

**DNA AND POLICE INVESTIGATIONS
IS LAW ENFORCEMENT READY FOR THE NEW SCIENCE?**

by

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The Command College Futures Study Project is a FUTURES study of a particular emerging issue of relevance to law enforcement. Its purpose is NOT to predict the future; rather, to project a variety of possible scenarios useful for strategic planning in anticipation of the emerging landscape facing policing organizations.

This journal article was created using the futures forecasting process of Command College and its outcomes. Defining the future differs from analyzing the past, because it has not yet happened. In this article, methodologies have been used to discern useful alternatives to enhance the success of planners and leaders in their response to a range of possible future environments.

Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

The views and conclusions expressed in the Command College Futures Project and journal article are those of the author, and are not necessarily those of the CA Commission on Peace Officer Standards and Training (POST).

DNA AND POLICE INVESTIGATIONS IS LAW ENFORCEMENT READY FOR THE NEW SCIENCE?

The field of DNA research is evolving almost daily, with new identification abilities becoming available that are indelibly changing criminal forensic technology. Is law enforcement ready, though, to make use of the new science? As long as society pursues justice, the need for the system to positively identify criminal suspects will be the critical factor in prosecution. What is changing are the methods we use to make those identifications, and the resources available to make use of those changes. Future effectiveness solving crime will depend upon how effective police are at implementing new DNA analysis technology to identify criminal suspects and detect cases when DNA has been altered or manufactured for scientific or medical purposes.

Science is Advancing Quickly

In a 2009 report by ABC News, a panel of experts ranked the ten most important medical advances of the decade. Number one in that ranking was the mapping of the human genome, labeled a landmark advance on par with going to the moon.¹ Mapping the human genome is considered the key to unlocking the secrets of DNA.² Curing disease, or lessening the effects of ailments is a significant motivation for the rapid advance of bio-science; however, projects to extend the human lifespan and improve capabilities are often better funded because of the strategic interests of our nation. Federally funded research has also been conducted to develop DNA recovery and

¹ ABC News/health “The top ten medical advances of the decade.” December 17, 2009 <http://abcnews.go.com/Health/Decade/genome-hormones-top-10-medical-advances-decade/story?id=9356853> (accessed July 12, 2011)

² Ibid.

inspection for purposes of establishing the identity of the donor for military, homeland security and law enforcement purposes.³

DNA Analysis

DNA (deoxyribonucleic acid) contains the human blueprint or what scientists commonly call the human source code. With a complete profile developed from evidence left at a crime scene, forensic scientists can identify or eliminate people based upon their sex, race or even family ancestry. The reliability of DNA evidence has risen to the same standard enjoyed by fingerprint evidence.⁴ With DNA evidence gathered from a crime scene, police can identify suspects or witnesses who might have previously been at the scene, or identify an otherwise unknown victim. Every human being can leave behind residue consisting of fluids, hairs or skin cells that contain a DNA profile that is unique to the contributor.

Further complicating the science of human identification by DNA analysis is the field of human organ growth. One significant benefit of the advances in DNA technology is the development replacement limbs and appendages using stem cells.⁵ An unanticipated result of the Iraq and Afghan wars is the increased speed of research in this field due to the sudden increase in demand. We can be certain the cloning of a human being will occur as scientists have demonstrated the ability to clone animals successfully. Current laws in the U.S and many modern countries ban human cloning;⁶ however, as

³ FBI Biometric Center for Excellence “FBI Initiatives” http://www.biometriccoe.gov/FBI_Initiatives.htm (viewed July 21, 2011)

⁴ Michael Lynch, Simon A. Cole, Ruth McNally and Kathleen Jordan. Truth Machine. (University of Chicago Press, 2008), 13.

