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## DNA-BASED CRIMINAL INVESTIGATION: PROBLEMS AND PROSPECTS

### 1. INTRODUCTION: THE RISE OF DNA TESTING

In February 2005, the district court Ellwangen, Germany, convicted and sentenced a 45-year-old man to life imprisonment for the murder of a young woman<sup>1</sup>. Nothing particular, except that the young woman was murdered in 1982. The trial was carried out almost a quarter of a century after the crime had been committed. The 1982 case was cleared up because the offender was a suspect in a 2004 rape case and was subject to DNA testing. The DNA sample was matched with the “cold case” DNA and could be clearly attributed to traces obtained from the 1982 case. A similar course took a case in Munich<sup>2</sup>. There, the DNA material was entered into a central DNA information system operated by the German Federal Bureau for Criminal Investigation (Bundeskriminalamt). The system was established in 1998 – as other DNA registers in all European countries. Also in the Munich case, the DNA from the murder case of 1983 generated a hit when the offender again was DNA-tested as a suspect, with the DNA matching the old trace conserved in the BKA database.

DNA-based investigations may take a reverse course as the U.S. Innocence Project demonstrates<sup>3</sup>. DNA exonerations of individuals convicted and sentenced to long terms of imprisonment or even death are numerous and have continued to increase over the last 15 years<sup>4</sup>. DNA-based exonerations have shed (additional) light on systemic defects inherent to conventional evidence generated through witness or suspect interrogations. From the perspective of effective protection of women against violence, the Council of Europe has voiced its conviction that DNA data banks may serve important preventive functions<sup>5</sup>.

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<sup>1</sup> *Stern*, 2 February 2005.

<sup>2</sup> *Spiegel Online*, 19 July 2004.

<sup>3</sup> Innocence Project, *Facts on Post-Conviction DNA Exonerations*, [www.innocenceproject.org/Content/351.php](http://www.innocenceproject.org/Content/351.php).

<sup>4</sup> S.R. Gross et al., “Exonerations in the United States 1989 through 2003”, *Journal of Criminal Law and Criminology* 2005, No. 95, pp. 523–560.

<sup>5</sup> *Recommendation Rec (2002)5 of the Committee of Ministers to member states on the protection of women against violence* adopted by the Committee of Ministers on 30 April 2002 at the 794th meeting of the Ministers’ Deputies.

DNA testing – sometimes called the genetic fingerprint – has developed into an effective, and today also a cost-effective, instrument in the investigation of crime<sup>6</sup>. Evidence of effectiveness is presented in the fast and certain identification of offenders in spectacular crime and in the clearing up of cold cases dating back decades, the latter sometimes also addressed as a “kind of ‘Minority Report’ in reverse”<sup>7</sup>. The growth of significance of DNA testing is due particularly to advances in genetic and molecular sciences but also to advances in information technology. Low Copy Number techniques have made it possible to extract DNA from very small or old cell material and other bio-molecular advances enable to extract DNA from types of material that was not accessible to DNA testing before<sup>8</sup>. The process of DNA testing has become more rapid as well as less costly. Information technology allows today to build huge databases and to develop fast (cross-border) handling and exchange of information. Automation and the use of portable, hand-held systems, commercial production of so-called DNA kits have contributed to make DNA testing a routine instrument in the investigation of crime<sup>9</sup>.

DNA testing and the related question of DNA data banks have been made a subject of study primarily from the viewpoint of forensic sciences, criminal policy and criminal doctrine. Sociology and criminology have only rarely dealt with the arrival and spread of DNA testing from their respective perspectives. DNA profiling certainly fits into the picture of a new culture of crime control as outlined by Garland<sup>10</sup>, who assumes that societies have established more intensive regimes of regulation and supervision. DNA testing and DNA databases express the changes toward actuarial justice, control of selected groups of offenders (sexual offenders) and risk management. DNA is also increasingly studied from an approach that seeks to look at how DNA testing is integrated into criminal law and criminal law practice with emphasizing interfaces between biochemical knowledge and legal doctrine, in particular in the area of evidence law. From the view of police and policing, DNA represents a particular phenomenon in the process of constructing police as technical agents of scientific rationality<sup>11</sup>.

