soul”.

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ANNEXES

Interview 1

Professor Duarte Nuno Pessoa Vieira has a unique position to talk about forensic sciences, and especially about the use of DNA under criminal investigation. Indeed, he is *inter alia*: the President (Director) of the National Institute of Forensic Medicine of Portugal; the President of the Medico-Legal Council of Portugal; the President of the European Council of Legal Medicine; the President of the International Academy of Legal Medicine; the President of the International Association of Forensic Sciences; the President of the World Police Medical Officers and the Short-Term Forensic consultant for the High Commissioner of Human Rights of the UN.

The interview was in the National Institute of Forensic Medicine of Portugal in Coimbra, the 2nd June 2012.

Tiphaine Salès (S): How do the quality controls of forensic laboratories work here? Are they as reliable as in other scientific laboratories?

Pr Duarte Nuno Pessoa Vieira (V): Laboratories working for justice expertise must be ruled under strict conditions. For this reason, I am afraid to let some private laboratories do forensic genetics. It is important to respect the procedures, the chain of custody and to act in accordance with international rules like those proposed by the International Association of Forensic Genetics. All laboratories must get an accreditation and a certification as well as conduct quality controls. Unfortunately, in Portugal and elsewhere, there are many private expert laboratories offering alternative DNA expertise for investigation and others. However, they don't fulfil the international regulations or strictly follow the steps for the analysis, in spite of the importance of the results for the court.

S: Is the access to forensic laboratories equal for both parts? Is it more difficult for the defendant's party to conduct DNA tests?

V: It depends on the rules. Forensic laboratories should not work with the prosecution, or with the investigative police. As a start, they shouldn't be in the same structure, to ensure that they are independent. Laboratories should be inside the Ministry of Education or even the Ministry

of Justice, like in Portugal.

Here, we are totally independent from the court or the police. We are appointed by the Minister of Justice for a two year term in which they cannot move us. We decide what we do according to the law.

I think that forensic structures in every country should be allowed, not only to work for the country, but also to work for any private citizen and any private entity. For example in Portugal, any private citizen or entity can come to our National Institute of Legal Medicine and ask for DNA expertise. Unfortunately, in many countries the official forensic services only work for the official structures.

S: What do you think about a progressive extension of DNA Databases?

V: This is a current debate in Europe. There are many different systems of DNA databases. The first one was in the United Kingdom in 1995. The Portuguese database is more recent and was started in 2000. I think that obtaining a total harmonisation of the systems would be very difficult because they are related to social and cultural aspects of each country. Also the legislation in each country changes according to these factors.

I am totally in favour of forensic databases if some conditions are guaranteed like the rights of the citizens. In Portugal, only people that are convicted for more than three years will be inside the criminal database. After the person finishes his or her sentence, the DNA profile is deleted from the database, unlike in the United Kingdom.

I am not afraid of a progressive extension because, for instance, the United Kingdom has to back track after the judgment of the European Court of Human Rights. This country is now obliged to withdraw many profiles from the database. I think all European countries should participate to establish a European database according to the *Prüm* Treaty.

As long as principles are respected, I am in favour of DNA databases and their expansion. However, I think databases shouldn't be inside the police or all forces involved in the investigation. They should be in an independent structure like in Portugal. It is inside the National Institute of Forensic Medicine and it is supervised by a Commission appointed by the Parliament. In order to use it, the police have to justify for which purpose and how it will be used.

S: Is there a risk of social discrimination in the uses of DNA samples?

V: I think that, with DNA databases, there are many fears that have no reason to exist. For instance, in many countries we have a national database of fingerprints. A national database of DNA doesn't give more information than the fingerprint database. The information is only about identification and nothing more. There is no information about genetic diseases, or about ethnicity. The profiles of DNA that we use are only on non-coding sequences of DNA. However people ignore this fundamental principle.

The national Portuguese law for databases states that if at any moment we discover that we can learn something from the DNA profile on genetics that we didn't discover before, then the profiles should be deleted. So the problem is not a threat of privacy but it is a problem of misinformation because people are afraid about the potential of DNA. They always associate DNA databases with the fact of being suspects. The reason is that the first DNA database in the UK targeted suspects. But if I am in a national database of fingerprints without being a suspect why can't I be in a DNA database without being a suspect too?

I am not against the idea to open the DNA database, not only to suspects but to all citizens. It would make sense but it is not possible. However the result would be the same with fingerprints. In Portugal, fingerprints are automatically registered when you make your identity card, and no one complains.

S: There is a difference between DNA samples and DNA profiles. You talk here about the profiles, but what about the samples that contain all the genetic information?