⁵ Time Magazine “The Science of Growing Body Parts” by Alice Park. November 1, 2007 <http://www.time.com/time/health/article/0,8599,1679115,00.html> (viewed July 21, 2011)

⁶ Library of Congress. “Human Cloning - Hearing before the U.S. House of Representatives, Committee of the Judiciary, Subcommittee on Crime.” One Hundred Seventh Congress, First Session on HR 1644 and HR 2172. (June 7 and June 19, 2001.)

other countries acquire the scientific knowledge necessary for cloning, American law will be irrelevant to their application of this science. The discovery of DNA has made an amazing impact on the field of human identification but, this field is just developing and more advances can be expected in the future. What type of DNA evidence can we expect to find from a crime scene involving a suspect with a laboratory-grown body part, or eventually, a human clone? Even now, advances in DNA evidence are both improving and complicating the prosecution process.

Analysis Techniques Improve with Touch DNA

The ability of crime scene investigators to obtain DNA evidence that identifies suspects has dramatically increased in the past two years with the discovery of Low Copy Number DNA, more commonly known as *touch DNA*⁷. This new method of analyzing minute amounts of DNA is gaining acceptance in courts across the nation and allows investigators to determine a criminal's identity using just a few human cells left behind at the crime scene. Oftentimes, a suspect need only touch a surface to leave enough cells for coding in this process.⁸

As DNA analysis techniques and other human identification technologies advance, law enforcement personnel will require more training to apply the new technology to solve cases.⁹ Forty years ago, detectives handled items of evidence with handkerchiefs and pencils. Twenty years ago, rubber gloves became the new standard for use in handling evidence. As the ability to collect trace evidence for DNA examination improves to the cellular level, crime scenes will be treated much like a laboratory clean

⁷ Scientific American "What is Touch DNA?" August 8, 2008
<http://www.scientificamerican.com/article.cfm?id=experts-touch-dna-jonbenet-ramsey> (viewed July 19, 2011)

⁸ Ibid.

⁹ Ibid.

room or a hazardous materials scene. Molecular evidence collected for DNA analysis may contain cells from emergency workers or the first responding officers to the crime. The more contributors to a sample, the more difficult and time consuming the analysis becomes. In the near future, anyone entering a crime scene where DNA is to be collected will have to wear masks and disposable jumpsuits, since the mere presence of skin cells from an investigator could add another DNA profile requiring identification.

The Demand on Crime Labs

The selection of cases for evidence analysis will become more important with the increased ability to develop DNA profiles. Forensic laboratories have to have rules on which types of cases qualify for their efforts, especially when the analysis is taxpayer funded. As an example, an investigator might like to have evidence from a misdemeanor crime analyzed for DNA evidence; however, if the laboratory accepted all such requests they will become bogged down in a never-ending backlog of cases, a good example of this phenomena is at the FBI laboratory which, had 3,200 cases waiting in 2010.¹⁰

Laboratories that do not anticipate the new demands of DNA analysis could become ineffective at providing relevant results for prosecution.¹¹ State and local crime labs are already lagging behind with requests for traditional DNA analysis requests. Low Copy DNA analysis will open up a new range of possibilities and consequently increased evidence submissions.¹² All this adds up missed filing deadlines for prosecutors and runs against the statute of limitations on many crimes. DNA results that come back after time has run out to file a case are a wasted effort. With significant backlogs, cases will have to

¹⁰ Reuters News “FBI Laboratory has large backlog of DNA cases” August 9, 2010.
<http://www.reuters.com/article/2010/08/09/us-usa-fbi-dna-idUSTRE67846E20100809> (viewed July 20, 2011)

¹¹ Ibid.

¹² ABC7 News “\$140K machine not helping SF DNA crime lab” July 23, 2010
http://abclocal.go.com/kgo/story?section=news/local/san_francisco&id=7571742 (viewed July 19, 2011)

be screened at the outset and many solvable cases will may make it to the technician for analysis.