## 2. THE POTENTIAL OF DNA

DNA testing is seen to provide a unique measure of investigation because it allows precise identification of an individual not only on the basis of a single source of information (as for example fingerprints) but on the basis of all types of cell material which can be taken from biological traces left at a crime scene (blood, saliva and other body fluids, hair, skin fragments, etc.) even if such traces are as tiny as those left with a cigarette butt<sup>12</sup>.

<sup>6</sup> E. Besselink, *Current and Future Developments in Forensic DNA Typing*, Universität Amsterdam, Amsterdam 2003.

<sup>7</sup> J. Roach, K. Pease, “DNA Evidence and Police Investigations: A Health Warning”, *Police Professional* 2006, vol. 2, p. 2.

<sup>8</sup> J.E. Samuels, C. Asplen, *The Future of Forensic DNA Testing: Predictions of the Research and Development Working Group*, Washington, November 2000.

<sup>9</sup> *Ibidem*.

<sup>10</sup> D. Garland, *The Culture of Crime Control*, Oxford University Press, Oxford 2001.

<sup>11</sup> R.V. Ericson, K.D. Haggerty, *Policing the Risk Society*, Clarendon Press, Oxford 1997.

<sup>12</sup> J.E. Samuels, C. Asplen, *op. cit.*

The DNA profile of an individual – defined through certain properties of the human genome – is determined by molecular-biological methods. The profile consists of (differing) lengths of non-coding parts (that means parts of the DNA not carrying information on the genetic substance) of the genome. This cell code is identical only for identical twins (a phenomenon occurring at a rate of about 3 in every 1000 deliveries). Biological traces found at a crime scene (including the victim) and possibly related to the crime are investigated with molecular-biological methods in order to determine non-coding parts of the gene (parts that do not carry information on substantive particulars of the individual but create a unique set of markers for the individual). A given number (determined by codes of practices) of such non-coding elements of the gene are then transformed into number codes and are then available for matching with other codes generated in the same procedure. Probabilities of identity of such codes (and with that the risk of identifying a false positive) are calculated on the basis of population statistics. Population statistics allow for the computation of the conditional match probability which is the probability, given the profile of the evidence sample, that a randomly chosen individual from the population shares this profile. These probabilities are dependent on the size of populations or whether populations have been isolated over time. The probabilities of false positives are in general very low and are rated therefore as providing for a level of proof of evidence that is (normally) beyond any doubt. However, a false positive may be also the result of improper handling of DNA at a crime scene or in a laboratory, of contamination or of deliberately leaving fake DNA in order to mislead investigative authorities. The O.J. Simpson case (sometimes addressed as the DNA wars) has gained notoriety for the type of problems that can emerge in the wake of introducing DNA-based evidence in high profile cases (in particular in a system based on jury trials and affected by allegations of racial discrimination<sup>13</sup>).

However, DNA testing allows in principle for further exploration of the cell material beyond identity markers. Skin or eye colour, ethnicity or the geographical region from where an individual comes, the risk of certain illnesses or psychiatric conditions may be determined, at least as a conclusion on probabilities. With advances of research on the human genome, the knowledge extractable from cell material will increase. Moreover, it is assumed that not far from now it will be possible on the basis of imaging tools to create photo-like pictures of an individual using cell material found at a crime scene and to determine the individual's psychological properties<sup>14</sup>. The rapid advances in the process of decoding the human genome and the evenly rapid progress in developing analytical and software tools indicate that such a future of DNA testing may be realized soon enough.

Recently, the range of DNA-based investigations has been extended to so-called familial searching, an approach that seeks to identify offenders through matching DNA to samples close enough to a case sample as to indicate a family relationship<sup>15</sup>. A 2003 case from Cardiff/Wales seems to be the first case where a suspect has been

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<sup>13</sup> "Simpson Trial Shows Need for Proper Use of Forensic Science, Experts Say", *The New York Times*, 11 October 1995.

<sup>14</sup> Nuffield Council on Bioethics, *The Forensic Use of Bioinformation: Ethical Issues*, London 2007.