V: The Portuguese law requires deleting every biological sample after the profile has been loaded into the database. Then the profile is stored with letters and numbers. The legislation differs regarding the countries but the ethical discussion around it is recurrent. I think the time will come when we will all have such law. There are some basic conditions in terms of human rights that should be compulsory for all countries.

S: Do you see such “conditions” put together in a future international treaty? What is the global situation in non-European countries?

V: The other countries are also starting DNA databases, such as Saudi Arabia and Iran. The problem is that these non-democratic countries do not have specific law to regulate it and it is dangerous. For this reason, the international structures should approve a document on the basic principles of national databases and write “we only recognize the national databases that

respect these conditions”. Guidelines should come from the United-Nations, the Commission on Human Rights or another international organism with the constitution of national databases in accordance to fundamental human rights principles. Unfortunately, I don’t see it coming yet.

Interview 2

Francisco Corte-Real is a specialist in forensic genetics and conducts DNA typing analysis for criminal investigations. He is the vice-president of the National Institute of Forensic Medicine of Portugal and the head of the national DNA database of Portugal. He also organised international meetings for the International Society for Forensic Genetics (ISFG). The interview was in the National Institute of Forensic Medicine of Portugal in Coimbra, the 2nd June 2012.

Tiphaine Salès (S): How do you assess the reliability of the DNA results?

Francisco Corte-Real (C): For DNA profiles loaded into DNA databases, we have more exigency than for other usual case works. For instance, we make the analysis twice, by different persons and different kits. This is specific to the Portuguese legislation, but it is not the case everywhere else. When it is for a trial, we are not obliged by law to make it twice, but we do it. Private laboratories might not respect this protocol.

S: How many private laboratories are there in Portugal?

C: We don’t know because our institution doesn’t control them. Private laboratories are only for paternity tests not criminal tests. For criminal tests in Portugal, there are three laboratories from the National Institute of Forensic Medicine (two in Coimbra and one in Porto) and the laboratory of the police office in Lisbon.

S: What do you think about the degree of independence of the laboratories from the authorities or from the prosecutor in the case of a trial?

C: There are persons that consider the police laboratory as not independent because it is inside the police building. Thus, there is a risk that the prosecutor is favoured when asking for DNA

analysis. The national institute is totally independent from the prosecutor. We are the middle men between the prosecutor and the defendant.

S: How do you allocate the DNA samples to analyse between the national institute and the police laboratory?

C: It depends on the prosecutor. Normally he or she goes to the location which is the closest geographically.

S: How long do you need today to make a DNA test and to obtain the results?

C: The limit is three months but in urgent cases we could do it within two days or more. Technically it is possible.

S: What are the latest technologies that you are using in your labs?

C: We currently use the autosomal STR and Y-STR, the mtDNA analysis, the SNP genotyping, and the X chromosome STR for the paternity tests.

S: Do you think that the national DNA Database could threaten the right to privacy?

C: Some questions must be considered. The Portuguese legislation is one of the most restrictive in this matter. For instance, the person has the right to know what information is in the database, the right to ask for correction, or a photo of the person concerned will be in the database only with his consent. The sample is automatically destroyed after obtaining the profile.

S: As a scientist, don't you think it could be useful to keep the samples in case of further discoveries?

C: There are reasons against and reasons in favor. It is more secure to destroy it to avoid any misuses of the samples by third persons. However, in the case of doubt or when there is a match, we need to repeat the DNA analysis. If the sample is destroyed, then we need to recollect it and repeat the whole procedure. The persons are afraid of what the experts here

could do with the samples, so we decided to put a law in place to ensure their automatic destruction.

S: As there is some discrimination in the arrests, do you think a DNA database could reflect any social discrimination?

C: In terms of ethnicity, we don't have information since we use non-coding genes. If in the future one of the markers reveals some information, the *Prüm* Treaty says that we must eliminate it from the databases. I think we have considered all of the aspects to prevent any abuses, so I don't fear such misuses.

S: Would you like to expand the DNA database to the whole population?

C: DNA sampling from birth is not possible and it is non-sense. Portugal has too large a population, so we don't have the capacities. Besides, it is not necessary and might cost a lot of money for no significant results. Crime prevention shouldn't concern children or new-born; they won't be criminals before a certain age.

S: How much does a DNA analysis cost?

C: The minimum is around 50 Euros without equipment and professionals. We estimate around 200 Euros for each sample. To sample from the whole population, with the amount of newborns per year, will be an expensive measure. It is better to do like the United Kingdom: beginning with criminals and then, when considering the majority of criminals are in the database, we can extend to other persons.