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The DNA revolution and forensic futures

Carole McCartney argues that the DNA revolution is unlikely to 'rid societies of crime'.

The DNA revolution

In just the last 25 years, forensic DNA profiling use has grown exponentially and its spread is now global (Interpol, 2008). In 2009 it secured its place as the standard bearer for forensic sciences, being cast as the 'gold standard' by the august body, the US National Academy of Sciences (NRCNA, 2009). Juries no longer need to be convinced of the accuracy or reliability of DNA evidence, indeed the concern is now that juries may be far too easily persuaded by DNA, or may even demand it before they will convict (the 'CSI effect'). With DNA profiling securely embedded in both police practice and popular culture, the frontiers of genetic science are now being pushed ever further in the quest to find the Holy Grail: the perfect crime-fighting tool. With the uses of DNA in crime investigation having expanded dramatically, the ongoing quest to achieve ever greater utility from DNA has not yet abated. Just three areas of development are outlined below: phenotyping of forensic crime scene samples; universal DNA databases; and finding the criminal 'gene'.

Phenotyping of forensic DNA samples

With mobile DNA testing at crime scenes a reality (albeit a rare occurrence), and DNA profiling at police stations promised in the near future, the time taken to profile a crime scene profile or suspect has dropped from days to potentially minutes. However, such developments, while opening possibilities for swift detection of offences, do not assist when no match is found. The frustrations of investigators with a crime scene DNA profile, but no link to a suspect, have led to efforts to maximise the information to be gained from a profile. 'Familial searches' (locating 'near matches' on a DNA database in an effort to identify potential relatives of the perpetrator) are now a legitimate investigative practice, though costly and time-consuming, while research into 'phenotyping' – detecting observable traits from genetic sequences – has led to 'red-hair' predictive tests (where offenders can be identified as having red hair, though this does not tell detectives if they still have their hair, or if they have dyed it), and ethnicity predictions (with similar difficulties in making reliable predictions about appearance from a generalised prediction about ethnic background). Scientists around the world however, are seeking the ultimate prize: constructing a reliable description of an offender (height, ethnicity, eye colour, hair colour, etc.) from their DNA profile.

This research to date, however, has yet to reap rewards, and scientists appear far from delivering police 'DNA photofits'. Meanwhile, there is a debate to be had over whether this would actually prove helpful in the context of investigations, with its ability to mislead. If police narrow their search, to concentrate upon just those suspects who fit the 'photofit' then mistakes could be made. It is known from studying miscarriages of justice that 'tunnel vision' early in investigations can lead to missed inculpatory evidence pointing to other suspects, as well as exculpatory evidence. It is also known that many genes interact with, or can be overridden by, the environment – e.g. height can depend upon dietary factors etc., while other external characteristics can be altered quite easily, i.e. hair colour, even eye colour. It will have to be determined just how helpful it may be to say to an investigator 'the suspect may be Caribbean'. Indeed, there will have to be a whole lot more work on perfecting such predictions before such information is more useful than misleading. There is also a possibility that ethnic predictions in particular could promote stereotypes. If researchers focus upon ethnicity (which is highly contested), then this could prove highly controversial.

Universal DNA databases

With serious limitations, and controversies associated with obtaining phenotypic information from profiles, the solution to having a crime scene profile but no match is to create a universal DNA database, with all the citizens of a country on a national database. Universality means that arguments about 'discrimination' disappear, and the police 'should' be able to solve all crimes (where a DNA profile can be retrieved from the crime scene). The issue simply then becomes one of ensuring that the DNA profiling system used is discriminating enough to be able to distinguish between millions of individuals. The United Arab Emirates, with a population of just over 5.5 million, are the first to start the process of DNA sampling all of their citizens. They hope that this will prove to be a powerful crime-solving tool, as well as assisting with identifying missing persons and bodies from disasters.

It is wildly optimistic to imagine that a universal DNA database will make serious inroads into the crime rate, particularly when the impact that it may have on crime detection will not be as dramatic as first thought. Presently in the UK, only 17 per cent of crime scenes annually are forensically examined. Of these, only 10 per cent yield a DNA profile. Most crimes do not have 'scenes' as such, or the scene is not one that can be searched productively, or the perpetrators are already known to the police. With such caveats, even a universal DNA database will not be the magic bullet to rid societies of crime.