<sup>15</sup> F.R. Bieber, C.H. Brenner, D. Lazer, "Finding Criminals through DNA of Their Relatives", *Science* 2006, No. 312, pp. 1315–1316.

identified (and ultimately convicted) through identifying a person whose DNA was very similar to the one found at a murder scene and was retained in the national DNA database. The investigation was then extended to family members of this individual and a close relative was found to match ultimately with the DNA sample from the murder scene<sup>16</sup>. This search strategy is (also) based upon the consideration that crime (and suspect and convicted offenders) is not distributed evenly across society but tends to be concentrated in certain social and kinship groups. The probability of being suspected or convicted of a crime has been demonstrated to be significantly higher when the biological father had been convicted of a crime<sup>17</sup>. However, allowing familial searches of DNA data banks indeed would result in a new category of people being placed under genetic surveillance<sup>18</sup>. It would not only be convicted (and suspected) offenders whose genetic information is entered and stored in DNA data banks. Also close relatives would be affected as they would fall into the range of criminal investigations whenever a relative had left cell material at a crime scene<sup>19</sup>.

### 3. CONDITIONS OF EFFECTIVE DNA-BASED CRIMINAL INVESTIGATION

The successful investigation of cold cases as mentioned in the introduction points to the conditions that must be present to use DNA testing as an effective tool. The first condition concerns the presence of traces left by an offender at the scene of a crime which can be used to extract DNA. Such a DNA profile represents a clear sign that a person has been present at the location of a crime or even that a person had committed a certain act if the person in question is known. DNA does not tell anything about how the crime has been committed (or why a crime has been committed). A link between a DNA profile and an individual can be established if either a suspect is already known to police and if DNA of that person can be run against the DNA found at the crime scene or if a DNA database has been established containing DNA profiles of persons already suspected or convicted of other crimes which can be searched for matches with the crime scene DNA. If matches are not achieved, then a dragnet type investigation may be launched which (on the basis of a general profile of a suspect) seeks to sample DNA from a more or less large group of individuals (defined usually through a geographic area, age and gender). Here, the sensitive question arises whether persons who fall into a general profile but may not be considered to be suspect of a crime, may be requested to participate in a genetic test and what consequences a refusal to provide for example a saliva sample has. It is in particular murder and rape cases for which such dragnet operations are launched, assuming that the suspect can be located in the vicinity of a murder scene and belongs, for example, to the group of male individuals between the age of 16 and 45 living in the vicinity of the crime

<sup>16</sup> The Forensic Science Service 2005, p. 9.

<sup>17</sup> B. Hutchings, S.A. Mednick, "Criminality in Adoptees and Their Adoptive and Biological Parents: A Pilot Study", in: S.A. Mednick, K.O. Christiansen (eds.), *Biosocial Bases of Criminal Behavior*, Gardner Press, New York 1977, pp. 127–142; K.O. Christiansen, "A Preliminary Study of Criminality Among Twins", *ibidem*, pp. 89–108.

<sup>18</sup> T. Duster, *Backdoor to Eugenics*, Routledge, London 2003.

<sup>19</sup> F.R. Bieber, C.H. Brenner, D. Lazer, *op. cit.*

scene<sup>20</sup>. The largest DNA dragnet in Germany had been launched in 1998 with testing some 18,000 men living in Cloppenburg/Lower Saxony. The mass DNA screening resulted in the clearing up of two murder cases; however, forensic laboratories in the area exclusively dealt with these cases for a period of several months. Since 1998, another mass screening has been going on in the North-East of Germany. Here, until now some 6,000 men have been screened; the dragnet is slowly extending and local police have vowed to continue testing until the murder case is resolved. It is in particular this kind of dragnet investigation which has come under critical attention in the last decade. The question of whether a large number of individuals (not suspected having committed a crime but just falling into a rather general profile of an assumed offender) may be subject to mass DNA screening everywhere has caused controversial debates. The US Supreme Court has ruled on several occasions that dragnets were unconstitutional because of the lack of individualized suspicion<sup>21</sup>. The German Federal Constitutional Court, however, has held that a dragnet operation in a murder case based on the knowledge that the last person visiting the victim was a driver of a Porsche car with license plates from Munich could be carried out although this involved DNA-testing of all Porsche owners of Munich (some 1,000 individuals; the operation did not yield any matches). A dragnet operation of course would not be necessary if a population-wide DNA database was available, with profiles of the public at large. Recently, an English judge has proposed to establish such a nationwide DNA database for the UK<sup>22</sup>. Of course, problems of preservation of privacy would multiply when establishing nationwide DNA databases. Apart from privacy concerns, dragnet operations as well as general DNA databases provoke the question of whether citizens may be requested to provide a DNA sample (for the purpose of security and criminal investigation) if they haven't provided any cause linking them to a criminal offence. With that, the innocent would be subject to criminal-justice-based interventions that – seen from conventional liberal criminal law doctrine – are legitimized only if a person has produced a reasonable suspicion that he or she has committed a crime.