Similarly, an increased reliance upon DNA evidence will certainly result in a corresponding increase in the desire to collect evidence that may yield suspect DNA. This could naturally lead to an increased need for field evidence technicians to examine likely locations and collect evidence samples for testing. The increased exposure of the value of DNA evidence by the media during high profile cases will likely result in better public education.¹³ The most publicized trial in American history¹⁴, the O.J. Simpson criminal trial, was televised from beginning to end. A public better educated in DNA science will likely expect more both as jury members and as the voting public.

The impact of this issue amongst various law enforcement agencies will vary depending upon their existing or planned criminalistics capacity. Agencies without a forensics laboratory either use one of the State's regional crime labs, an allied agency crime lab or a private laboratory under a contractual agreement. In the emerging landscape of analysis, agencies will be largely affected by those decisions made by outside entities (i.e. the outside lab or the state legislature) and they may or may not actually have input in how those decisions are made. It is more likely the most significant issue these agencies will face will be limited to the training of their crime scene technicians or in some cases their patrol personnel who collect the trace evidence. These personnel will require updated knowledge in the possible sources, collection and handling of trace evidence before it goes to the lab for analysis.

¹⁴ Thomas L. Jones, TRU-TV Crime Library.
http://www.trutv.com/library/crime/notorious_murders/famous/simpson/index_1.html (viewed July 15, 2011)

Agencies that operate forensics laboratories will be affected differently because they are performing the DNA analysis functions themselves. The impact of advancements in the field will require more training and in some cases more personnel. Small amounts of DNA collected as touch DNA require laboratory amplification before a profile can be identified. Existing personnel will need additional training on the new low-copy DNA analysis techniques along with the operation of newly available scientific equipment. Some professional affiliations, such as the International Association for Identification will promote and facilitate advanced training and in other cases, state and federal grant programs will cover the expense of additional training. A grant program from the U.S. Office of Justice Programs is one such source of funding.

Training Need for the Future

New training should include the methodology and applicability of low-copy DNA in all crimes that currently yield DNA evidence. In addition, laboratory submission guidelines should be reviewed to take into account the increased ability to obtain evidence results on crimes not previously considered qualified for DNA analysis. By today's standards, DNA-qualified crimes are commonly limited to murder, sexual assault and kidnapping. Today, though, we have the ability to obtain low copy DNA evidence from crimes as varied as robbery, theft and fraud. Policy makers in agencies operating laboratories should revisit these qualification standards in conjunction with the District Attorney to establish if the submission requirements should be revised to reflect the newest technology.

The forensic laboratory manager should also assess the equipment needs of the facility based upon the expected needs of the technicians who will be performing the processes. This is important since the cellular amplification required for low copy DNA

analysis will require additional equipment. This needs analysis should also anticipate the expanded demand that can be anticipated from an increased workload in the laboratory because of any revisions to the submission requirements. If the laboratory will begin to accept DNA analysis requests for lesser crimes (i.e. simple theft or burglary) then more work will be generated. Since the turn-around time in any lab is dependant upon the availability of personnel and the capacity of the equipment, lab managers should ensure their lab has enough equipment to maximize their effectiveness.

Conclusion

Science will continue to advance in many areas not necessarily impacting upon law enforcement. We are, however, beneficiaries of change in far more areas that may be readily apparent. In this article we have discussed the benefits of scientific advances as they apply to forensic analysis; however, law enforcement leaders will continue to see many benefits from science including improvements to the way society receives police services, improvements in the management of the police profession and through bioengineering, improvements to the actual personnel who work in the law enforcement profession.

Sociologists tell us that crime will always be present to some extent in every civilization. The introduction of bio-engineered human organs and ultimately cloned human beings will only complicate the investigation of crimes for the police. Will DNA analysis result in positive identifications of clones? What about fingerprints, could we lose a time-tested method of identification when fingerprints cease to be unique? These questions will persist in the forensic identification field as we get closer to that reality. To be sure, identification issues of the future will challenge the law enforcement profession to an extent we can only imagine.

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