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The UK has traditionally had the most expansive DNA database, with the DNA of all individuals arrested for recordable offences kept on the UK's National DNA Database. In December 2008, however, the European Court of Human Rights ruled that the UK's 'blanket and indiscriminate' regime for retaining DNA from individuals who were not convicted breached human rights. This necessitated a change to the law, although debate continues over what the change should be. The Crime and Security Act 2010, rushed through parliament before dissolution, aimed to keep DNA profiles of 'innocent' individuals for six years. The rationale is that minor offenders (or in this case, people who have merely been arrested) are often also serious offenders, or will progress in their offending to become serious offenders. If their DNA is put on the database at the outset of their offending, then they can be 'deterred' from further offending, or if not, at least will be easily detected (see McCartney et al., 2010 for details).

Policies that are underpinned by such 'bigger is better' logic, are poorly supported by evidence of effectiveness, and may be seriously flawed. Criminologists will be aware that 'labelling theory' may actually mean that by attaching a label of 'criminal' or 'future offender' to an individual, may impact upon the individual's view of themselves as well as how others treat them, which can make the label a self-fulfilling prophecy. Deterrence arguments remain very difficult to sustain and there are serious civil liberties implications for treating individuals as 'future criminals', or 'pre-suspects' (Lynch et al., 2008). With even universal databases then being limited in their impact, for the ultimate in crime prevention genetic science must go one step further, and enable us to identify criminals prior to their offending, perhaps even prior to their birth.

Finding the criminal 'gene'

The belief that there is a 'gene' for criminality is not new. Indeed, the search for the 'criminal gene' has been a mainstay of criminology since its inception, with Lombroso explicitly stating that criminals were 'born' not made. Genetic studies have mostly taken the form of twin, or sibling, and hereditary studies, which purport to demonstrate how much offending can be attributed to 'nature' or 'nuture'. On the whole, such studies have not proven conclusively that there are 'genetic' explanations for offending. However, the search has now become more sophisticated and scientists are able to search the human genome – using large 'pools' of criminals as subjects – to find the elusive 'crime gene'. There has been some provisional success, at least in locating biological bases that may explain some offending behaviour, though these tend toward neurobiological or biological explanations than specifically a genetic cause, although research continues to look for the interactions between genes, environment, and behaviour (e.g. the discovery of a 'smoking gene' – which makes people pre-disposed to smoke etc. (BBC, 2010)). With the human genome now decoded, and research to find 'genes for…' continuing apace, it may not be too futuristic to consider that before too long, it will be reported that scientists have located a gene that may bear the stigma 'criminal gene', regardless of whether this pre-determines someone will become criminal or not. The media could quite well ignore the superficiality of such an argument, and the complexities of offending, with the necessary interactions between the behaviour, societal reactions, the law etc., required before someone is even considered 'criminal'.

Genetic science as crime fighting tool

There is no denying that DNA has had a dramatic impact upon the criminal justice system, and the potential that remains for genetic science to find new forensic applications. However, the impact on crime rates, and detection rates, has in the main, been exaggerated to date. While DNA has undoubtedly brought many people to justice, some of whom may never have been detected using traditional investigative means, it is far from being our most powerful tool in the fight against crime. Indeed, it is perhaps true to say that its biggest impact has been seen in the US, with the numbers of individuals, many from death row, freed after DNA profiling proved that they were innocent. These exonerations are having a far-reaching impact on the criminal process, highlighting where mistakes are made in an effort to prevent further such atrocities (see www.innocenceproject.org). Forensic DNA has also shone a critical light on other forensic sciences that are now scrutinised for their accuracy and reliability.

DNA, however, remains marginal in most crime investigations (indeed, fingerprints are still more commonly found and used in evidence against offenders). The efforts outlined here, to increase the utility of DNA and the expansionist doctrine with regard to DNA databases, are marred by serious ethical and scientific obstacles. They have yet to be proven, and in some cases are based upon little, if any, evidence. This is not to say that all researchers are chasing unrealistic dreams, and there is potentially scope for greater use of DNA in crime investigation. However, the search for the genetic 'Holy Grail' of using DNA as a way of ridding societies of crime may ultimately be misguided. ■

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