From the viewpoint of criminal and constitutional law, DNA-based criminal investigations pose the following questions:

Under what conditions may biological material found at a crime scene be analyzed for DNA?

Under what conditions a suspect is obliged to provide a cell sample to be analyzed for DNA?

Which information may be extracted from cell material taken from a suspect or found at a crime scene?

Under what conditions a DNA sample may be entered in a national database and how long should it be stored?

Under what conditions a mass DNA screening may be carried out?

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<sup>20</sup> For an overview of English practice, see: C. McCartney, "The DNA Expansion Programme and Criminal Investigation", *British Journal of Criminology* 2006, No. 46, p. 179.

<sup>21</sup> *Davis v. Mississippi*, 394 Unites States: Supreme Court Reports 721, 1969.

<sup>22</sup> BBC, "All UK 'must be on DNA database'", *BBC News Online*, 5 September 2007, at <http://news.bbc.co.uk/1/hi/uk/6979138.stm>.

#### 4. CRIMINAL LEGISLATION AND PRIVACY

Seen from constitutional law and from an international perspective, it is essentially the privacy right which is infringed upon by looking into the DNA of an individual. Extracting DNA and retaining the DNA profile in computer files will affect the privacy right as protected by Article 8 of the European Convention on Human Rights (and other international and national human rights instruments). The European Court on Human Rights has declared cases admissible where applicants challenge United Kingdom legislation which authorizes to enter DNA profiles of individuals suspected of having committed a crime<sup>23</sup>. In Germany, however, it is also discussed whether going beyond mere identification markers of DNA will touch the basic right of human dignity<sup>24</sup> which has established (as part of the privacy right) a particularly protected right to make autonomous decisions upon any data related to an individual (right of informational self-determination). The deeper DNA testing digs into genetic information (in particular analyses going beyond identity-specific characteristics that have no known medical or biological significance), the more serious the intrusion into the right to privacy (and into the right to human dignity) is. From a constitutional perspective, the question may be put forward also as a question of proportionality. It has to be considered whether the taking of cell samples and the analysis of DNA and the interests pursued by that (prevention and investigation of crime) outweighs the individual interests in protection of the privacy right.

Legislation in Germany may serve as an example of DNA legislation in the field of criminal procedure law. The first law addressing DNA tests within the framework of the criminal process was created in 1997 (§ 81e, § 81f German Criminal Procedure Law). According to these provisions, cell samples may be used to determine the DNA if this is necessary to determine filiation or the individual to whom the biological traces can be linked. The type of information which may be extracted is restricted to identity specific characteristics. In the 1997 law, a judicial order was requested even if the cell material was anonymous (and could not yet be attributed to a suspect). In 1998, the DNA law was amended in order to allow for establishing a nationwide DNA database and enter information on offenders convicted of selected (serious) crimes. DNA tests are ordered by a judge if a certain threshold of seriousness is reached. Statutory authorization for the retroactive sampling of DNA from persons convicted of serious crime and assessed to be at risk of relapsing into serious crime resulted in constitutional challenges with the Federal Constitutional Court in principle upholding retroactive testing and storage in the national DNA data bank but holding also that there must be compelling evidence for the assumption of future offending<sup>25</sup>. The most recent law amendment as of August 12, 2005<sup>26</sup> brought significant changes. The amendment did away with the requirement of a judicial permission to apply DNA tests to anonymous biological traces found at crime scenes. Such tests may now be

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<sup>23</sup> European Court on Human Rights, Decision as to the Admissibility of Application nos. 30562/04 and 30566/04 by S. and Michael Marper against the United Kingdom, 16.1.2007.

<sup>24</sup> See furthermore the jurisdiction of the German Federal Constitutional Court (BVerfG NJW 1984, p. 419).

<sup>25</sup> BVerfG, 2 BvR 1741/99 as of 14.12.2000; BVerfG, 2 BvR 1841/00 as of 15.3.2001.

<sup>26</sup> Gesetz zur Novellierung der forensischen DNA-Analyse vom 12. August 2005.

ordered to be carried out by prosecutors and police officers. However, taking a biological sample from a suspect still requires a judicial order as does the ordering of a DNA test to be carried out. Such a judicial order is not required if the suspect (after being cautioned) consents to the test.

The amendment brought then changes to the conditions under which DNA profiles may be entered into the central DNA data bank. Until 2005, entering and saving DNA profiles in the national DNA data bank<sup>27</sup> were allowed in the case of all “serious” crimes and all sexual crimes (irrespective of their seriousness). Since the 2005 amendment, DNA profiles can be kept also if the offender has demonstrated to be a repeat offender and if the repeat offences in their totality amount to serious offence. Finally, the entering of DNA profiles still requires a forecast that the offender will engage in sexual offences, serious or repeated crime in the future<sup>28</sup>.

The 2005 law amendment extends to mass screening of DNA (§81h Criminal Procedural Law). Mass screening of DNA now can be carried out in the case of investigations of most serious types of crime (murder and other violent crime, kidnapping and sexual offences). A judicial order is required which details according to which criteria (gender, age range, geographical region) the group of persons to be determined to whom a DNA test will be applied. However, the persons falling into the dragnet of mass DNA screening are not obliged to take the test and must be informed of the voluntary character of the test. This confirms that those falling into a mass screening are not suspects in a technical sense. In fact, the concept of suspicion would be stretched too far and would not be reconcilable with the rule of law if, for example, in the case of a sexual murder, all men within an age range of 15 to 55 and being residents of a geographical area could be treated as suspects of this murder allowing for coercive measures on the basis of the criminal procedural code. DNA profiles collected in a mass screening procedure must be destroyed after the matching procedure has been completed.

The law reform of 2005 then added provisions aiming at implementing the principle of fair trial/procedure. The law seeks to establish organizational distance between investigating bodies and those entrusted with the task to carry out DNA profiling. §81e Criminal Procedural Law prescribes that DNA testing may only be carried out legally by experts who are either not members of the investigating bodies (police) or belong to a department of police which is separated organizationally and in substance from those police agencies which do investigations.

In principle, the time period for which a DNA sample may be stored in the national DNA data bank corresponds to the time periods operative for the general register on criminal records. This means that after a statutorily defined conviction free time period the DNA sample is destroyed.

All of the abovementioned aspects of DNA testing and DNA data banks display considerable variation when looking at them from an internationally comparative perspective. So, some systems make use of catalogues of criminal offences when defining who is eligible for a national DNA data bank. Some systems refer to general

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<sup>27</sup> Operated by the Bundeskriminalamt and containing at the beginning of 2008 some 670,000 profiles of which some 19% were profiles of unknown offenders ([www.bka.de](http://www.bka.de)).

<sup>28</sup> See also the decisions of the Federal Constitutional Court: BVerfG NJW 2001, pp. 879; BVerfG, 2 BvR 429/01 as of 20.12.2001.

categories of criminal offences, like for example all felonies. Variation can be found with respect to the time period for which DNA may be stored in data banks. The English law marks certainly the most extreme case as it allows for storage without any time restrictions.

In some legal systems, the law allows for digging deeper into DNA and beyond the identification markers. The Dutch Criminal Procedural Law allows not only the test for identification markers but empowers investigators to extract from DNA all information which would have been accessible also through the cognition of witnesses (hair and eye colour, ethnicity, gender<sup>29</sup>). The Forensic Science Services in England offer an ethnic inference service.

## 5. CONTROVERSIES

The policy debates around DNA and DNA data banks will unfold further and continue to create legal and political controversies. These debates will unfold around the questions whether DNA profiling and DNA data banks should be extended and how the privacy right should be weighed against assumed advantages of DNA profiles in the investigation of crime. Such debates will be fueled by cases of serious (violent) crime rapidly cleared up after DNA test have led to matches in DNA data banks and of course by the perception that DNA is a multi-functional and most effective tool. DNA-based criminal investigation will – this is the narrative – not only lead to improving clearance rates but it will ultimately lead to maximizing general and individual deterrence. Potential criminal offenders will be deterred in face of the threat of rapid and unavoidable identification. The policy questions therefore concern whether the requirements of carrying out DNA tests within the framework of criminal proceedings should be lowered, whether DNA data banks should be expanded, whether transnational DNA data banks should be established and whether more than identity markers should be allowed to be extracted from cell material. Particular attention is paid to the question of when DNA profiles should be destroyed after having been entered into central DNA data banks. It is argued that restrictive limitation will result in restrictions in the clearing up of serious crime<sup>30</sup>.

A look at the international scene reveals various examples of extensions of DNA testing and DNA data banks. The English law allows entering DNA profiles under much less restrictive conditions than most other legal systems. According to the English law, a DNA sample may be taken and a DNA profile may be entered into the national DNA data bank if a so-called “recordable” offence (the offence/offender is eligible for the general register of criminal records) is concerned and if reasonable suspicion has been established. This has resulted in the English DNA data bank being today the biggest worldwide. However, it is not established yet whether such extensions of DNA data banks in fact result in a cost-benefit ratio (including immaterial costs, e.g. infringements upon the privacy right) as to justify lowering the requirements for storage of profiles in a DNA data bank<sup>31</sup>. Evaluation studies that could

<sup>29</sup> Ministry of Justice, *The Dutch DNA Testing (Convicted Persons)*, Act. Den Haag 2006.

<sup>30</sup> C. Haas, P. Voegeli, A. Kratzer, W. Bär, “Die Schweizerische DNA-Datenbank. Rückblick auf sechs erfolgreiche Jahre”, *Kriminalistik* 2006, vol. 60, pp. 561.

<sup>31</sup> C. McCartney, op. cit.



provide reliable information on cost-benefits do not exist. Reports on the number of matches (in terms of identifying suspects or identifying serial offending) found through national DNA data banks are numerous. However, such reports do not demonstrate that without DNA effective investigation would not have been possible. When comparing Germany and the United Kingdom, for example, it turns out that despite the huge difference in terms numbers of DNA profiles available in national DNA banks, the clearance rates of crimes in general and those of specific serious crimes do not differ between both countries.

DNA data banks of course yield more matches if more profiles are stored. Matching ratios are certainly also dependent on the characteristics of individual criminal careers and the general patterns of reoffending among the active criminal population.

## 6. THE GROWTH OF DNA DATABASES AND APPLICATIONS

The dynamic growth of DNA databases is visible in many countries that have started to collect DNA from the end of the 1980s on<sup>32</sup>. Currently (2007), the FBI-operated DNA database in the U.S. contains 4,949,831 DNA profiles of which 4,766,390 are from convicted offenders<sup>33</sup>. The Canadian DNA data bank counted approximately 100,000 profiles in 2006 and herewith reflects a rather restrictive use of DNA profiling<sup>34</sup>. In Switzerland, some 75,000 DNA profiles had been registered until 2006<sup>35</sup>. The English database evidently is the biggest DNA profile data set worldwide. Established in 1993, it covers today some 4,5 million profiles of convicted offenders and suspects. This amounts to some 5% of the population at large<sup>36</sup>. In contrast, the French and Dutch DNA national DNA registers are rather small amounting to a collection of some 450,000 (France) and 27,000 (the Netherlands) DNA prints<sup>37</sup>. In Germany, the DNA database run by the Bundeskriminalamt (Federal Criminal Office) in 2007 contained 500,000 profiles from which 19% concerned anonymous samples from crime scenes.

The dynamic of growth is expressed for example in the French DNA register. In October 2003, the French register contained some 8,000 profiles, in 2007 the number climbed to 450,000. In England/Wales, the pace of DNA registering is remarkable. Each year some 400,000 profiles are added to the data bank (in addition to 80,000 anonymous samples coming from crime scenes)<sup>38</sup>.

It is in particular the European Union that aims at establishing a supranational system of DNA data banks. In a communication of the Commission to the European Council and the European Parliament on the improvement of the effectiveness of European Data Banks in the field of the Interior and Justice (24. 11. 2005), the need for cross-national law enforcement on the basis of uniform and networked information

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<sup>32</sup> P.M. Schneider, P.D. Martin, "Criminal DNA Databases: The European Situation", *Forensic Science International* 2001, No. 119, pp. 232–238.

<sup>33</sup> [www.fbi.gov/hq/lab/codis/index1.htm](http://www.fbi.gov/hq/lab/codis/index1.htm).

<sup>34</sup> The National DNA Data Bank of Canada, *Annual Report 2005–2006*, Ottawa 2007, p. 6.

<sup>35</sup> C. Haas, P. Voegeli, A. Kratzer, W. Bär, op. cit., p. 560.

<sup>36</sup> BBC, op. cit.

<sup>37</sup> Nederlands Forensisch Instituut, *Jaarverslag 2006 van de Nederlandse DNA-databank voor strafzaken*, Den Haag 2007, p. 6.

<sup>38</sup> The Forensic Science Service, *Annual Report 2004–2005*, London 2005, p. 18.

systems is stressed. In the Treaty of Pruem (May 2005), several European countries have agreed to allow the exchange of DNA profiles. The Treaty of Pruem will be transformed into European Law as regards its DNA-related parts. Interpol has set up an international database of DNA in 2003 and attempts to develop a resource for its member states<sup>39</sup>. However, the number of DNA profiles has remained quite small indicating perhaps that many countries do not expect gains through the internationalization of DNA-based investigations<sup>40</sup>.

When looking at the practice of DNA-based criminal investigation, it is not exceptional and serious crime where DNA technique unfolds. It is rather volume crime in terms of property crime where DNA testing is routinely applied. The focus is on property crime. A look at German practice and results of DNA matching reveals that two third of the hits concern theft, robbery and extortion<sup>41</sup>.

Analysis of matches demonstrates that the proportion of matches is fairly high and – over time – does not show a tendency to decrease<sup>42</sup>. But, it has been argued also that DNA is still marginal in the overall investigation and detection of crime. Just 0,85% of all recorded crime in England/Wales produces a DNA sample which can be tested<sup>43</sup>.

## 7. OUTLOOK

In 2003, the UK government has transmitted a sensitive question to the national Commission on Human Genetics. The question concerned whether it would be useful to have a general DNA register into which the DNA of every newborn in the UK would be entered. The commission responded by stressing that from a medical perspective benefits would result from such a general DNA registration<sup>44</sup>. However, it was stressed also that currently technical and cost-related aspects as well as ethical and legal grounds speak against the establishing of a general DNA register that will prospectively cover the population at large. It was held that such a general register carries various risks, among them the risk of stigmatization and discrimination as well as the risk of abuse of genetic information. It was recommended to come back to this question in the future. The questions launched by the English government demonstrate the course DNA testing and DNA data banks may take in the future. It is the general and unconditional registering of DNA from all citizens. The line of development opened by such thinking fits into developments in adding to identity papers or passports and equivalents of biological markers that are safe against abuse and allow for precise identification. The latter developments have been pushed by

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<sup>39</sup> W. Schuller, "Interpol/DNA-Datenbank. Internationale Kooperation", *Der Kriminalist* 2005, pp. 151–154.

<sup>40</sup> P. Johnson, R. Williams, "Internationalizing New Technologies of Crime Control: Forensic DNA Databasing and Datasharing in the European Union", *Policing and Society* 2007, No. 17, pp. 103–118.

<sup>41</sup> [www.bka.de](http://www.bka.de).

<sup>42</sup> D. Leary, K. Pease, "DNA and the Active Criminal Population", *Crime Prevention and Community Safety: An International Journal* 2003, No. 5 (1), pp. 7–12.

<sup>43</sup> C. McCartney, *op. cit.*, p. 182.

<sup>44</sup> Human Genetics Commission, *Profiling the Newborn: A Prospective Gene Technology? A Report from a Joint Working Group of the Human Genetics Commission and the UK National Screening Committee*, London, March 2005.

concerns about illegal immigration and international terrorism. Another policy development recently endorsed by the European Union coincides with the discussion on unconditional registering of DNA. In the directive 2006/24/EC, the European Union has paved the way towards a general retention of all telecommunication traffic data (including internet traffic) for a minimum period of six months and a maximum of two years. The directive must be implemented September 15, 2007 and legislation in Europe today shows that in many countries the minimum period of retention of six months will be surpassed.

However, registering DNA from every newborn would open the path to a fully transparent individual. If such data banks were available and if law enforcement and security agencies had access to such data banks a fully controlled individual would be result. This would of course contradict the model of an autonomous man as underlying the model of a democracy based on the rule of law. The DNA debates show that the warnings voiced by Gary T. Marx some years ago addressing “techno-fallacies” of surveillance technologies<sup>45</sup>. DNA is portrayed as being infallible and most of its attractiveness results from its unrivalled ability to solve crime<sup>46</sup>. Advocates of the expansion of DNA testing and DNA registers rely on beliefs that express “more is better” and which reflect the assumption that growing investments in technologies will yield linear advances in benefits. There is also extensive reliance on the neutrality of technologies. DNA tests and DNA information systems are not simply a matter of applying a technology, and relying on technology alone is said to create huge dangers (stemming also from neglecting other investigative approaches and the failure to develop more subtle (and embedded) uses of technology<sup>47</sup>. The belief in science may also affect the question of whether companies producing DNA kits for forensic practice may be forced by defence councils to disclose the data and the research results upon which the DNA kits are based<sup>48</sup>.

However, assumptions on the neutrality of biological technology as expressed in DNA testing do not hold true even when considering the current practice. DNA databases will for example reflect the class and ethnic biases inherent to crime statistics in general. It is revealing that the debate in the United Kingdom evidently is struggling with the apparent overrepresentation of ethnic minorities in the national DNA database<sup>49</sup>. Figures computed from Home Office statistics and census data show almost 40% of black men have their DNA profile on the database. That compares with 13% of Asian men and 9% of white men<sup>50</sup>. In fact, genetic surveillance penetrates according to such estimates most deeply those segments of society which are overrepresented in the criminal justice system and DNA data banks would simply reiterate the selection processes exerted through policy choices as well as search and seizure and arrest policies which are allegedly biased toward minority groups.

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<sup>45</sup> G.T. Marx, “Some Information Age Techno-Fallacies”, *Journal of Contingencies and Crisis Management* 2003, No. 11, pp. 25–31.

<sup>46</sup> C. McCartney, op. cit.

<sup>47</sup> J. Roach, K. Pease, op. cit.

<sup>48</sup> J.N. Mellon, “Manufacturing Convictions: Why Defendants Are Entitled to The Data Underlying Forensic DNA Kits”, *Duke Law Journal* 2001, No. 51, pp. 1097–1137.

<sup>49</sup> BBC, op. cit.

<sup>50</sup> Ibidem.

Proposed legislation in the state of New York aiming at collecting DNA from all persons convicted for misdemeanors equally provoked critique that such a DNA database would result in a racially and demographically skewed and biased sample subject to the priorities set by law enforcement<sup>51</sup>. This holds true of course for all types of victimless crime which become known to criminal justice agencies only through the use of proactive (and therefore selective) law enforcement. While it can be argued that this type of disproportionality reflects biases in the criminal justice system at large and not problems inherent to DNA databases, it would be nevertheless another expression of surveillance affecting particularly minority groups which expose themselves due to the interest the state expresses for example in controlling marijuana use.

It is advisable therefore to adopt a “minimalist” strategy when thinking on the future course of DNA testing and DNA data banks. Beside the ethical and legal questions arising out of far-reaching genetic information<sup>52</sup> and the data protection issues that stem from comprehensive data banks, software interfaces and easy applicability of DNA tests, it is the general question of whether societies should treat their citizens as generally suspicious of either having committed a crime or likely to commit a crime in the future.

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<sup>51</sup> H.G. Levine, *Hearings of New York State Assembly Committees on Codes and on Corrections Regarding Pending and Proposed Legislation to Collect DNA from All People Convicted of a Misdemeanor in New York State and also Regarding New York City's Epidemic of Marijuana Possession Arrests*, Albany, New York, May 31, 2007.

<sup>52</sup> R. Tutton, C. Oonagh (eds.), *Genetic Databases: Socio-Ethical Issues in the Collection and Use of DNA*, Routledge, London 2004.